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European Technical Assessment

ETA 21/0945
of 04.09.2024

General part

Technical Assessment Organism issuing the ETA: ITeC ITeC has been designed in agreement with Article 29 of the Regulation (UE) No 305/2011 and it is a member of EOTA (European Organisation for Technical Assessment).	
Trade name of the construction product	**Mapetherm PIR System**
Product family to which the construction product belongs	Product Area Code: 04 External Thermal Insulation Composite Systems (ETICS) with rendering on PIR for the use as external insulation of building walls.
Manufacturer	**MAPEI SpA** Via Cafiero 22 IT-20158 Milano Italy www.mapei.com
Manufacturing plant(s)	According to Annex N kept by ITeC.
This European Technical Assessment contains	23 pages including 3 annexes which form an integral part of this assessment and Annex N, which contains confidential information and is not included in the European Technical Assessment when that assessment is publicly available.
This European Technical Assessment is issued in accordance with Regulation (EU) 305/2011, on the basis of	EAD 040083-00-0404 *External Thermal Insulation Composite Systems (ETICS) with renderings,* edition 2019.
This ETA replaces	ETA 21/0945 issued on 13.05.2022

General comments

Translations of this European Technical Assessment in other languages shall fully correspond to the original issued document and should be identified as such.

Specific parts of the European Technical Assessment

1 Technical description of the product

Mapetherm PIR System is an ETICS (External Thermal Insulation Composite System) with rendering – a kit comprising components which are factory-produced by the manufacturer or component suppliers.

The ETICS system comprises a prefabricated polyisocyanurate (PIR) insulation board to be bonded onto a wall with (or without) supplementary mechanical fixings. The methods of fixing and the relevant components are specified in the table below. The insulation product is faced with a rendering system consisting of several layers (site applied), one of which contains reinforcement. The rendering is applied directly to the insulating panels, without any air gap or disconnecting layer.

The ETICS includes special fittings (e.g. base profiles, corner profiles…) to treat details of ETICS (connections, apertures, corners, parapets, sills…). The assessment and performance or 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.

Composition of the ETICS:

	Components	Coverage (kg/m²)	Thickness (mm)
Purely bonded ETICS or **Bonded ETICS with supplementary mechanical fixings** (pursuant to ETA holder's instructions, the minimal bonded surface shall be 40%; National application documents shall be taken into account.)			
Adhesive	**Mapetherm AR1:** Grey powder consisting of cement, fine grained sands, synthetic resins and additives. The product requires the addition of 21-24% water, 5,25-6 l of water per 25 kg.	4 to 6 (powder)	5 to 8
	Mapetherm AR1 GG grey/white: Grey/white powder consisting of grey/white cement, sand, synthetic resins, polypropylene fibres and additives. The product requires the addition of 21%-24% water (5,25 l - 6 l of water per 25 kg).	4 to 6 (powder)	5 to 8
Insulation product	**PIR board**: - Generic factory made rigid polyisocyanurate foam insulation board according to EN 13165 with the characteristics described in the table A1.1. - **Mapetherm PIR,** factory made rigid polyisocyanurate foam insulation board according to EN 13165 with the characteristics described in the table A1.2. - **Stiferite Class SK,** factory made rigid polyisocyanurate foam insulation board according to EN 13165 with the characteristics described in the table A1.3.	--	20 to 200

	Components	Coverage (kg/m²)	Thickness (mm)
Base coat	**Mapetherm AR1:** Grey powder consisting of cement, fine grained sands, synthetic resins and additives. The product requires the addition of 21-24% water, 5,25-6 l of water per 25 kg.	4 to 6 (powder)	4 to 5
Glass fibre mesh	**Mapetherm Net** Standard glass fibre mesh. See Annex 3, table A3.1 for product characteristics.	--	--
	Mapetherm Net R131 Standard glass fibre mesh. See Annex 3, table A3.2 for product characteristics.	--	--
Key coat	**Quarzolite Base Coat:** ready to use water acrylic based dispersion. This product can be applied before the following finishing coats: - Quarzolite Tonachino - Quarzolite Tonachino Plus - Quarzolite Tonachino PRO - Quarzolite Tonachino PRO S - Elastocolor Tonachino Plus	0,3 – 0,5	0,3 – 0,4
	Silancolor Base Coat: ready to use water silicone resin-based dispersion. This product can be applied before the following finishing coats: - Silancolor Tonachino - Silancolor Tonachino Plus - Silancolor AC Tonachino - Silancolor AC Tonachino Plus	0,3 – 0,5	0,3 – 0,4
	Silancolor Base Coat Plus: ready to use water silicone resin-based dispersion with a mould and algae resistant component. This product can be applied before the following finishing coats: - Quarzolite Tonachino Plus - Silancolor Tonachino Plus - Silancolor AC Tonachino Plus - Elastocolor Tonachino Plus	0,2 – 0,3	0,05 – 0,15
	Silancolor Primer: ready to use water silane and siloxane based dispersion. This product can be applied before the following finishing coats: - Silancolor Tonachino - Silancolor AC Tonachino	0,1 – 0,15	--
	Silancolor Primer Plus: ready to use water silane and siloxane based dispersion with a mould and algae resistant component. This product can be applied before the following finishing coats: - Quarzolite Tonachino Plus - Silancolor Tonachino Plus - Silancolor AC Tonachino Plus - Elastocolor Tonachino Plus	0,1 – 0,15	--

	Components	Coverage (kg/m²)	Thickness (mm)
	Malech: ready to use water micronized acrylic resin based dispersion. This product can be applied before the following finishing coats: - Quarzolite Tonachino - Quarzolite Tonachino PRO - Quarzolite Tonachino PRO S - Elastocolor Tonachino Plus	0,1 – 0,15	--
Finishing coats	**Quarzolite Tonachino:** ready to use acrylic binder paste. Rustic finishing aspect. Particle size: - 0,7 mm - 1,2 mm - 1,5 mm - 2,0 mm	1,7 – 2,0 1,9 – 2,3 2,2 – 2,6 3,0 – 3,5	Regulated by particle size
	Quarzolite Tonachino Plus: ready to use acrylic binder paste with a mould and algae resistant component. Rustic finishing aspect. Particle size: - 1,2 mm - 1,5 mm	1,9 – 2,3 2,2 – 2,6	Regulated by particle size
	Quarzolite Tonachino PRO: ready to use acrylic binder paste with mould and algae resistant component. Compact-rustic finishing aspect. Maximum particle size: - 1,2 mm - 1,5 mm	1,9 – 2,3 2,2 – 2,6	Regulated by particle size
	Quarzolite Tonachino PRO S: ready to use acryl-siloxane binder paste, with a mould and algae resistant component. Compact-rustic finishing aspect. Maximum particle size: - 1,2 mm - 1,5 mm	1,9 – 2,3 2,2 – 2,6	Regulated by particle size
	Silancolor Tonachino: ready to use silicon-resin binder paste. Rustic finishing aspect. Particle size: - 0,7 mm - 1,2 mm - 1,5 mm - 2,0 mm	1,7 – 2,0 1,9 – 2,3 2,2 – 2,6 3,0 – 3,5	Regulated by particle size
	Silancolor Tonachino Plus: ready to use silicon-resin binder paste with a mould and algae resistant component. Rustic finishing aspect. Particle size: - 1,2 mm - 1,5 mm	1,9 – 2,3 2,2 – 2,6	Regulated by particle size
	Silancolor AC Tonachino: ready to use acryl-siloxane binder paste. Rustic finishing aspect. Maximum particle size: - 1,2 mm - 1,5 mm	1,9 – 2,3 2,2 – 2,6	Regulated by particle size
	Silancolor AC Tonachino Plus: ready to use acryl-siloxane binder paste with a mould and algae resistant component. Rustic finishing aspect. Maximum particle size: - 1,2 mm - 1,5 mm	1,9 – 2,3 2,2 – 2,6	Regulated by particle size

	Components	Coverage (kg/m²)	Thickness (mm)
	Elastocolor Tonachino Plus: ready to use elastomeric binder paste with a mould and algae resistant component. Rustic finishing aspect. Particle size: 1,2 mm.	1,9 – 2,3	Regulated by particle size
Fixings	Supplementary fixings according to the description of Annex 2.	Remain under the ETA holder's responsibility.	
Ancillary components	Remain under the ETA holder's responsibility.		

Table 0: Components of the ETICS **Mapetherm PIR System**.

2 Specification of the intended use(s) in accordance with the applicable EAD

This ETICS is intended for use as external insulation of buildings' walls. The walls are made of masonry (bricks, blocks, stones …) or concrete (cast on site or as prefabricated panels). The characteristics of the walls shall be verified prior to use of the ETICS, especially regarding conditions for reaction to fire classification and for fixing of the ETICS either by bonding or mechanically. The ETICS is designed to give the wall to which it is applied satisfactory thermal insulation.

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

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

The ETICS is not intended to ensure the airtightness of the building structure.

The product will be installed according to the manufacturer's instructions.

The provisions made in this ETA are based on an assumed working life of at least 25 years for **Mapetherm PIR System**. These provisions are based upon the current state of the art and the available knowledge and experience.

The indications given on the working life cannot be interpreted as a guarantee given by the producer but are to be regarded only as a mean for choosing the right products in relation to the expected economically reasonable working life of the works.

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

Performance of the system **Mapetherm PIR System** related to the basic requirements for construction works (hereinafter BWR) were determined according to EAD 040083-00-0404 for *External Thermal Insulation Composite Systems (ETICS) with Rendering*. Essential characteristics of **Mapetherm PIR System** are indicated in the following sections.

Essential characteristic	ETA section	Performance
Basic Works Requirement 2: Safety in case of fire		
Reaction to fire	3.1	Reaction to fire of the ETICS: B-s1,d0 See table 2 for details. Reaction to fire of the insulation material: Class E Reaction to fire of PU foam adhesive: Not relevant.
Façade fire performance	--	Not assessed.
Propensity to undergo continuous smouldering of ETICS	--	Not relevant for PIR.
Basic Works Requirement 3: Hygiene, health and the environment		
Content, emission and/or release of dangerous substances – leachable substances	--	Not assessed.
Water absorption	3.2.1	Water absorption of the base coat and the rendering system: < 1 kg/m² after 1 hour See table 3 for results. Water absorption of the insulation product: According to the DoP (see tables A1.1 to A1.3).
Water tightness of the ETICS: hygrothermal behaviour	--	Not assessed.
Water tightness: freeze-thaw behaviour	--	Not assessed.
Impact resistance	3.2.2	See table 4 for results.
Water vapour permeability	3.2.3	Water vapour permeability of the rendering system: See table 5a and 5b for results. Water vapour permeability of the insulation product: According to the DoP (see tables A1.1 to A1.3).
Basic Works Requirement 4: Safety and accessibility in use		
Bond strength between base coat and insulation product	3.3.1	≥ 80 kPa. Cohesive failure in the insulation product. See table 6 for results.

Essential characteristic	ETA section	Performance
Bond strength between adhesive and substrate	3.3.2	Dry condition: ≥ 250 kPa. Cohesive rupture in the adhesive. 48 h immersion in water + 2 h 23ºC and 50% RH: ≥ 80 kPa. Cohesive rupture in the adhesive. 48 h immersion in water + 7 days 23ºC and 50% RH: ≥ 250 kPa. Cohesive rupture in the adhesive. See table 7 for results.
Bond strength between adhesive and insulation product	3.3.3	Dry condition: ≥ 80 kPa. Cohesive rupture in the insulation product. 48 h immersion in water + 2 h 23ºC and 50% RH: ≥ 30 kPa. Adhesive rupture and/or cohesive rupture in the insulation product. 48 h immersion in water + 7 days 23ºC and 50% RH: ≥ 80 kPa. Cohesive rupture in the insulation product. See table 8 for results.
Bond strength of the foam adhesives	--	Not relevant.
Fixing strength (transverse displacement)	--	Test not required because the ETICS fulfils the following criteria: E x d < 50.000 N/mm. Note: 'E' is modulus of elasticity of the base coat without mesh and 'd' the mean dry thickness of the base coat.
Wind load resistance	--	Not relevant (purely bonded ETICS or bonded ETICS with supplementary mechanical fixings)
Tensile strength perpendicular to the faces of insulation product	--	In dry conditions: According to the DoP: TR80 (see table A1.1 to A1.3). In wet conditions: Not assessed.
Shear strength and shear modulus of elasticity test of ETICS	--	Shear strength: ≥ 20 kPa. Shear modulus of elasticity: ≥ 1000 kPa. (see table A1.1 to A1.3)
Pull-through resistance of fixings from profiles	--	Test not necessary (purely bonded system or bonded system with supplementary fixings)
Render strip tensile test	--	Not assessed.
Shear strength and shear modulus of foam adhesives	--	Not relevant.
Post expansion behaviour of foam adhesives	--	Not relevant.

Essential characteristic	ETA section	Performance
Bond strength after ageing	3.4	≥ 80 kPa. Cohesive rupture in the insulation product. See table 9 for results.
Mechanical and physical characteristics of the mesh	Annex 3	Tensile strength of the glass fibre mesh: See A3.1 and A3.2 for results. Protection of metal mesh: Not relevant.
Basic Works Requirement 5: Protection against noise.		
Airborne sound insulation of ETICS	--	Not assessed.
Dynamic stiffness of the thermal insulation product	--	Not assessed
Air flow resistance of the thermal insulation product	--	Not relevant for PIR.
Basic Works Requirement 6: Energy economy and heat retention.		
Thermal resistance and thermal transmittance of ETICS	3.5	Thermal resistance and thermal transmittance of the ETICS: See section 3.5. Thermal resistance of the thermal insulation product: According to the DoP (see table A1.1 to A1.3).

Table 1: Essential characteristics of the ETICS **Mapetherm PIR System**.

3.1 Safety in case of fire (BWR 2) Reaction to fire of the system

EAD 040083-00-0404, clause 2.2.1.

The reaction to fire of **Mapetherm PIR System** according to EN 13501-1 is defined table 2. The configuration tested was the worst case with regard to reaction to fire.

Reaction to fire classification of **Mapetherm PIR System** according to EN 13501-1: **B-s1,d0**	
Component	**ETICS configuration**
Adhesive	Mapetherm AR1 Mapetherm AR1 GG
Insulation: PIR boards	In quantity ensuring class E according to EN 13501-1.

Reaction to fire classification of **Mapetherm PIR System** according to EN 13501-1: **B-s1,d0**	
Component	**ETICS configuration**
Base coat	Mapetherm AR1
Glass fibre mesh	Mapetherm Net Mapetherm Net R131
Key coat	All key coats defined in table 0.
Finishing coat	All finishing coats defined in table 0.
With the exception of the thermal insulation, none of the components of the system contains flame retardants.	

Table 2: Reaction to fire classification of **Mapetherm PIR System**.

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

3.2 Hygiene, health and environment (BWR 3)

3.2.1 Water absorption

EAD 040083-00-0404, clause 2.2.5.1.

		Water absorption [kg/m²]	
		After 1 hour	**After 24 hours**
Water absorption of the base coat			
Base coat onto PIR		< 0,5 (test result: 0,11)	≥ 0,5 (test result: 0,63)
Water absorption of the rendering system			
Rendering systems: base coat + key coat + finishing coats indicated hereafter:	Quarzolite Tonachino Quarzolite Tonachino Plus	< 0,5 (test result: 0,02)	< 0,5 (test result: 0,11)
	Quarzolite Tonachino PRO	< 0,5 (test result: 0,05)	< 0,5 (test result: 0,33)
	Quarzolite Tonachino PRO S	< 0,5 (test result: 0,02)	< 0,5 (test result: 0,07)
	Silancolor Tonachino Silancolor Tonachino Plus	< 0,5 (test result: 0,05)	< 0,5 (test result: 0,16)
	Silancolor AC Tonachino Silancolor AC Tonachino Plus	< 0,5 (test result: 0,09)	< 0,5 (test result: 0,37)
	Elastocolor Tonachino Plus	< 0,5 (test result: 0,01)	< 0,5 (test result: 0,11)

Table 3: Water absorption test results (mean values).

3.2.2 Impact resistance

EAD 040083-00-0404, clause 2.2.8.

Rendering system Base coat + key coat (if necessary) + finishing coats, indicated hereafter:	Impact Ø mark (mm)		Category
	3 J	10 J	
	Single mesh		
Mapetherm AR1 + Quarzolite Base Coat + Quarzolite Tonachino 2 mm**	24 / 25 / 23 / 22 / 21 Superficial damage without cracking.	30 / 28 / 33 / 31 / 31 Presence of micro-cracks but rendering not penetrated.	II
Mapetherm AR1 + Silancolor Base Coat + Silancolor AC Tonachino Plus **	25 / 15 / 18 / 19 / 18 Superficial damage without cracking.	28 / 24 / 28 / 46 / 45 Presence of micro-cracks but rendering not penetrated.	II
Mapetherm AR1 + Malech + Quarzolite Tonachino 0,7 mm*	37 / 31 / 27 / 27 / 27 Superficial impact mark	40 / 44 / 42 / 43 / 45 Presence of micro-cracks but rendering not penetrated / Presence of cracks	III
Mapetherm AR1 + Silancolor Primer + Silancolor Tonachino 0,7 mm*	-- No marks	46 / 38 / 42 / 39 / 40 Superficial impact mark / Presence of micro-cracks but rendering not penetrated.	II
Mapetherm AR1 + Silancolor Primer Plus + Silancolor AC Tonachino Plus*	-- No marks	-- No marks	I
Mapetherm AR1 + Malech + Elastocolor Tonachino Plus*	-- No marks	-- No marks	I
Mapetherm AR1 + Malech + Quarzolite Tonachino PRO 1,2 mm*	5 / 10 / 6 / 0 / 0 No deterioration	34 / 26 / 30 / 35 / 28 Presence of micro-cracks but rendering not penetrated.	II
Mapetherm AR1 + Quarzolite Base Coat + Quarzolite Tonachino PRO S 1,2 mm*	0 / 11 / 9 / 10 / 0 No deterioration	27 / 25 / 28 / 27 / 31 Presence of micro-cracks but rendering not penetrated.	II

* Finishing coats tested on small samples.

** Finishing coats tested on the wall submitted to hygrothermal cycles.

Results also valid for “Plus” variant.

Table 4: Category of use according to impact resistance test results.

3.2.3 Water vapour permeability

EAD 040083-00-0404, clause 2.2.9.1.

Base coat	Thickness (mm)	Equivalent air thickness, S_d (m)
Mapetherm AR1	5,0	≤ 2,0 (test result: 0,10)

Table 5a: Water vapour permeability test results of the base coat.

Rendering systems: Mapetherm AR1 + key coat + finishing coats indicated hereafter		Equivalent air thickness S_d (m)
Key coat	**Finishing coat**	
Malech	Quarzolite Tonachino	≤ 2,0 (test result: 0,21)
Quarzolite Base Coat	Quarzolite Tonachino	≤ 2,0 (test result: 0,23)
Silancolor Primer Plus	Quarzolite Tonachino Plus	≤ 2,0 (test result: 0,15)
Quarzolite Base Coat	Quarzolite Tonachino Plus	≤ 2,0 (test result: 0,19)
Silancolor Base Coat Plus	Quarzolite Tonachino Plus	≤ 2,0 (test result: 0,19)
Malech	Quarzolite Tonachino PRO	≤ 2,0 (test result: 0,25)
Quarzolite Base Coat	Quarzolite Tonachino PRO	≤ 2,0 (test result: 0,24)
Malech	Quarzolite Tonachino PRO S	≤ 2,0 (test result: 0,23)
Quarzolite Base Coat	Quarzolite Tonachino PRO S	≤ 2,0 (test result: 0,21)
Silancolor Primer	Silancolor Tonachino	≤ 2,0 (test result: 0,24)
Silancolor Base Coat	Silancolor Tonachino	≤ 2,0 (test result: 0,24)
Silancolor Base Coat Plus	Silancolor Tonachino Plus	≤ 2,0 (test result: 0,20)
Silancolor Base Coat	Silancolor Tonachino Plus	≤ 2,0 (test result: 0,19)
Silancolor Primer Plus	Silancolor Tonachino Plus	≤ 2,0 (test result: 0,23)
Silancolor Base Coat	Silancolor AC Tonachino	≤ 2,0 (test result: 0,19)
Silancolor Primer	Silancolor AC Tonachino	≤ 2,0 (test result: 0,21)
Silancolor Base Coat	Silancolor AC Tonachino Plus	≤ 2,0 (test result: 0,21)
Silancolor Primer Plus	Silancolor AC Tonachino Plus	≤ 2,0 (test result: 0,23)
Silancolor Base Coat Plus	Silancolor AC Tonachino Plus	≤ 2,0 (test result: 0,24)
Malech	Elastocolor Tonachino Plus	≤ 2,0 (test result: 0,27)
Quarzolite Base Coat	Elastocolor Tonachino Plus	≤ 2,0 (test result: 0,25)
Silancolor Primer Plus	Elastocolor Tonachino Plus	≤ 2,0 (test result: 0,23)

Rendering systems: Mapetherm AR1 + key coat + finishing coats indicated hereafter		Equivalent air thickness S_d (m)
Key coat	**Finishing coat**	
Silancolor Base Coat Plus	Elastocolor Tonachino Plus	≤ 2,0 (test result: 0,29)

Note: the combinations tested above cover the rest of combinations of the same products with less thickness.

Table 5b: Water vapour permeability test results of the rendering system.

3.3 Safety and accessibility in use (BWR 4)

3.3.1 Bond strength between base coat and insulation product

EAD 040083-00-0404, clause 2.2.11.1.

	Bond strength			
	Minimum value (kPa)	**Mean value (kPa)**	**Rupture typology**	**Required value (kPa)**
Mapetherm AR1				
On samples after 28 days drying under the same conditions of the rig	70	88	C	≥ 80 (A/B) or < 80 (C)
After hygrothermal cycles on the rig	50	78	C	
After freeze-thaw test	Not Assessed			

A: adhesive rupture.

B: cohesive rupture in adhesive.

C: cohesive rupture in insulation product.

Table 6: Bond strength between base coat and insulation product test results.

3.3.2 Bond strength between the adhesive and the substrate

EAD 040083-00-0404, clause 2.2.11.2.

	Bond strength			
	Minimum value (kPa)	**Mean value (kPa)**	**Rupture typology**	**Required value (kPa)**
Mapetherm AR1				
No complementary conditioning	1120	1410	B	≥ 250
2 days immersion in water + 2 h drying	440	562	B	≥ 80

	Bond strength			
	Minimum value (kPa)	**Mean value (kPa)**	**Rupture typology**	**Required value (kPa)**
2 days immersion in water + 7 days drying	1040	1222	B	≥ 250
Mapetherm AR1 GG				
No complementary conditioning	600	684	B	≥ 250
2 days immersion in water + 2 h drying	410	504	B	≥ 80
2 days immersion in water + 7 days drying	670	840	B	≥ 250

A: adhesive rupture.

B: cohesive rupture in adhesive.

C: cohesive rupture in insulation product.

Table 7: Bond strength between adhesive and substrate (concrete) test results.

3.3.3 Bond strength between adhesive and the insulation product

EAD 040083-00-0404, clause 2.2.11.3.

	Bond strength			
	Minimum value (kPa)	**Mean value (kPa)**	**Rupture typology**	**Required value (kPa)**
Mapetherm AR1				
No complementary conditioning	110	138	C	≥ 80 (A, B) or ≥ 30 (C)
2 days immersion in water + 2 h drying	80	96	A	≥ 30 (A, B) or no requirement (C)
2 days immersion in water + 7 days drying	110	168	A / C	≥ 80 (A, B) or no requirement (C)
Mapetherm AR1 GG				
No complementary conditioning	71	86	A/C	≥ 80 (A, B) or ≥ 30 (C)
2 days immersion in water + 2 h drying	30	50	A	≥ 30 (A, B) or no requirement (C)
2 days immersion in water + 7 days drying	85	110	A	≥ 80 (A, B) or no requirement (C)

	Bond strength			
	Minimum value (kPa)	**Mean value (kPa)**	**Rupture typology**	**Required value (kPa)**

A: adhesive rupture.

B: cohesive rupture in adhesive.

C: cohesive rupture in insulation product.

Table 8: Bond strength between adhesive and insulation product results.

3.4 Bond strength after ageing

EAD 040083-00-0404, clauses 2.2.20.

Base coat	**Rendering systems:** Base coat + key coat + finishing coats indicated hereafter:	**Bond strength**		
		Individual values (kPa)	**Mean value (kPa)**	**Rupture typology**
Mapetherm AR1	Quarzolite Base Coat + Quarzolite Tonachino*	65 / 73 / 62 / 101 / 116	83	C
	Quarzolite Base Coat + Quarzolite Tonachino PRO	66 / 124 / 139 / 82 / 86	99	C
	Quarzolite Base Coat + Quarzolite Tonachino PRO S	133 / 135 / 120 / 126 / 134	130	A / C
	Silancolor Base Coat + Silancolor AC Tonachino Plus*	117 / 63 / 70 / 112 / 69	86	C
	Silancolor Base Coat + Silancolor Tonachino	68 / 82 / 40 / 61 / 62	63	C
	Quarzolite Base Coat + Elastocolor Tonachino Plus	93 / 137 / 124 / 123 / 77	111	A / C

* Cases tested on the wall after hygrothermal cycles.

A: adhesive rupture.

B: cohesive rupture in adhesive.

C: cohesive rupture in insulation product.

Table 9: Bond strength after ageing test results.

3.5 Energy economy and heat retention (BWR 6)

EAD 040083-00-0404, clause 2.2.23.

The thermal resistance of the ETICS is calculated as follows:

$R_{ETICS} = R_{insulation} + R_{render}$

Where: $R_{insulation}$: thermal resistance of the insulation panel (in accordance with the Declaration of Performance of the insulation panels).

R_{render}: thermal resistance of the render (base coat + key coat + finishing coat). See section 2.2.23.1 of EAD 040083-00-0404.

R_{ETICS}: thermal resistance of the ETICS ($R_{ETICS} = R_{insulation} + R_{render}$).

The thermal transmittance of the substrate wall covered by the ETICS is calculated in accordance with the standard EN ISO 6946:

$U_c = U + \chi_p * n$

Where: $\chi_p * n$: has to be taken into account only if it is greater than 0,04 W/(m²·K).

U_c: global (corrected) thermal transmittance of the covered wall W/(m²·K).

n: number of anchors (through insulation product) per m².

χ_p: local influence of thermal bridge caused by anchor. The values listed below can be taken into account if not specified in the anchor's ETA:

= 0,002 W/K for anchors with a stainless steel screw covered by plastic material and for anchors with an air gap at the head of the screw ($\chi_p * n$ negligible for n<20).

= 0,004 W/K for anchors with a galvanized steel screw with the head covered by a plastic material ($\chi_p * n$ negligible for n<10).

= 0,008 W/K for all other anchors (worst case).

The influence of thermal bridges can also be calculated as described in EN ISO 10211.

U: thermal transmittance of the normal part of the covered wall (excluding thermal bridges) (W/(m²·K)) determined as follows:

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

Where:

R_i: thermal resistance of the insulation product (according to declaration of performance) in (m²·K)/W.

R_{render}: thermal resistance of the render (about 0,02 (m²·K)/W).

$R_{substrate}$: thermal resistance of the substrate of the building (concrete, brick…) in (m²·K)/W.

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

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

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

According to the decision 97/556/EC amended by Decision 2001/596/EC, as amended of the European Commission[1], the systems of AVCP (see EC delegated regulation (EU) No 568/2014 amending Annex V to Regulation (EU) 305/2011) given in the table 10 applies.

Trade name of the system	Intended use(s)	Level(s) or class(es) (Reaction to fire)	AVCP system
Mapetherm PIR System	External thermal insulation composite system/kits (ETICS) with rendering in external walls subject to fire regulations.	A1(2), A2(2), B(2), C(2), D, E, F or A1(3) to E(3)	2+
	External thermal insulation composite system/kits (ETICS) with rendering in external walls not subject to fire regulations.	Any	2+

(1) Products/material for which as 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 note 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).

Table 10: Applicable AVCP system.

5 Technical details necessary for the implementation of the AVCP system, as foreseen in the applicable EAD

All the necessary technical details for the implementation of the AVCP system are laid down in the *Control Plan* deposited with the ITeC[2], with which the factory production control shall be in accordance.

Products not manufactured by the kit manufacturer shall also be controlled according to the Control Plan.

Where materials/components are not manufactured and tested by the supplier in accordance with agreed methods, then they shall be subject to suitable checks/tests by the kit manufacturer before acceptance.

Any change in the manufacturing procedure which may affect the properties of the product shall be notified and the necessary type-testing revised according to the *Control Plan*.

[1] Official Journal of the European Union (OJEU) L229/15 of 20/08/1997.

Official Journal of the European Union (OJEU) L209/33 of 02/08/2011.

[2] The *Control Plan* is a confidential part of the ETA and is only handed over to the notified certification body involved in the assessment and verification of constancy of performance.

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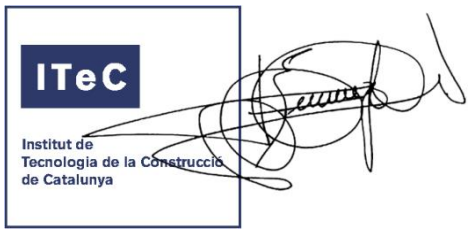

Ferran Bermejo Nualart
Technical Director, ITeC

ANNEX 1: Insulation product characteristics

Descriptions and characteristics	Performance
Trade name	Generic polyisocyanurate foam (PIR) insulation board.
Description	Factory made rigid polyisocyanurate foam (PIR) insulation board according to EN 13165.
Thickness (mm) EN 823	T2
Length (mm) EN 822	± 5 (< 1000 mm) ± 7,5 (1000 mm to 2000 mm)
Width (mm) EN 822	± 5 (< 1000 mm) ± 7,5 (1000 mm to 2000 mm)
Flatness (mm) EN 825	≤ 5
Shear strength EN 12090 (N/mm²)	≥ 0,02
Shear modulus EN 12090 (N/mm²)	≥ 1,0
Characteristics declared in the insulation board DoP	
Reaction to fire EN 13501-1	E
Thermal conductivity (W/m·K) EN 12667	According to Declaration of Performance
Durability of reaction to fire against heat, weathering, ageing/degradation	Reaction to fire does not change
Durability of thermal resistance against heat, weathering, ageing/degradation	Thermal resistance does not change
Dimensional stability under specified temperature and humidity conditions EN 1604	DS(70,90)4
Dimensional stability under specified temperature conditions EN 1604	DS(-20,0)2
Tensile strength (kPa) EN 1607	≥ 80 – TR80
Compression strength (kPa) EN 826	≥ 150 - CS(10\Y)150
Water absorption (short term, partial immersion) EN 1609	WS(P)0,2
Water absorption (long term, total immersion) EN 12087	WL(T)1 – Thickness: < 120 mm WL(T)2 – Thickness: ≥ 120 mm
Water vapour diffusion resistance factor (μ) EN 12086	According to Declaration of Performance

Table A1.1: Characteristics of PIR thermal insulation board.

Descriptions and characteristics	Performance
Trade name	Mapetherm PIR
Description	Factory made rigid polyisocyanurate foam (PIR) insulation board according to EN 13165.
Thickness (mm) EN 823	T2
Length (mm) EN 822	± 5 (< 1000 mm) ± 7,5 (1000 mm to 2000 mm)
Width (mm) EN 822	± 5 (< 1000 mm) ± 7,5 (1000 mm to 2000 mm)
Flatness (mm) EN 825	≤ 5
Shear strength EN 12090 (N/mm²)	≥ 0,02
Shear modulus EN 12090 (N/mm²)	≥ 1,0
Characteristics declared in the insulation board DoP	
Reaction to fire EN 13501-1	E
Thermal conductivity (W/m·K) EN 12667	0,026 – Thickness < 100 mm 0,025 – Thickness ≥ 100 mm
Durability of reaction to fire against heat, weathering, ageing/degradation	Reaction to fire does not change
Durability of thermal resistance against heat, weathering, ageing/degradation	Thermal resistance does not change
Dimensional stability under specified temperature and humidity conditions EN 1604	DS(70,90)4
Dimensional stability under specified temperature conditions EN 1604	DS(-20,0)2
Tensile strength (kPa) EN 1607	≥ 80 – TR80
Compression strength (kPa) EN 826	≥ 150 - CS(10\Y)150
Water absorption (short term, partial immersion) EN 1609	WS(P)0,2
Water absorption (long term, total immersion) EN 12087	WL(T)1 – Thickness < 120 mm WL(T)2 – Thickness ≥ 120 mm
Water vapour diffusion resistance factor (μ) EN 12086	MU40-120

Table A1.2: Characteristics of Mapetherm PIR thermal insulation board.

Descriptions and characteristics	Performance
Trade name	Stifterite Class SK
Description	Factory made rigid polyisocyanurate foam (PIR) insulation board according to EN 13165.
Thickness (mm) EN 823	T2
Length (mm) EN 822	± 5 (< 1000 mm) ± 7,5 (1000 mm to 2000 mm)
Width (mm) EN 822	± 5 (< 1000 mm) ± 7,5 (1000 mm to 2000 mm)
Flatness (mm) EN 825	≤ 5
Shear strength EN 12090 (N/mm²)	≥ 0,02
Shear modulus EN 12090 (N/mm²)	≥ 1,0
Characteristics declared in the insulation board DoP	
Reaction to fire EN 13501-1	E
Thermal conductivity (W/m·K) EN 12667	0,027 – Thickness : 20 mm to 40 mm 0,026 – Thickness : 50 mm to 80 mm 0,025 – Thickness : 100 mm to 160 mm 0,024 – Thickness : 180 mm to 200 mm
Durability of reaction to fire against heat, weathering, ageing/degradation	Reaction to fire does not change
Durability of thermal resistance against heat, weathering, ageing/degradation	Thermal resistance does not change
Dimensional stability under specified temperature and humidity conditions EN 1604	DS(70,90)3 – Thickness: 20 mm to 40 mm DS(70,90)4 – Thickness: 50 mm to 200 mm
Dimensional stability under specified temperature conditions EN 1604	DS(-20,0)2
Tensile strength (kPa) EN 1607	≥ 80 – TR80
Compression strength (kPa) EN 826	≥ 150 - CS(10\Y)150
Water absorption (short term, partial immersion) EN 1609	WS(P)0,2
Water absorption (long term, total immersion) EN 12087	WL(T)2 – Thickness < 120 mm WL(T)1 – Thickness ≥ 120 mm
Flatness after one side wetting EN 825	FW2
Water vapour diffusion resistance factor (μ) EN 12086	MU56

Table A1.3: Characteristics of Stiferite Class SK thermal insulation board.

ANNEX 2: Anchors characteristics

Anchors with an ETA according to EAD 330196-01-0604 (or according to ETAG 014 used as EAD).

The anchors are composed of a plastic expansion sleeve with a plate with a diameter of 60 mm, and a plastic or metallic nail or screw.

Use categories and characteristic resistances in the substrate are given in each anchor's ETA.

Other characteristics:

- Mounting: surface assembly.
- Plate stiffness: ≥ 0,6 kN/mm.

ANNEX 3: Glass fibre mesh characteristics

Trade name: Mapetherm Net.

Mesh size: 4,3 mm ± 0,5 mm (warp) x 3,6 mm ± 0,5 mm (weft).

Weight per unit area: 150 g/m² (± 5 %).

	Mapetherm Net		Required value
	Warp	**Weft**	
Tensile strength in the as-delivered state (mean value)	≥ 40 N/mm	≥ 38 N/mm	--
Tensile strength after artificial ageing (mean value)	≥ 20 N/mm	≥ 20 N/mm	≥ 20 N/mm
Residual strength after artificial ageing	50 %	53 %	≥ 50%
Elongation after artificial ageing (mean value)	≤ 3,0 %	≤ 3,0 %	--

Table A3.1: Mechanical characteristics of the glass fibre mesh **Mapetherm Net** and required values stated in the EAD 040083-00-0404.

Trade name: Mapetherm Net R131

Mesh size: 4,0 mm (warp) x 4,6 mm (weft).

Weight per unit area: 167 g/m².

	Mapetherm Net R131		Required value
	Warp	**Weft**	
Tensile strength in the as-delivered state (mean value)	≥ 48 N/mm	≥ 50 N/mm	--
Tensile strength after artificial ageing (mean value)	≥ 33 N/mm	≥ 38 N/mm	≥ 20 N/mm
Residual strength after artificial ageing	69 %	76 %	≥ 50%
Elongation after artificial ageing (mean value)	≤ 3,0 %	≤ 3,0 %	--

Table A3.2: Mechanical characteristics of the glass fibre mesh **Mapetherm Net R131** and required values stated in the EAD 040083-00-0404.