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and types of construction

Bautechnisches Prüfamt

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European Technical Assessment

ETA-12/0533
of 3 April 2024

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General Part

Technical Assessment Body issuing the
European Technical Assessment:

Deutsches Institut für Bautechnik

Trade name of the construction product

StoTherm Classic 10 MW/MW-L

Product family
to which the construction product belongs

External Thermal Insulation Composite System with
rendering for the use as external insulation of building
walls

Manufacturer

Sto SE & Co. KGaA
Ehrenbachstraße 1
79780 Stühlingen
DEUTSCHLAND

Manufacturing plant

Sto Aktiengesellschaft
Ehrenbachstraße 1
79780 Stühlingen
DEUTSCHLAND

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

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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 is comprised a prefabricated insulation product of mineral wool (MW) to be bonded and if necessary additional mechanically fixed onto a wall. The walls are made of masonry (bricks, blocks, stones...) or concrete (cast on site or as prefabricated panels). The methods of fixing and the relevant components are specified in annex 1 below.

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 "StoTherm Classic 10 MW/MW-L" 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 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) Euroclass according to EN 13501-1
Reaction to fire of the MW insulation product <ul style="list-style-type: none"> - Cross heat of combustion for the MW insulation product EN ISO 1716 - Apparent density EN 1602 	(see annex 2) Euroclass A1 according EN 13501-1 Value [MJ/kg] Value [kg/m ³]
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	(see annex 3.1) Average [kg/m ²] Average [kg/m ²]
Rendering system after 1 hour after 24 hours	Average [kg/m ²] Average [kg/m ²]
MW insulation product after 24 hours	Maximum value 3.0 kg/m ²
Water-tightness of the ETICS Hygrothermal behaviour on the test wall	Pass 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. The ETICS is so assessed as free/thaw resistant.
Impact resistance	(see annex 3.2) Category
Water vapour permeability - Rendering system - MW insulation product	(see annex 3.3) s _d value [m] μ = 1 Thickness of the insulation product 340 mm

3.3 Safety and accessibility in use (BWR 4)

Essential characteristic	Performance
<p>Bond strength</p> <p>between base coat and MW insulation product</p> <p>between adhesive and substrate</p> <p>between adhesive and MW insulation</p>	<p>(see annex 4.1)</p> <ul style="list-style-type: none"> - Minimal value/average [kPa] - Minimal value/average [kPa] <p>(see annex 4.2)</p> <ul style="list-style-type: none"> - Thickness [mm] of the used adhesives - Minimal value [kPa], rupture type: Initial state (dry conditions) - Minimal value/average [kPa], rupture type: after 2 d immersion in water, 2 h drying - Minimal value/average [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 - Minimal value [kPa], rupture type: Initial state (dry conditions) - Minimal value/average [kPa], rupture type: after 2 d immersion in water, 2 h drying - Minimal value/average [kPa], rupture type: after 2 d immersion in water, 7 d drying
<p>Fixing strength (displacement test)</p>	<p>Test not required therefore no limitation of ETICS length required.</p>
<p>Wind load resistance of ETICS</p> <p>pull-through test of fixing</p> <p>static foam block test</p>	<p>(see annex 4.4)</p> <ul style="list-style-type: none"> - R_{panel} [kN/fixing], - R_{joint} [kN/fixing], - Plate diameter of anchor ≥ 60 mm, ≥ 90 mm res. ≥ 140 mm - plate stiffness ≥ 0.3 kN/mm² - load resistance of the anchor plate ≥ 1.0 kN
<p>Tensile strength perpendicular to the faces</p> <p>in dry conditions</p> <p>MW panel, MW panel</p> <p>MW lamella</p> <p>in wet conditions</p> <ul style="list-style-type: none"> - series 2 - series 3 	<p>$\sigma_{\text{mt}} \geq 14$ kPa, $\sigma_{\text{mt}} \geq 5$ kPa (mechanically fixed ETICS with supplementary adhesive)</p> <p>$\sigma_{\text{mt}} \geq 80$ kPa (bonded ETICS)</p> <p>≥ 33 % of average value in dry conditions ≥ 50 % of average value in dry conditions</p>

Essential characteristic	Performance
Shear strength of the ETICS MW panel $\sigma_{mt} \geq 14$ kPa MW lamella $\sigma_{mt} \geq 80$ kPa MW panel $\sigma_{mt} \geq 5$ kPa	≥ 20 kPa ≥ 20 kPa ≥ 6 kPa
Shear modulus of the ETICS MW panel $\sigma_{mt} \geq 14$ kPa MW lamella $\sigma_{mt} \geq 80$ kPa MW panel $\sigma_{mt} \geq 5$ kPa	≥ 1.0 MPa ≥ 1.0 MPa ≥ 0.3 MPa
Render strip tensile test	(see annex 4.5) Crack width w_{rk} [m]
Bond strength after ageing finishing coat tested on the rig finishing coat not tested on the rig	(see annex 4.6) Minimal value/average [kPa] Minimal value/average [kPa]
Tensile strength of the glass fibre mesh in the as-delivered state	see annex 4.7) Average [N/mm]
Residual tensile strength of the glass fibre mesh after aging	see annex 4.7) Average [N/mm]
Relative residual tensile strength of the glass fibre mesh after aging	see annex 4.7) Average [%]
Elongation of the glass fibre mesh in the as-delivered state	see annex 4.7) Average [%]
Elongation of the glass fibre mesh after aging	(see annex 4.7) Average [%]

3.4 Protection against noise (BWR 5)

Essential characteristic	Performance
Airborne sound insulation of ETICS	no performance assessed
Dynamic stiffness of the MW insulation product	no performance assessed
Air flow resistance of the MW 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
"StoTherm Classic 10 MW/MW-L"	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 3 April 2024 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	<p>Bonded ETICS:</p> <ul style="list-style-type: none"> • Insulation product factory-prefabricated mineral wool (MW) product* - MW lamella • Adhesives <ul style="list-style-type: none"> - Sto-Baukleber (cement based powder requiring addition of 22 – 26 % of water) - StoLevell Uni (cement based powder requiring addition of 20 – 23 % of water) - StoLevell Duo Plus (cement based powder requiring addition of about 25 % of water) - StoLevell FT (cement based powder requiring addition of about 28 % of water) - StoLevell Duo (cement based powder requiring addition of 20 – 25 % of water) - StoLevell Duo plus QS (cement based powder requiring addition of 20 – 25 % of water) - StoLevell Alpha (cement based powder requiring addition of 25 – 28 % of water) - StoLevell Novo (cement based powder requiring addition of 37 % of water) - StoColl Mineral HP (cement based powder requiring addition of 23 – 25 % of water) - StoColl IP (cement based powder requiring addition of 20 % of water) 	<p>–</p> <p>3.0 to 7.5 (powder)</p> <p>3.0 to 7.5 (powder)</p> <p>3.0 to 7.5 (powder)</p> <p>3.0 to 7.5 (powder)</p> <p>3.0 to 7.5 (powder)</p> <p>3.0 to 7.5 (powder)</p> <p>3.0 to 7.5 (powder)</p> <p>3.0 to 7.5 (powder)</p> <p>3.0 to 7.5 (powder)</p> <p>4.0 to 5.0 (powder)</p>	<p>≤ 200</p> <p>–</p> <p>–</p> <p>–</p> <p>–</p> <p>–</p> <p>–</p> <p>–</p> <p>–</p> <p>–</p>
Insulation material with associated method of fixing	<p>Mechanically fixed ETICS with anchors and supplementary adhesive:</p> <ul style="list-style-type: none"> • 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 330196-01-0604¹ 	<p>–</p>	<p>60 to 340 60 to 200</p>

¹

EAD 330196-01-0604

Plastic anchors made of virgin or non-virgin material for fixing of external thermal insulation composite systems with rendering (and previous versions)

	Components National application documents shall be taken into account	Coverage [kg/m ²]	Thickness [mm]
Base coat	StoArmat Classic S1 ready to use paste (cement free) consisting of a terpolymer binder, silicat particles, fibres and specific additives.	5.5 to 10.0	3.0 to 5.0
Glass fibre Mesh	Sto-Glasfasergewebe Alkali- and slide-resistant glass fibre mesh with mass per unit area of about 165 g/m ² and mesh size of about 6.0 mm x 6.0 mm.	–	–
	Sto-Glasfasergewebe F Alkali- and slide-resistant glass fibre mesh with mass per unit area of about 165 g/m ² and mesh size of about 4.0 mm x 4.0 mm.	–	–
	Sto-Panzerewebe (reinforced mesh implemented in addition to the meshes described above to improve the impact resistance) Alkali- and slide-resistant glass fibre mesh with mass per unit area of about 450 g/m ² and mesh size of about 7.5 mm x 7.5 mm.	–	–
Key coat	Sto-Putzgrund Ready to use pigmented acrylic-resin dispersion liquids For the compatibility with the finishing coats see below.	about 0.3 l/m ²	–
Finishing coat	To use with key coat "Sto-Putzgrund", if applicable:** <ul style="list-style-type: none"> • Ready to use pastes – acrylic binder: <ul style="list-style-type: none"> Stolit K (particle size 1.0 to 6.0 mm) Stolit R (particle size 1.0 to 6.0 mm) Stolit Effect (particle size 3.0 mm) Stolit MP (thin, middle or thick layered) • Ready to use pastes – acrylic/siloxane binder: <ul style="list-style-type: none"> StoSilco K (particle size 1.0 to 3.0 mm) StoSilco R (particle size 1.0 to 3.0 mm) StoSilco MP (thin, middle or thick layered) StoSilco blue K (particle size 1.0 to 3.0 mm) StoSilco blue MP (thin, middle or thick layered) • Ready to use pastes – acrylic binder: <ul style="list-style-type: none"> StoLotusan K (particle size 1.0 to 3.0 mm) StoLotusan MP (thin, middle or thick layered) 	1.8 to 6.0 1.8 to 6.0 3.5 to 5.5 1.5 to 4.0 1.8 to 4.3 1.8 to 4.3 1.5 to 4.0 1.6 to 4.6 1.5 to 4.0 1.8 to 4.3 1.5 to 4.0	} regulated by particle size 1.0 to 3.0 } regulated by particle size 1.0 to 3.0 regulated by particle size 1.0 to 3.0 regulated by particle size 1.0 to 3.0

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. 8.4 %	min. 45.0 %	
Mineral wool insulation product	Euroclass A1 according to EN 13501-1	no flame retardant	
Anchors	-	-	
Rendering system: Base coat with finishing coat and compatible key coat indicated in annex 1:			
Stolit K/R (particle size 1.0 to 3.0 mm) Stolit Effect	max. 9.6 %	min. 8.0 %	A2 - s1,d0
Stolit MP		min. 8.0 %	
StoSilco K/R/MP		min. 7.7 %	
StoSilco blue K/MP		min. 8.0 %	
StoLotusan K/MP		min. 11.6 %	A2 - s2,d0
Stolit QS K		min. 9.4 %	
Stolit QS R/MP		min. 9.4 %	
StoSilco QS K		min. 9.4 %	
StoSilco QS R/MP		min. 9.4 %	B - s2,d0
Stolit K/R (particle size 3.5 to 6.0 mm)		min. 8.0 %	

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

PCS ≤ 1.02 MJ/kg

2.3 Apparent density EN 1602

Description and characteristics	MW panel	MW panel	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/m ³]; EN 1602	$120 \leq \rho_a \leq 150$	$100 \leq \rho_a \leq 150$	$80 \leq \rho_a \leq 150$
* Minimal value of all single values			

Annex 3

Hygiene, health and environment (BWR 3)

3.1 Water absorption (capillarity test)

Base coat:

Base coat	Thickness	Average water absorption [kg/m ²]	
		after 1 h	after 24 h
StoArmat Classic S1	3 – 4 mm	0.008	0.132

Rendering system:

Finishing coat with base coat "StoArmat Classic S1" indicated hereafter	Average water absorption [kg/m ²]	
	after 1 h	after 24 h
Stolit K/R/Effect/MP	0.037	0.209
StoSilco K/R/MP	0.057	0.461
StoSilco blue K/MP	0.028	0.260
StoLotusan K/MP	0.017	0.088
Stolit QS K/R/MP	0.013	0.252
StoSilco QS K/R/MP	0.034	0.228

3.2 Impact resistance

Standard mesh: "Sto-Glasfasergewebe" or "Sto-Glasfasergewebe F"

Rendering system: Base coat "StoArmat Classic S1" with finishing coat indicated hereafter:	two-part mesh: Sto-Glasfasergewebe [Category]	Standard mesh with Sto- Panzergewebe [Category]
Stolit K/R/Effect/MP	II	I
StoSilco K/R/MP	II	I
StoSilco blue K/MP	no performance assessed	
StoLotusan K/MP	II	I
Stolit QS K/R/MP	no performance assessed	
StoSilco QS K/R/MP	I	no performance assessed

3.3 Water vapour permeability ETICS

Equivalent air thickness s_d [m]			Calculated Equivalent air thickness s_d [m]	
Base coat:				
"StoArmat Classic S1"	0.26 m			
Rendering system:				
Finishing coat		Decorative coat	of the system	
Stolit K/R/MP/Effect	0.31 m	StoColor Silco / G	0.08 m	0.65
		StoColor Silco Variant / G	0.10 m	0.67
		StoColor Jumbosil	0.13 m	0.70
		StoColor Lotusan / G	0.03 m	0.60
StoSilco K/R/MP	0.21 m	StoColor Silco / G	0.08 m	0.55
		StoColor Silco Variant / G	0.10 m	0.57
		StoColor Jumbosil	0.13 m	0.60
		StoColor Lotusan / G	0.03 m	0.50
StoSilco blue K/MP	0.71 m	StoColor Silco / G	0.08 m	1.05
		StoColor Silco Variant / G	0.10 m	1.07
		StoColor Jumbosil	0.13 m	1.10
		StoColor Lotusan / G	0.03 m	1.00
StoLotusan K/MP	0.11 m	StoColor Silco / G	0.08 m	0.45
		StoColor Silco Variant / G	0.10 m	0.47
		StoColor Jumbosil	0.13 m	0.50
		StoColor Lotusan / G	0.03 m	0.40
Stolit QS K/R/MP	0.21	StoColor Silco / G	0.08 m	0.55
		StoColor Silco Variant / G	0.10 m	0.57
		StoColor Jumbosil	0.13 m	0.60
		StoColor Lotusan / G	0.03 m	0.50
StoSilco QS K/R/MP	0.41	StoColor Silco / G	0.08 m	0.75
		StoColor Silco Variant / G	0.10 m	0.77
		StoColor Jumbosil	0.13 m	0.80
		StoColor Lotusan / G	0.03 m	0.70

Annex 4

Safety and accessibility in use (BWR 4)

4.1 Bond strength between base coat and MW lamella

		Conditioning		
		Initial state [kPa]	After hygrothermal cycles [kPa]	After freeze/thaw test
StoArmat Classic S1	Average	91	56*	Test not required because freeze/thaw cycles not necessary
	Minimal value	83	47*	
* < 80 kPa, but failure in the insulation product				

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]
StoLevell FT (5 mm)	Average	in adhesive	1233	369	1157
	Minimal value		784	299	1026
StoLevell Duo Plus (5 mm)	Average	in adhesive	1230	583	2020
	Minimal value		1166	501	1893
Sto-Baukleber (5 mm)	Average	in adhesive	1210	1150	1620
	Minimal value		930	970	1210
StoLevell Uni (5 mm)	Average	in adhesive	1793	637	2560
	Minimal value		1586	467	2489
StoLevell Duo plus QS (5 mm)	Average	in adhesive	1264	523	2001
	Minimal value		961	341	1691
StoLevell Novo (5 mm)	Average	in adhesive	793	405	1059
	Minimal value		733	327	947
StoLevell Duo (5 mm)	Average	in adhesive	2178	1133	2554
	Minimal value		2066	989	2339
StoLevell Alpha (5 mm)	Average	in adhesive	2178	1133	2554
	Minimal value		2066	989	2339
StoColl Mineral HP (5 mm)	Average	in adhesive	2080	1840	1790
	Minimal value		1927	1732	1732
StoColl IP (3 – 5 mm)	Average	in adhesive	1565	975	1830
	Minimal value		1407	577	1738

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]
StoLevell FT (3 – 5 mm)	Average	in insulation product	86	64	68*
	Minimal value		73*	57	56*
StoLevell Duo Plus (3 – 5 mm)	Average	in insulation product	91	74	92
	Minimal value		85	67	80
Sto-Baukleber (3 – 5 mm)	Average	in insulation product	102	92	78
	Minimal value		91	81	70*
StoLevell Uni (3 – 5 mm)	Average	in insulation product	87	60	81
	Minimal value		77*	55	78*
StoLevell Duo plus QS (3 – 5 mm)	Average	in insulation product	68	64	68
	Minimal value		63	58	64
StoLevell Novo (3 – 5 mm)	Average	in insulation product	81	41	80
	Minimal value		75*	34	72*
StoLevell Duo (3 – 5 mm)	Average	in insulation product	130	135	125
	Minimal value		108	121	111
StoLevell Alpha (3 – 5 mm)	Average	in insulation product	110	95	100
	Minimal value		102	85	87
StoColl Mineral HP (3 – 5 mm)	Average	in insulation product	140	110	110
	Minimal value		128	106	101
StoColl IP (3 – 5 mm)	Average	in insulation product	105	85	105
	Minimal value		971	776	945

* < 80 kPa but failure in thermal insulation material

Minimal bonded surface area

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

$$S = 37.5 \%$$

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

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 in annex 1.

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			≥ Ø 60 mm
Failure load [kN]	Anchors not placed at the panel joints (Static Foam Block Test)	R _{panel}	Minimal: 0.65 Average: 0.74
	Anchors placed at the panel joints (Static Foam Block Test)	R _{joint}	Minimal: 0.59 Average: 0.61
	Anchors not placed at the panel joints (Pull-through test, dry conditions)	R _{panel}	Minimal: 0.64 Average: 0.60
	Anchors not placed at the panel joints (Pull-through test, wet conditions) - series 2* - series 3*	R _{panel}	Minimal: 0.36 Average: 0.39 Minimal: 0.41 Average: 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		≥ 5.0 kPa	
Plate diameter of anchor			≥ Ø 90 mm	≥ Ø 140 mm
Failure load [kN]	Anchors not placed at the panel joints (Static Foam Block Test)	R _{panel}	Minimal: 0.48 Average: 0.49	Minimal: 0.56 Average: 0.69
	Anchors placed at the panel joints (Static Foam Block Test)	R _{joint}	Minimal: 0.38 Average: 0.39	Minimal: 0.44 Average: 0.54
	Anchors not placed at the panel joints (Pull-through test, dry conditions)	R _{panel}	Minimal: 0.54 Average: 0.61	no performance assessed
	Anchors not placed at the panel joints (Pull-through test, wet conditions) - series 2*	R _{panel}	Minimal: 0.40 Average: 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			≥ Ø 140 mm
Failure load [kN]	Anchors placed at the panel joints (Pull-through test, dry condition)	R_{joint}	Minimal: 0.62 Average: 0.66
	Anchors placed at the panel joints (Pull-through test, wet condition)	R_{joint}	Minimal: 0.51 Average: 0.57
	Anchors placed at the panel joints (Static Foam Block Test)	R_{joint}	Minimal: 0.71

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

Anchor	Thickness of the MW panel [t]	Conditions of installation*
ejothem STR U ejothem STR U 2G (ETA-04/0023)	$t \geq 80$ mm	<ul style="list-style-type: none"> – Maximum installation depth of the anchor plate: 15 mm (\triangleq thickness of insulation cover) – Cutting depth: 20 mm
	$t \geq 100$ mm	<ul style="list-style-type: none"> – Maximum installation depth of the anchor plate: 15 mm (\triangleq thickness of insulation cover) – Cutting depth: 35 mm
* according to the appropriate ETA of anchor		

English translation prepared by DIBt

4.5 Render strip tensile test

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

Base coat	Glass fibre mesh	Average value of crack width w_m (1%)
StoArmat Classic S1	"Sto-Glasfasergewebe F"	0.10 mm

4.6 Bond strength after aging

Finishing coat with base coat "StoArmat Classic S1" indicated hereafter		7 d immersion in water and 7 d drying [kPa]
Stolit K/R/Effect/MP	Average	64
	Minimal value	44
StoSilco K/R/MP	Average	73
	Minimal value	59
StoSilco blue K/MP	Average	73
	Minimal value	62
StoLotusan K/MP	Average	65
	Minimal value	47
Stolit QS K/R/MP	Average	65
	Minimal value	53
StoSilco QS K/R/MP	Average	85
	Minimal value	68

4.7 Reinforcement (glass fibre mesh)

Sto-Glasfasergewebe	Average warp	Average weft
Tensile strength in as-delivered state	2154 N / 50 mm	2883 N / 50 mm
Residual tensile strength after aging	1274 N / 50 mm	1807 N / 50 mm
Relative residual tensile strength after aging	59.1 %	62.7 %
Elongation in as-delivered state	3.7 %	3.8 %
Elongation after aging	1.8 %	2.1 %

Sto-Glasfasergewebe F	Average warp	Average weft
Tensile strength in as-delivered state	2236 N / 50 mm	2434 N / 50 mm
Residual tensile strength after aging	1494 N / 50 mm	1523 N / 50 mm
Relative residual tensile strength after aging	66.8 %	68.1 %
Elongation in as-delivered state	3.9 %	4.2 %
Elongation after aging	2.7 %	2.6 %

Sto-Panzergerewebe	Average warp	Average weft
Tensile strength in as-delivered state	7954 N / 50 mm	8936 N / 50 mm
Residual tensile strength after aging	5886 N / 50 mm	5051 N / 50 mm
Relative residual tensile strength after aging	74.0 %	56.5 %
Elongation in as-delivered state	4.3 %	4.4 %
Elongation after aging	3.2 %	2.7 %

Annex 5

Energy economy and heat retention (BWR 6)

5.1 Thermal resistance and thermal transmittance

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 anchors profiles increases the thermal transmittance U . This influence had to take into account according to EN ISO 6946.

The thermal bridges caused by mechanical fixing devices (anchors profiles) increase the thermal transmittance U . This influence had to take into account according to EN ISO 6946:2007.

$$U_c = U + \Delta U$$

corrected thermal transmittance [$\text{W}/(\text{m}^2 \cdot \text{K})$]

$$\Delta U = \Delta U_{anchor} + \Delta U_{profile}$$

correction term for mechanical fixing devices (anchors, profiles)

$$\Delta U_{anchor} = \chi_p \cdot n$$

correction term for anchors

where: 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 technical approval

$$\chi_p = 0.004 \text{ W/K}$$

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 with the head covered by plastic material, and for anchors with an air gap at the head of the screw