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European Technical Assessment

ETA-07/0326
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General Part

Technical Assessment Body issuing the
European Technical Assessment:

Deutsches Institut für Bautechnik

Trade name of the construction product

Unio-Plus VWS-System

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 of building walls

Manufacturer

HORNBACH Baustoff Union GmbH
Le Quartier Hornbach 11
67433 Neustadt an der Weinstraße
DEUTSCHLAND

Manufacturing plant

HORNBACH Baustoff Union GmbH
Le Quartier Hornbach 11
67433 Neustadt an der Weinstraße

This European Technical Assessment
contains

20 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

ETA-07/0326 issued on 23 June 2017

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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 additionally 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 "Unio-Plus VWS-System" 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]
Facade fire performance	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 EPS insulation after 24 hours	(see annex 3.1) Mean value [kg/m ²] Mean value [kg/m ²] Mean value [kg/m ²] Mean value [kg/m ²] 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 is less than 0.5 kg/m ² after 24 hours for all configurations of the ETICS. The ETICS is so assessed as free/thaw resistant.
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
<p>Bond strength between base coat and EPS insulation</p> <p>between adhesive and substrate</p> <p>between adhesive and EPS insulation</p>	<p>(see annex 4.1)</p> <ul style="list-style-type: none"> - Minimum value/Mean value [kPa], rupture type: Initial state (28 d immersion) - Minimum value/Mean value [kPa], rupture type: after hygrothermal cycles <p>(see annex 4.2)</p> <ul style="list-style-type: none"> - Thickness [mm] of the used adhesives - Minimum value/Mean 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 <p>(see annex 4.3)</p> <ul style="list-style-type: none"> - 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
Fixing strength (displacement test)	Test not required therefore no limitation of ETICS length required
<p>Wind load resistance of ETICS pull-through test of fixing static foam block test</p> <p>dynamic wind uplift test</p>	<p>(see annex 4.4)</p> <ul style="list-style-type: none"> - R_{panel} [N/fixing], - R_{joint} [N/fixing], - Plate diameter of anchor ≥ 60 mm, ≥ 90 mm - plate stiffness ≥ 0.3 kN/mm² - load resistance of the anchor plate ≥ 1.0 kN <p>not applicable</p>
<p>Tensile strength perpendicular to the faces in dry conditions standard EPS</p> <p>elastified EPS</p>	<p>$\sigma_{\text{mt}} \geq 80$ kPa (bonded ETICS)</p> <p>$\sigma_{\text{mt}} \geq 100$ kPa (bonded ETICS with anchors)</p> <p>$\sigma_{\text{mt}} \geq 150$ kPa (bonded ETICS with profiles)</p> <p>$\sigma_{\text{mt}} \geq 80$ kPa (bonded or bonded ETICS with anchors)</p>
<p>Shear modulus of the ETCS standard EPS</p> <p>elastified EPS</p>	<p>$1.0 \leq G_m \leq 3.8$ [MPa]</p> <p>$0.3 \leq G_m \leq 1.0$ [MPa]</p>
Pull-through resistance of fixings from profiles	≥ 0.5 kN

Essential characteristic	Performance
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) Minimum value/Mean value [kPa], rupture type Minimum 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 [$(m^2 \cdot K)/W$]
thermal transmittance of ETICS	(see annex 5) Calculated value or measurement value U [$W/(m^2 \cdot K)$]

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
"Unio-Plus VWS-System"	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 by Deutsches Institut für Bautechnik

Anja Rogsch
Head of Section

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 - elastified EPS • Adhesives <ul style="list-style-type: none"> - Unio-Plus Klebe- und Armierungsmörtel grau (cement based powder requiring addition of about 25 % of water) - Unio-Plus Klebe- und Armierungsmörtel weiß (cement based powder requiring addition of about 25 % of water) - Unio-Plus Klebe- und Armierungsmörtel MG II (cement based powder requiring addition of about 25 % of water) - Unio-Plus WDVS-Spachtel (organic based ready to use paste) 	<p>–</p> <p>–</p> <p>4.0 to 6.0</p> <p>4.0 to 6.0</p> <p>4.0 to 6.0 (prepared)</p> <p>3.0 to 4.0 (prepared)</p>	<p>≤ 400</p> <p>≤ 200</p> <p>–</p> <p>–</p> <p>–</p> <p>–</p>
	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"> - "Unio-Plus Halteleiste PVC" and - "Unio-Plus Verbindungsleiste PVC" Polyvinyl chloride (PVC) profiles • Anchors for profiles <ul style="list-style-type: none"> - WS 8 L, WS 8 N - ejothem SDK U, ejothem NK U - SDF-K plus 	<p>–</p>	<p>60 to 200</p>
Base coat	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 - elastified EPS • Supplementary adhesive (equal to bonded ETICS) • Anchors for insulation product all anchors with ETA according to EAD 330196-01-0604¹ 	<p>–</p> <p>–</p>	<p>60 to 400</p> <p>60 to 200</p>
	<ul style="list-style-type: none"> Unio-Plus Klebe- und Armierungsmörtel grau Unio-Plus Klebe- und Armierungsmörtel weiß Identical with the equally named adhesives given above.	<p>4.5 to 7.5</p> <p>4.5 to 7.5</p>	<p>3.0 to 5.0</p> <p>3.0 to 5.0</p>

¹ EAD 330196-01-0604 Plastic anchors made of virgin or non-virgin material for fixing of external insulation composite systems with rendering

Annex 2

Safety in case of fire (BWR 2)

2.1 Reaction to fire

Configurations	Organic content	Flame retardant content	Class according to EN 13501-1
Base coat	max. 2.1 %	no flame retardant	
EPS insulation product	In quantity ensuring Class E according to EN 13501-1	In quantity ensuring Class E according to EN 13501-1	
Profile	-	-	
Anchors	-	-	
rendering system: Base coat with finishing coat and compatible key coat indicated in annex 1:			
Unio-Plus Kratzputz Perfekt Unio-Plus Münchner Rauhputz Super Unio-Plus Scheibenputz Unio-Plus Marmorputz Unio-Plus Strukturalputz L with Unio-Plus Edelputzgrundierung	max. 1.2 %	no flame retardant	B – s1,do
Unio-Plus Kunstharzputz Unio-Plus Silikonharzputz Unio-Plus Siloxanputz with Unio-Plus Edelputzgrundierung Unio-Plus Silikatputz with Unio-Plus Silikat-Putzgrund	max. 7.5 %	min. 3 %	

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 value water absorption [kg/m ²]	
		after 1h	after 1h
Unio-Plus Klebe- und Armierungsmörtel grau	5	0.02	0.19
Unio-Plus Klebe- und Armierungsmörtel weiß	5	0.01	0.14

Rendering system Base coats "Unio-Plus Klebe- und Armierungsmörtel grau" or "Unio-Plus Klebe- und Armierungsmörtel weiß" with finishing coat and key coat indicated hereafter	Thickness [mm]	Mean value water absorption [kg/m ²]	
		after 1h	after 1h
Unio-Plus Kratzputz Perfekt with Unio-Plus Edelputzgrundierung	10	0.07	0.21
Unio-Plus Münchner Rauputz Super with Unio-Plus Edelputzgrundierung	3	0.07	0.42
Unio-Plus Scheibenputz with Unio-Plus Edelputzgrundierung	3	0.04	0.36
Unio-Plus Marmorputz with Unio-Plus Edelputzgrundierung	2.5	0.04	0.27
Unio-Plus Strukturalputz L with Unio-Plus Edelputzgrundierung	3	0.06	0.44
Unio-Plus Kunstharzputz with Unio-Plus Edelputzgrundierung	2	0.04	0.33
Unio-Plus Silikonharzputz with Unio-Plus Edelputzgrundierung	2	0.01	0.17
Unio-Plus Siloxanputz with Unio-Plus Edelputzgrundierung	2	0.05	0.34
Unio-Plus Silikatputz with Unio-Plus Silikat-Putzgrund	2	0.02	0.30

3.2 Impact resistance

Rendering system: Base coats "Unio-Plus Klebe- und Armierungsmörtel grau" or "Unio-Plus Klebe- und Armierungsmörtel weiß" with finishing coat and key coat indicated hereafter	Single-layered glass fibre mesh "Unio-Plus Armierungsgewebe F"
Unio-Plus Kratzputz Perfekt with Unio-Plus Edelputzgrundierung	Category II
Unio-Plus Münchener Rauputz Super with Unio-Plus Edelputzgrundierung	Category II
Unio-Plus Scheibenputz with Unio-Plus Edelputzgrundierung	Category II
Unio-Plus Marmorputz with Unio-Plus Edelputzgrundierung	Category II
Unio-Plus Strukturalputz L with Unio-Plus Edelputzgrundierung	Category II
Unio-Plus Kunstharzputz with Unio-Plus Edelputzgrundierung	Category II
Unio-Plus Silikonharzputz with Unio-Plus Edelputzgrundierung	Category II
Unio-Plus Siloxanputz with Unio-Plus Edelputzgrundierung	Category II
Unio-Plus Silikatputz with Unio-Plus Silikat-Putzgrund	Category II

3.3 Water vapour permeability

Rendering system Base coats "Unio-Plus Klebe- und Armierungsmörtel grau" with finishing coat and key coat indicated hereafter	Equivalent air thickness s_d (Result determined with a layer thickness of 5 mm for the base coat)
Unio-Plus Kratzputz Perfekt with Unio-Plus Edelputzgrundierung	≤ 1.0 m (Test result obtained with particle size 3 mm: 0.1 m)
Unio-Plus Münchner Rauputz Super with Unio-Plus Edelputzgrundierung	≤ 1.0 m (Test result obtained with particle size 3 mm: 0.1 m)
Unio-Plus Scheibenputz with Unio-Plus Edelputzgrundierung	≤ 1.0 m (Test result obtained with particle size 3 mm: 0.1 m)
Unio-Plus Marmorputz with Unio-Plus Edelputzgrundierung	≤ 1.0 m (Test result obtained with particle size 2.5 mm: 0.1 m)
Unio-Plus Strukturalputz L with Unio-Plus Edelputzgrundierung	≤ 1.0 m (Test result obtained with particle size 3 mm: 0.1 m)
Unio-Plus Kunstharzputz with Unio-Plus Edelputzgrundierung	≤ 1.0 m (Test result obtained with particle size 2 mm: 0.4 m)
Unio-Plus Silikonharzputz with Unio-Plus Edelputzgrundierung	≤ 1.0 m (Test result obtained with particle size 2 mm: 0.2 m)
Unio-Plus Siloxanputz with Unio-Plus Edelputzgrundierung	≤ 1.0 m (Test result obtained with particle size 2 mm: 0.2 m)
Unio-Plus Silikatputz with Unio-Plus Silikat-Putzgrund	≤ 1.0 m (Test result obtained with particle size 2 mm: 0.1 m)

Rendering system Base coats "Unio-Plus Klebe- und Armierungsmörtel weiß" with finishing coat and key coat indicated hereafter	Equivalent air thickness s_d (Result determined with a layer thickness of 5 mm for the base coat)
Unio-Plus Münchner Rauputz Super with Unio-Plus Edelputzgrundierung	≤ 1.0 m (Test result obtained with particle size 3 mm: 0.3 m)
Unio-Plus Siloxanputz with Unio-Plus Edelputzgrundierung	≤ 1.0 m (Test result obtained with particle size 2 mm: 0.1 m)

No performance determined for all other combinations.

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
Unio-Plus Klebe- und Armierungsmörtel grau	Mean value	insulation material	153	148	Test not required because freeze/thaw cycles not necessary
	Minimum value		148	120	
Unio-Plus Klebe- und Armierungsmörtel weiß	Mean value	insulation material	137	no performance assessed	
	Minimum value		127		

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]
Unio-Plus Klebe- und Armierungsmörtel grau	Mean value	in adhesive	530	599	646
	Minimum value		437	536	520
Unio-Plus Klebe- und Armierungsmörtel weiß	Mean value	in adhesive	575	433	1029
	Minimum value		479	357	764
Unio-Plus WDVS-Spachtel	Mean value	in adhesive	535	83	790
	Minimum value		474	71	606
Unio-Plus Klebe- und Armierungsmörtel MG II	Mean value	in adhesive	373	178	1062
	Minimum value		326	163	978

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]
Unio-Plus Klebe- und Armierungsmörtel grau	Mean value	insulation material	153	72	128
	Minimum value		148	58	117
Unio-Plus Klebe- und Armierungsmörtel weiß	Mean value	insulation material	137	88	100
	Minimum value		127	71	87
Unio-Plus WDVS-Spachtel	Mean value	insulation material	145	58	128
	Minimum value		127	36	112
Unio-Plus Klebe- und Armierungsmörtel MG II	Mean value	insulation material	118	79	159
	Minimum value		102	71	153

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 %.

English translation prepared by DIBt

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 value: 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			∅ 60 mm	∅ 90 mm
Failure loads [N]	Anchors not placed at the panel joints (Static Foam Block Test)	R_{panel}	Minimal: 510 Mean value: 520	Minimal: 720 Mean value: 730
	Anchors placed at the panel joints (Pull-through test)	R_{joint}	Minimal: 400 Mean value: 430	Minimal: 430 Mean value: 470

Apply to all anchors listed in the annex 1 mounted on the insulation panels surface			
Characteristics of the EPS (elastified EPS)	Thickness		≥ 60 mm
	Tensile strength perpendicular to the faces		≥ 80 kPa
	Shear modulus		≥ 0.3 N/mm ²
Plate diameter of anchor			∅ 60 mm
Failure loads [N]	Anchors not placed at the panel joints (Static Foam Block Test)	R_{panel}	Minimal: 350 Mean value: 360
	Anchors placed at the panel joints (Pull-through test)	R_{joint}	Minimal: 300 Mean value: 310

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 (for standard and elastified EPS)	– Maximum installation depth of the anchor plate: 15 mm (\triangleq thickness of insulation cover) – Incision depth: 20 mm
	≥ 100 mm (for standard and elastified EPS)	– Maximum installation depth of the anchor plate: 15 mm (\triangleq thickness of insulation cover) – Incision depth: 35 mm
TERMOZ 8 SV (ETA-06/0180)	≥ 80 mm (for standard EPS only)	– Maximum installation depth of the anchor plate: 15 mm (\triangleq thickness of insulation cover)
* according to the appropriate ETA of anchor		

4.5 Render strip tensile test

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

Base coat "Unio-Plus Klebe- und Armierungsmörtel grau" with glass fibre mesh indicated hereafter	Mean value of crack width $w_{m(1\%)}$
"Unio-Plus Armierungsgewebe F"	0.18 mm

For the base coat "Unio-Plus Klebe- und Armierungsmörtel weiß" was no performance assessed.

4.6 Bond strength after ageing

Rendering system Base coats "Unio-Plus Klebe- und Armierungsmörtel grau" with finishing coat indicated hereafter		Rupture Type	after hygro-thermal cycles [kPa]	7 d immersion in water and 7 d drying [kPa]
Unio-Plus Münchner Rauputz Super with Unio-Plus Edelputzgrundierung	Mean value	insulation material		112
	Minimum value			76
Unio-Plus Scheibenputz with Unio-Plus Edelputzgrundierung	Mean value	insulation material	148	
	Minimum value		130	
Unio-Plus Marmorputz with Unio-Plus Edelputzgrundierung	Mean value	insulation material		103
	Minimum value			92
Unio-Plus Strukturalputz L with Unio-Plus Edelputzgrundierung	Mean value	insulation material	146	
	Minimum value		130	
Unio-Plus Kratzputz Perfekt with Unio-Plus Edelputzgrundierung	Mean value	insulation material	156	
	Minimum value		130	
Unio-Plus Silikonharzputz with Unio-Plus Edelputzgrundierung	Mean value	insulation material		142
	Minimum value			122
Unio-Plus Siloxanputz with Unio-Plus Edelputzgrundierung	Mean value	no performance assessed		
	Minimum value			
Unio-Plus Kunstharzputz with Unio-Plus Edelputzgrundierung	Mean value	insulation material		129
	Minimum value			107
Unio-Plus Silikatputz with Unio-Plus Silikat-Putzgrund	Mean value	insulation material	144	
	Minimum value		120	

4.7 Reinforcement (glass fibre mesh)

"Unio-Plus Armierungsgewebe F"	Mean value warp	Mean value weft
Tensile strength in as-delivered state	≥ 48 N/mm	≥ 50 N/mm
Residual tensile strength after aging	≥ 33 N/mm	≥ 38 N/mm
Relative residual tensile strength after aging	≥ 50 %	≥ 50 %
Elongation in as-delivered state	3.9 %	4.0 %
Elongation after aging	2.9 %	3.0 %

Annex 5

Energy economy and heat retention (BWR 6)

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.

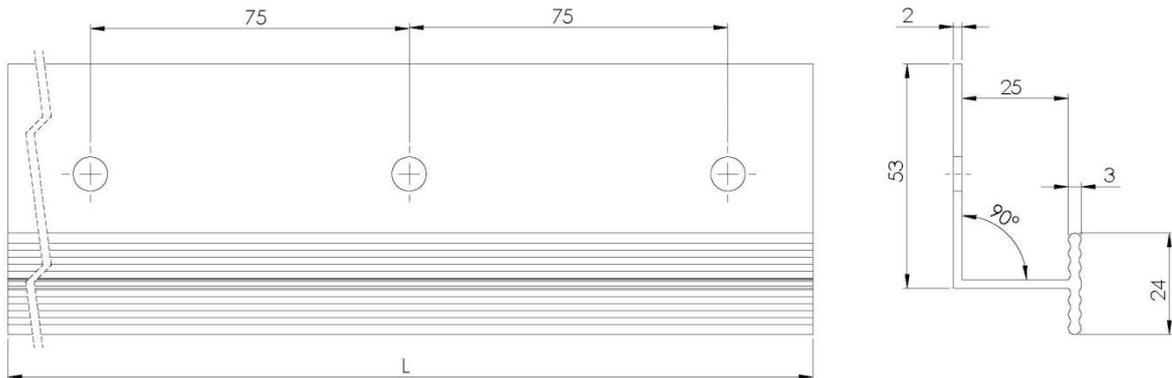
Annex 6

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 – "Unio-Plus Halteleiste PVC" (dimensions in millimetres)



Vertical connection profile – "Unio-Plus Verbindungsleiste PVC" (dimensions in millimetres)

