Deutsches Institut für Bautechnik

Public-law institution jointly founded by the federal states and the Federation

European Technical Assessment Body for construction products

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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-ECO Therm Mineral
Product family to which the construction product belongs	Product Area Code: 4 External Thermal Insulation Composite Systems (ETICS) with renderings to be applied as external thermal insulation on the 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	20 pages including 5 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	ETA-07/0158 issued on 19 February 2018

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Specific Part

1 Technical description of the product

This product is an ETICS (External Thermal Insulation Composite System) 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 the ETICS.

The ETICS kit comprises a prefabricated insulation product of mineral wool (MW) to be bonded and if 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 and finishing coat (site applied), the base coat contains reinforcement. The rendering system 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 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.

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-ECO Therm Mineral" 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 normally 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 MW-insulation product - Cross heat of combustion for the MW-insulation product EN ISO 1716 - Apparent density EN 1602	(see annex 2) Class A1 according EN 13501-1 Value [MJ/kg] Value [kg/m³]
Facade fire performance	no performance assessed
Propensity to undergo continuous smouldering of ETICS	no performance assessed

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 Rendering system after 1 hour after 24 hours **MW insulation product after 24 hours**	(see annex 3.1) Mean value [kg/m²] Mean value [kg/m²] Mean value [kg/m²] Mean value [kg/m²] Maximum value 3.0 [kg/m²]	
Water-tightness of the ETICS Hygrothermal behaviour on the test wall	Passed without defects	
Freeze/thaw behaviour of the ETICS	(see annex 3.1) Description	
Impact resistance	(see annex 3.2) Category	
Water vapour permeability - Rendering system	(see annex 3.3) s_d value [m]	
- MW insulation product	μ = 1	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 MW insulation product	(see annex 4.1) - Minimum value/mean value [kPa], rupture type: Initial state (28 d immersion) - Minimum value/mean value [kPa], rupture type: after hygrothermal cycles
between adhesive and substrate	(see annex 4.2) - Thickness [mm] of the used adhesives - Minimum value [kPa], rupture type: Initial state (dry conditions) - Minimum value/mean value [kPa], rupture type: after 2 d immersion in water, 2 h drying - Minimum value/mean value [kPa], rupture type: after 2 d immersion in water, 7 d drying
between adhesive and MW insulation	(see annex 4.3) - Thickness [mm] of the used adhesives - Minimum value [kPa], rupture type: Initial state (dry conditions) - Minimum value/mean value [kPa], rupture type: after 2 d immersion in water, 2 h drying - Minimum value/ mean value [kPa], rupture type: after 2 d immersion in water, 7 d drying
Wind load resistance of ETICS pull-through test of fixing static foam block test	(see annex 4.4) - R_{panel} [kN/fixing], - R_{joint} [kN/fixing], - Plate diameter of anchor ≥ 60 mm, ≥ 90 res. ≥140 mm - plate stiffness ≥ 0.3 kN/mm² - load resistance of the anchor plate ≥ 1.0 kN
Tensile strength perpendicular to the faces in dry conditions MW panel MW panel MW lamella in wet conditions - series 2 - series 3	 $\sigma_{mt} \geq 14$ kPa $\sigma_{mt} \geq 5$ kPa $\sigma_{mt} \geq 80$ kPa ≥ 33 % of mean value value in dry conditions ≥ 50 % of mean value value in dry conditions
Shear strength of the ETICS MW panel $\sigma_{mt} \geq 5$ kPa MW panel $\sigma_{mt} \geq 14$ kPa MW lamella $\sigma_{mt} \geq 80$ kPa	 ≥ 6 kPa ≥ 20 kPa ≥ 20 kPa
Shear modulus of the ETICS MW panel $\sigma_{mt} \geq 5$ kPa MW panel $\sigma_{mt} \geq 14$ kPa MW lamella $\sigma_{mt} \geq 80$ kPa	 ≥ 0,3 MPa ≥ 1,0 MPa ≥ 1,0 MPa

Essential characteristic	Performance
Pull-through resistence of fixings from profiles	not relevant
Render strip tensile test	no performance assessed
Bond strength after ageing finishing coat not tested on the rig	(see annex 4.5) Minimum value/mean value [kPa], rupture type
Tensile strength of the glass fibre mesh in the as-delivered state	(see annex 4.6) Mean value [N/mm]
Residual tensile strength of the glass fibre mesh after aging	(see annex 4.6) Mean value [N/mm]
Relative residual tensile strength of the glass fibre mesh after aging	(see annex 4.6) Mean value [%]
Elongation of the glass fibre mesh in the as-delivered state	(see annex 4.6) Mean value [%]
Elongation of the glass fibre mesh after aging	(see annex 4.6) 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 [(m² ·K)/W]
Thermal transmittance of ETICS	(see annex 5) Calculated value or measurement value U [W/(m² ·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-ECO Therm Mineral"	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+

(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)

(2) Products/materials not covered by footnote (1)

(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)

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 Deutsches Institut für Bautechnik

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beglaubigt:
Klette

Deutsches Institut für Bautechnik DIBt

Annex 1

Composition of the ETICS

	Components (National application documents shall be taken into account)	**Coverage [kg/m²]**	**Thickness [mm]**
Insulation material with associated method of fixing	**Bonded ETICS:** • **Insulation product** factory-prefabricated mineral wool (MW) product - MW lamella	–	≤ 400
	• **Adhesives** (cement based powder requiring addition of about 25 % of water) - **villerit Baukleber VWS 850 grau** - **villerit Baukleber VWS 850 weiß** - **villerit KA-Basic Klebe- und Armierungsmörtel**	4.0 – 6.0 (prepared)	–
	- **villerit InnoTherm** - **villerit activedry Klebe- und Armierungsmörtel**	3.5 – 5.5 (prepared)	–
	Mechanically fixed ETICS with anchors and supplementary adhesive: • Insulation product factory-prefabricated mineral wool (MW) product - MW panel - MW lamella • **Supplementary adhesive** (equal to bonded ETICS) • **Anchors for insulation product** all anchors with ETA according to EAD 330196-00-0604[1]	–	60 to 340 60 to 200
Base coat	**villerit Baukleber VWS 850 grau** **villerit Baukleber VWS 850 weiß** **villerit KA-Basic Klebe- und Armierungsmörtel**	4.5 – 5.7 (prepared)	mean (dry): about 5.0
	villerit InnoTherm **villerit activedry Klebe- und Armierungsmörtel**	4.0 – 7.0 (prepared)	3.0 - 10.0 (dry)
	Identical with the equally named adhesive(s) given above.		
Glass fibre mesh	**villerit Armierungsgewebe fein** Alkali- and slide-resistant glass fibre mesh with mass per unit area of about 160 g/m² and mesh size of about 4.0 mm x 4.0 mm.	–	–
Key coat	**villerit Quarzbrücke** Ready to use pigmented acrylic-resin dispersion liquid For the compatibility with the finishing coats see below.	ca. 0.3 l/m²	–

[1] EAD 330196-00-0604 Plastic anchors for fixing of external thermal insulation composite systems with rendering

	Components (National application documents shall be taken into account)	**Coverage [kg/m²]**	**Thickness [mm]**
Finishing coat	**To use with key coat if applicable:****		
	• Ready to use paste – acrylosiloxane binder:		
	villerit Siliconit K*	2.2 to 5.0	
	villerit Siliconit R* (particle size 1.5 – 2 – 3 and 4 mm)	2.2 to 5.0	
	villerit activedry Siliconit K*	2.2 to 5.0	
	villerit activedry Siliconit R* (particle size 1.5 – 2 – 3 and 4 mm)	2.2 to 5.0	
	Application without key coat:		
	• Ready to use paste – silicate binder:		
	villerit Silan K* (particle size 1.5 – 2 and 3 mm)	2.2 to 4.0	
	villerit Silan R* (particle size 1.5 – 2 – 3 and 4 mm)	2.2 to 5.0	
	villerit activedry Silan K* (particle size 1.5 – 2 and 3 mm)	2.2 to 4.0	
	villerit activedry Silan R* (particle size 1.5 – 2 – 3 and 4 mm)	2.2 to 5.0	
	• Thin layered cement based powder requiring addition of about 27 % of water:		Regulated by particle size
	villerit Rustikalputz (particle size 1.5 – 2 and 3 mm)	2.5 to 3.5 (prepared)	
	villerit -Rauhputz (particle size 1.5 – 2 – 3 – 4 – 5 and 6 mm)	2.2 to 6.6 (prepared)	
	villerit Stockputz (particle size 1.5 – 2 – 3 – 4 – 5 and 6 mm)	2.2 to 6.6 (prepared)	
	villerit activedry Mineralputz M (particle size 1.5 – 2 and 3 mm)	2.5 to 3.5 (prepared)	
	villerit activedry Mineralputz R (particle size 1.5 – 2 – 3 – 4 – 5 and 6 mm)	2.2 to 6.6 (prepared)	
	villerit activedry Mineralputz K (particle size 1.5 – 2 – 3 – 4 – 5 and 6 mm)	2.2 to 6.6 (prepared)	
	villerit Stockputz SLC*** (particle size 1.5 – 2 – 3 – 4 – 5 and 6 mm)	1.5 to 5.0 (prepared)	
	villerit Rauhputz SLC*** (particle size 1.5 – 2 – 3 – 4 – 5 and 6 mm)	1.5 to 5.0 (prepared)	
Ancillary material	Remains the responsibility of the manufacturer.		

* K/R indicates different structures of the finishing coats.

** The instruction to the installer concerning the use of a key coat remains the responsibility of the manufacturer

*** The finishing coats "villerit Stockputz SLC" and "villerit Rauhputz SLC" shall be used only with the base coats "villerit Baukleber VWS 850 grau/weiß" and "villerit KA-Basic Klebe- und Armierungsmörtel"

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	
Mineral wool	In quantity ensuring Euroclass E according to EN 13501-1	no flame retardant	
Anchors	-	-	
Rendering system Base coat with finishing coat and compatible key coat indicated in annex 1			
Silicate based pastes: villerit Silan K/R villerit activedry Silan K/R	max. 4.8 %	no flame retardant	A2 - s2,d0
Cement based powders: villerit Stockputz / Rauhputz / Rustikalputz, villerit activedry Mineralputz K/R/Rustik, villerit Stockputz SLC and villerit Rauhputz SLC associated with a decorative paint	max. 2.5 %	no flame retardant	A2 - s1,d0
Organic based pastes villerit Siliconit K/R villerit activedry Siliconit K/R with key coat villerit Quarzbrücke	max. 9.9 %	no flame retardant	A2 - s1,d0

2.2 Cross heat of combustion for the MW-insulation product EN ISO 1716

PCS ≤ 1,1 MJ/kg

2.3 Apparent density EN 1602

Description and characteristics	MW panels	MW panels	MW lamella
Tensile strength perpendicular to the faces [kPa]; EN 1607 - in dry conditions*	$\sigma_{mt} \geq 14$	$\sigma_{mt} \geq 5$	$\sigma_{mt} \geq 80$
Apparent density [kg/m³]; EN 1602	$120 \leq \rho_a \leq 150$	$80 \leq \rho_a \leq 150$	$80 \leq \rho_a \leq 150$
* Minimum value of all individual values			

Annex 3

Hygiene, health and environment (BWR 3)

3.1 Water absorption (capillarity test)

Base coat	Thickness [mm]	Mean value water absorption [kg/m²]	
		after 1 h	after 24 h
villerit Baukleber VWS 850 grau	5	0.190	0.658
villerit Baukleber VWS 850 weiß	5	0.190	0.658
villerit KA-Basic Klebe- und Armierungsmörtel	4	0.065	0.247
villerit InnoTherm	5	0.071	0.413
villerit activedry Klebe- und Armierungsmörtel	5	0.071	0.413

Rendering system Base coat "villerit Baukleber VWS 850 grau/weiß" and "villerit KA-Basic Klebe- und Armierungsmörtel" with finishing coat and without key coat indicated hereafter	Thickness [mm]	Mean value water absorption [kg/m²]	
		after 1 h	after 24 h
villerit Stockputz	6	0.098	0.628
villerit Rauhputz	6	0.082	0.237
villerit Rustikalputz	3	0.057	0.330
villerit Stockputz SLC	4	0.125	0.413
villerit activedry Mineralputz K	6	0.098	0.628
villerit activedry Mineralputz R	6	0.082	0.237
villerit activedry Mineralputz M	3	0.057	0.330
villerit Rauhputz SLC	4	0.247	0.679
villerit Siliconit	4	0.096	0.828
villerit activedry Siliconit	4	0.096	0.828
villerit Siliconit with villerit Quarzbrücke	4	0.073	1.063
villerit Silan	4	0.030	0.131
villerit activedry Silan	6	0.098	0.628

The water absorption of the rendering system with the base coats “villerit Baukleber VWS 850 grau/weiß” and “villerit KA-Basic Klebe- und Armierungsmörtel” and the finishing coats "villerit Rauhputz", "villerit Rustikalputz", "villerit activedry Mineralputz R", "villerit activedry Mineralputz Rustik" "villerit Stockputz SLC", "villerit Silan" and "villerit activedry Silan" is less than 0.5 kg/m² after 24 hours. The ETICS has therefore been assessed as frost/thaw resistant.

The ETICS with the base coats “villerit Baukleber VWS 850 grau/weiß” alone and these base coats and base coat "villerit KA-Basic Klebe- und Armierungsmörtel" with the finishing coats “villerit Stockputz,” “villerit activedry Mineralputz K,” “villerit Rauhputz SLC,” “villerit Siliconit” and “villerit activedry Siliconit” was assessed as freeze/thaw resistant according to the simulation procedure.

Rendering system Base coat "villerit InnoTherm" and "villerit activedry Klebe- und Armierungsmörtel" with finishing coat and without key coat indicated hereafter	**Thickness [mm]**	**Mean value water absorption [kg/m²]**	
		after 1 h	**after 24 h**
villerit Stockputz	6	0.299	0.803
villerit Rauhputz	6	0.228	0.812
villerit Rustikalputz	3	0.078	0.593
villerit Stockputz SLC	not applicable according to Annex 1		
villerit activedry Mineralputz K	6	0.299	0.803
villerit activedry Mineralputz R	6	0.228	0.812
villerit activedry Mineralputz M	3	0.078	0.593
villerit Rauhputz SLC	not applicable according to Annex 1		
villerit Siliconit	4	0.381	1.148
villerit activedry Siliconit	4	0.381	1.148
villerit Silan	4	0.539	1.223
villerit activedry Silan	4	0.539	1.223

The water absorption of the rendering system with the base coats “villerit InnoTherm” and “villerit activedry Klebe- und Armierungsmörtel” is more than 0.5 kg/m² after 24 hours. The ETICS has therefore been assessed as not frost/thaw resistant.

3.2 Impact resistance

The verified resistance to hard body impact of the ETICS results in the classification into categories listed below.

Rendering system Base coat "villerit Baukleber VWS 850 grau/weiß" and "villerit KA-Basic Klebe- und Armierungsmörtel" with finishing coat and without key coat indicated in annex 1:	**Thickness [mm]**	**Single standard mesh "villerit Armierungsgewebe fein"**
villerit Rauhputz	1.5	Category II
villerit Stockputz	1.5	Category II
villerit Rustikalputz	1.5	Category II
villerit activedry Mineralputz K	1.5	Category II
villerit activedry Mineralputz R	1.5	Category II
villerit activedry Mineralputz M	1.5	Category II
villerit Stockputz SLC	1.5	Category II
villerit Rauhputz SLC	1.5	Category II
villerit Siliconit	1.5	Category II
villerit activedry Siliconit	1.5	Category II
villerit Silan	1.5	Category II
villerit activedry Silan	1.5	Category II
villerit Rauhputz	1.5	Category II

For all other configurations of base coat and finishing coat was no performance assessed.

3.3 Water vapour permeability

Rendering system Base coat "villerit Baukleber VWS 850 grau/weiß" and "villerit KA-Basic Klebe- und Armierungsmörtel" with finishing coat and key coat indicated in annex 1	**Equivalent air thickness s_d**
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 K	≤ 1.0 m (Test result obtained with particle size 3 mm: 0.1 m)
villerit activedry Mineralputz R	≤ 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 Rauhputz SLC	≤ 1.0 m (Test result obtained with particle size 4 mm: 0.1 m)
villerit Stockputz SLC	≤ 1.0 m (Test result obtained with particle size 4 mm: 0.1 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 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 Siliconit with villerit Quarzbrücke	≤ 1.0 m (Test result obtained with particle size 3 mm: 0.2 m)

Rendering system Base coat "villerit InnoTherm" and "villerit activedry Klebe- und Armierungsmörtel" with finishing coat and without key coat indicated in annex 1	**Equivalent air thickness s_d**
villerit Siliconit	≤ 1.0 m (Test result obtained with particle size 4 mm: 0.3 m)
villerit activedry Siliconit	≤ 1.0 m (Test result obtained with particle size 4 mm: 0.3 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 6 mm: 0.1 m)
villerit Rauhputz SLC	not applicable according to Annex 1
villerit Stockputz	≤ 1.0 m (Test result obtained with particle size 6 mm: 0.1 m)
villerit Stockputz SLC	not applicable according to Annex 1
villerit activedry Mineralputz K	≤ 1.0 m (Test result obtained with particle size 6 mm: 0.1 m)
villerit activedry Mineralputz R	≤ 1.0 m (Test result obtained with particle size 6 mm: 0.1 m)
villerit activedry Mineralputz M	≤ 1.0 m (Test result obtained with particle size 3 mm: 0.1 m)
villerit Silan	≤ 1.0 m (Test result obtained with particle size 4 mm: 0.1 m)
villerit activedry Silan	≤ 1.0 m (Test result obtained with particle size 4 mm: 0.1 m)

Annex 4

Safety and accessibility in use (BWR 4)

4.1 Bond strength between base coat and MW lamella

		Rupture type	Conditioning		
			Initial state [kPa]	after 7 d immersion in water [kPa]	after freeze/thaw test
villerit Baukleber VWS 850 grau	Mean value	insulation product	90	87	no performance assessed
	Minimum value		80	81	
villerit Baukleber VWS 850 weiß	Mean value	insulation product	90	87	no performance assessed
	Minimum value		80	81	
villerit KA-Basic Klebe- und Armierungsmörtel	Mean value	insulation product	81	58	Test not required because freeze/thaw cycles not necessary
	Minimum value		79	56	
villerit InnoTherm	Mean value	insulation product	15	14	
	Minimum value		14	13	
villerit activedry Klebe- und Armierungsmörtel	Mean value	insulation product	15	14	
	Minimum value		14	13	

4.2 Bond strength between adhesive and substrate

Substrate: Concrete		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 Baukleber VWS 850 grau	Mean value	adhesive	428	no performance assessed	940
	Minimum value		390		840
villerit Baukleber VWS 850 weiß	Mean value	adhesive	428	no performance assessed	940
	Minimum value		390		840
villerit KA-Basic Klebe- und Armierungsmörtel	Mean value	adhesive	423	316	446
	Minimum value		385	264	416
villerit InnoTherm	Mean value	adhesive	439	129	974
	Minimum value		302	100	827
villerit activedry Klebe- und Armierungsmörtel	Mean value	adhesive	439	129	974
	Minimum value		302	100	827

4.3 Bond strength between adhesive and MW lamella

		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 Baukleber VWS 850 grau	Mean value	insulation product	90	89	93
	Minimum value		80	83	89
villerit Baukleber VWS 850 weiß	Mean value	insulation product	90	89	93
	Minimum value		80	83	89
villerit KA-Basic Klebe- und Armierungsmörtel	Mean value	insulation product	83	57	59
	Minimum value		79	56	55
villerit InnoTherm	Mean value	insulation product	75	77	93
	Minimum value		65	70	91
villerit activedry Klebe- und Armierungsmörtel	Mean value	insulation product	75	77	93
	Minimum value		65	70	91

Minimal bonded surface

S [%] = 0,03 N/mm² x 100 / 0,08 N/mm²

S = 37,5 %

The minimal bonded surface S of bonded ETICS is 50 % (systemic).

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 anchors

Failure loads – table 1

Apply to all anchors listed in the annex 1 mounted on the insulation panels surface			
Characteristics of the **MW panels**	Thickness		≥ 60 mm
	Tensile strength perpendicular to the faces		**≥ 14 kPa**
Plate diameter of anchor			≥ ∅ 60 mm
Failure load [kN/anchor]	Anchors not placed at the panel joints (Static Foam Block Test)	R_{panel}	Minimal: 0.65 Mean value: 0.74
	Anchors placed at the panel joints (Static Foam Block Test)	R_{joint}	Minimal: 0.59 Mean value: 0.61
	Anchors not placed at the panel joints (Pull-through test, dry conditions)	R_{panel}	Minimal: 0.64 Mean value: 0.69
	Anchors not placed at the panel joints (Pull-through test, wet conditions) - series 2* - series 3*	R_{panel}	Minimal: 0.36 Mean value: 0.39 Minimal: 0.41 Mean value: 0.45
* according to EAD 040083-00-0404 clause 2.2.14.2			

Failure loads – table 2

Apply to all anchors listed in the annex 1 mounted on the insulation panels surface				
Characteristics of the **MW panels**	Thickness		≥ 80 mm	
	Tensile strength perpendicular to the faces		**≥ 5 kPa**	
Plate diameter of anchor			≥ ∅ 90 mm	≥ ∅ 140 mm
Failure load [kN/anchor]	Anchors not placed at the panel joints (Static Foam Block Test)	R_{panel}	Minimal: 0.48 Mean value: 0.49	Minimal: 0.56 Mean value: 0.69
	Anchors placed at the panel joints (Static Foam Block Test)	R_{joint}	Minimal: 0.38 Mean value: 0.39	Minimal: 0.44 Mean value: 0.54
	Anchors not placed at the panel joints (Pull-through test, dry conditions)	R_{panel}	Minimal: 0.54 Mean value: 0.61	no performance assessed
	Anchors not placed at the panel joints (Pull-through test, wet conditions) - series 2*	R_{panel}	Minimal: 0.40 Mean value: 0.46	no performance assessed
* according to EAD 040083-00-0404 clause 2.2.14.2				

Failure loads – table 3

Apply to all anchors listed in the annex 1 mounted on the insulation panels surface			
Characteristics of the **MW lamella**	Thickness		≥ 60 mm
	Tensile strength perpendicular to the faces		**≥ 80 kPa**
Plate diameter of anchor			≥ ∅ 140 mm
Failure load [kN/anchor]	Anchors placed at the panel joints (Pull-through test, dry condition)	R_{joint}	Minimal: 0.62 Mean value: 0.66
	Anchors placed at the panel joints (Pull-through test, wet condition)	R_{joint}	Minimal: 0.51 Mean value: 0.57
	Anchors placed at the panel joints (Static Foam Block Test)	R_{joint}	Minimal: 0.71

The failure loads specified Table 1 of Section 4.4.1 apply plate diameter of anchor of 60 mm for the following anchors, even with countersunk installation, only under the following conditions:

Anchor	Thickness of the MW panel [t]	Conditions of installation*
ejotherm STR U ejotherm STR U 2G (ETA-04/0023)	t ≥ 80 mm	– Maximum installation depth of the anchor plate: 15 mm (≙ thickness of insulation cover) – Cutting depth 20 mm
	t ≥ 100 mm	– Maximum installation depth of the anchor plate: 15 mm (≙ thickness of insulation cover) – Cutting depth 35 mm
TERMOZ 8 SV (ETA-06/0180)	t ≥ 80 mm	– Maximum installation depth of the anchor plate: 15 mm (≙ thickness of insulation cover)
* according to the appropriate ETA of anchor		

4.5 Bond strength after aging

Rendering system Base coat "villerit Baukleber VWS 850 grau/weiß" and "villerit KA-Basic Klebe- und Armierungsmörtel" with finishing coat indicated hereafter		**Rupture type**	**7 d immersion in water and 7 d drying [kPa]**
villerit Stockputz	Mean value	insulation product	17
	Minimum value		16
villerit Rauhputz	Mean value	insulation product	16
	Minimum value		15
villerit Rustikalputz	Mean value	insulation product	16
	Minimum value		15
villerit activedry Mineralputz K	Mean value	insulation product	17
	Minimum value		16
villerit activedry Mineralputz R	Mean value	insulation product	16
	Minimum value		15
villerit activedry Mineralputz M	Mean value	insulation product	16
	Minimum value		15
villerit Stockputz SLC	Mean value	insulation product	15
	Minimum value		15
villerit Rauhputz SLC	Mean value	insulation product	15
	Minimum value		15
villerit Siliconit	Mean value	insulation product	15
	Minimum value		15
villerit activedry Siliconit	Mean value	insulation product	15
	Minimum value		15
villerit Silan	Mean value	insulation product	15
	Minimum value		14
villerit activedry Silan	Mean value	insulation product	15
	Minimum value		14

Rendering system Base coat "villerit InnoTherm" and "villerit activedry Klebe- und Armierungsmörtel" with finishing coat indicated hereafter		**Rupture type**	**7 d immersion in water and 7 d drying [kPa]**
villerit Stockputz	Mean value	insulation product	63
	Minimum value		60

For all other configurations was no performance assessed.

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4.6 Reinforcement (glass fibre mesh)

villerit Armierungsgewebe fein	**Mean value warp**	**Mean value 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 (m² ·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 [W/(m² ·K)]
	n:	number of anchors per m²
	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
	χ_p = 0.004 W/K	for anchors with a galvanized steel screw with the head covered by a plastic material
	χ_p = 0.002 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