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European Technical Assessment

ETA 21/0950
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 MW System

Product family to which the construction product belongs

Product Area Code: 04
External Thermal Insulation Composite Systems (ETICS) with rendering on MW 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

30 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 21/0950 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.

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Specific parts of the European Technical Assessment

1 Technical description of the product

Mapetherm MW 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 mineral wool (MW) insulation board fixed onto a wall by mechanical fixings with supplementary adhesive. 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 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.

Composition of the ETICS:

	Components	Coverage (kg/m ²)	Thickness (mm)
Mechanical fixed ETICS with supplementary adhesive (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
	Mapetherm AR1 Light white: White powder consisting of cement, lightweight mineral aggregates, fine grained sands, synthetic resins and additives. The product requires the addition of 29% - 31% water (6,7 l – 7,1 l of water per 23 kg).	3 to 5 (powder)	5 to 8
	Mapetherm AR1 MAXI grey/white: Grey/white powder consisting of 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	MW board: Factory made mineral wool (MW) insulation board according to EN 13162 with the characteristics described in Annex 1.	--	40 to 240
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

	Components	Coverage (kg/m ²)	Thickness (mm)
	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)	4 to 5
	Mapetherm AR1 Light white: White powder consisting of cement, lightweight mineral aggregates, fine grained sands, synthetic resins and additives. The product requires the addition of 29% - 31% water (6,7 l – 7,1 l of water per 23 kg).	3 to 5 (powder)	5 to 8
	Mapetherm AR1 MAXI grey/white: Grey/white powder consisting of 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)	4 to 6
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	--

	Components	Coverage (kg/m ²)	Thickness (mm)
Finishing coats	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	--
	Malech: ready to use water micronized acrylic resin based dispersion. This product can be applied before the following finishing coats: - Quarzolite Tonachino - Elastocolor Tonachino Plus - Quarzolite Tonachino PRO - Quarzolite Tonachino PRO S	0,1 – 0,15	--
	Quarzolite Tonachino: ready to use acrylic binder paste. Rustic finishing aspect. Maximum 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. Maximum 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 acrylic-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. Maximum 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

Components	Coverage (kg/m²)	Thickness (mm)
Silancolor Tonachino Plus: ready to use silicon-resin 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
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
Elastocolor Tonachino Plus: ready to use elastomeric binder paste with a mould and algae resistant component. Rustic finishing aspect. Maximum particle size: 1,2 mm.	1,9 – 2,3	Regulated by particle size
Fixings	See 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 MW 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 MW 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 MW 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 MW System** are indicated in the following sections.

Essential characteristic	ETA section	Performance
Basic Works Requirement 2: Safety in case of fire		
		<u>Reaction to fire of the ETICS:</u> A2-s1,d0.
Reaction to fire	3.1	See table 2 for details. <u>Reaction to fire of the insulation material:</u> Class A2-s1,d0 or A1.
Façade fire performance	--	Not assessed.
Propensity to undergo continuous smouldering of ETICS	--	Not assessed.
Basic Works Requirement 3: Hygiene, health and the environment		
Content, emission and/or release of dangerous substances – leachable substances	--	Not assessed.
		<u>Water absorption of the base coat and the rendering system:</u>
Water absorption	3.2.1	See tables 3a and 3b for results. <u>Water absorption of the insulation product:</u> According to the DoP (see tables A1.1 to A1.5).
Water tightness of the ETICS: hygrothermal behaviour	--	Test passed (without defects). The ETICS is assessed as resistant to hygrothermal cycles.
Water tightness: freeze-thaw behaviour	3.2.2	The system “Mapetherm MW System” is freeze-thaw resistant. See section 3.2.2.
Impact resistance	3.2.3	See table 4 for results.

Essential characteristic	ETA section	Performance
Water vapour permeability	3.2.4	<u>Water vapour permeability of the rendering system:</u> See tables 5a and 5b for results. <u>Water vapour permeability of the insulation product:</u> According to the DoP (see tables A1.1 to A1.5).
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.
Bond strength between adhesive and substrate	--	Not relevant for mechanically fixed systems with supplementary adhesive.
Bond strength between adhesive and insulation product	--	Not relevant for mechanically fixed systems with supplementary adhesive.
Bond strength of the foam adhesives	--	Not relevant.
Fixing strength (transverse displacement)	--	Test not required because the ETICS fulfils the following criteria: - Mechanically fixed ETICS with supplementary adhesive, where the bonded area exceeds 20%. - $E \times d < 50.000 \text{ N/mm}$. 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	3.3.2 Annex 4	<u>Pull-through test of the fixings:</u> See section 3.3.2 and Annex 4 for results. <u>Static foam block test:</u> Not assessed. <u>Dynamic wind uplift test:</u> Not assessed.
Tensile strength perpendicular to the faces of insulation product	--	<u>In dry conditions:</u> According to the DoP: TR7,5 and TR10 (see tables A1.1 to A1.5). <u>In wet conditions:</u> Not assessed.
Shear strength and shear modulus of elasticity test of ETICS	--	Test not necessary (mechanically fixed ETICS with supplementary adhesive).
Pull-through resistance of fixings from profiles	--	Not relevant.
Render strip tensile test	--	Not assessed.

Essential characteristic	ETA section	Performance
Shear strength and shear modulus of foam adhesives	--	Not relevant.
Post expansion behaviour of foam adhesives	--	Not relevant.
Bond strength after ageing	3.3.3	< 80 kPa. Cohesive rupture in the insulation product. See table 8 for results.
Mechanical and physical characteristics of the mesh	Annex 3	<u>Tensile strength of the glass fibre mesh:</u> See tables A3.1 and A3.2 for results. <u>Protection of metal mesh:</u> 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 assessed.
Basic Works Requirement 6: Energy economy and heat retention.		
Thermal resistance and thermal transmittance of ETICS	3.4	<u>Thermal resistance and thermal transmittance of the ETICS:</u> See section 3.4. <u>Thermal resistance of the thermal insulation product:</u> According to the DoP (see tables A1.1 to A1.5).

Table 1: Essential characteristics of the ETICS **Mapetherm MW 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 MW System** according to EN 13501-1 is defined in table 2. The configuration tested was the worst case with regard to reaction to fire.

Reaction to fire classification of **Mapetherm MW System** according to EN 13501-1:
A2-s1,d0

Component	ETICS configuration
Adhesive	Mapetherm AR1 Mapetherm AR1 GG Mapetherm AR1 Light Mapetherm AR1 MAXI
Insulation: MW boards	In quantity ensuring class A2-s1,d0 according to EN 13501-1.
Base coat	Mapetherm AR1 Mapetherm AR1 GG Mapetherm AR1 Light Mapetherm AR1 MAXI
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.
None of the components of the system contains flame retardants.	

Table 2: Reaction to fire classification of **Mapetherm MW 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/m ²]	
		After 1 hour	After 24 hours
<i>Water absorption of the base coat – Mapetherm AR1</i>			
Base coat onto MW		< 0,5 (test result: 0,05)	< 0,5 (test result: 0,25)
<i>Water absorption of the rendering system</i>			
Rendering systems: base coat +	Quarzolite Tonachino	< 0,5 (test result: 0,13)	< 0,5 (test result: 0,40)
	Quarzolite Tonachino Plus		
	Quarzolite Tonachino PRO	< 0,5 (test result: 0,05)	< 0,5 (test result: 0,43)

		Water absorption [kg/m ²]	
		After 1 hour	After 24 hours
key coat + finishing coats indicated hereafter:	Quarzolite Tonachino PRO S	< 0,5 (test result: 0,02)	< 0,5 (test result: 0,08)
	Silancolor Tonachino	< 0,5 (test result: 0,07)	< 0,5 (test result: 0,17)
	Silancolor Tonachino Plus		
	Silancolor AC Tonachino	< 0,5 (test result: 0,05)	< 0,5 (test result: 0,36)
	Silancolor AC Tonachino Plus		
	Elastocolor Tonachino Plus	< 0,5 (test result: 0,01)	< 0,5 (test result: 0,05)

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

		Water absorption [kg/m ²]	
		After 1 hour	After 24 hours
<i>Water absorption of the base coat - Mapetherm AR1 GG / AR1 Light / AR1 MAXI</i>			
Base coat onto MW		< 0,5 (test result: 0,21)	> 0,5 (test result: 0,98)
<i>Water absorption of the rendering system</i>			
Rendering systems: base coat + key coat + finishing coats indicated hereafter:	Quarzolite Tonachino	< 0,5 (test result: 0,03)	< 0,5 (test result: 0,38)
	Quarzolite Tonachino Plus		
	Quarzolite Tonachino PRO	< 0,5 (test result: 0,06)	< 0,5 (test result: 0,13)
	Quarzolite Tonachino PRO S	< 0,5 (test result: 0,02)	< 0,5 (test result: 0,06)
	Silancolor Tonachino	< 0,5 (test result: 0,06)	< 0,5 (test result: 0,48)
	Silancolor Tonachino Plus		
	Silancolor AC Tonachino	< 0,5 (test result: 0,08)	< 0,5 (test result: 0,49)
	Silancolor AC Tonachino Plus		
	Elastocolor Tonachino Plus	< 0,5 (test result: 0,02)	< 0,5 (test result: 0,08)

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

3.2.2 Water tightness: freeze-thaw behaviour

EAD 040083-00-0404, clause 2.2.7.

For the base coat Mapetherm AR1 with all the renderings, the ETICS is freeze-thaw resistant as the water absorption of both reinforced base coat and the renderings systems was less than 0,5 kg/m² after 24 hours.

For the base coats Mapetherm AR1 GG / AR1 Light / AR1 MAXI with all the renderings, the ETICS have demonstrated resistance to freeze-thaw cycles, as evidenced by passing the test without defects (see table 6 in clause 3.3.1 and table 8 in clause 3.3.3).

3.2.3 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 + Malech + Quarzolite Tonachino	No marks	No marks	I
Mapetherm AR1 + Malech + Quarzolite Tonachino PRO	No marks	No marks	I
Mapetherm AR1 + Quarzolite Base Coat + Quarzolite Tonachino PRO S	No marks	No marks	I
Mapetherm AR1 + Silancolor Primer + Silancolor Tonachino	No marks	No marks	I
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

Finishing coats tested on small samples.

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

3.2.4 Water vapour permeability

EAD 040083-00-0404, clause 2.2.9.1.

Product	Thickness (mm)	Equivalent air thickness, S_d (m)
Mapetherm AR1	5,0	$\leq 1,0$ (test result: 0,10)
Mapetherm AR1 GG	5,0	$\leq 1,0$ (test result: 0,08)
Mapetherm AR1 Light	8,0	$\leq 2,0$ (test result: 0,09)
Mapetherm AR1 MAXI	6,0	$\leq 2,0$ (test result: 0,08)

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	$\leq 1,0$ (test result: 0,21)
Quarzolite Base Coat	Quarzolite Tonachino	$\leq 1,0$ (test result: 0,23)
Silancolor Primer Plus	Quarzolite Tonachino Plus	$\leq 1,0$ (test result: 0,15)
Quarzolite Base Coat	Quarzolite Tonachino Plus	$\leq 1,0$ (test result: 0,19)
Silancolor Base Coat Plus	Quarzolite Tonachino Plus	$\leq 1,0$ (test result: 0,19)
Malech	Quarzolite Tonachino PRO	$\leq 2,0$ (test result: 0,25)
Quarzolite Base Coat	Quarzolite Tonachino PRO	$\leq 2,0$ (test result: 0,24)
Malech	Quarzolite Tonachino PRO S	$\leq 2,0$ (test result: 0,23)
Quarzolite Base Coat	Quarzolite Tonachino PRO S	$\leq 2,0$ (test result: 0,21)
Silancolor Primer	Silancolor Tonachino	$\leq 1,0$ (test result: 0,24)
Silancolor Base Coat	Silancolor Tonachino	$\leq 1,0$ (test result: 0,24)
Silancolor Base Coat Plus	Silancolor Tonachino Plus	$\leq 1,0$ (test result: 0,20)
Silancolor Base Coat	Silancolor Tonachino Plus	$\leq 1,0$ (test result: 0,19)
Silancolor Primer Plus	Silancolor Tonachino Plus	$\leq 1,0$ (test result: 0,23)
Silancolor Base Coat	Silancolor AC Tonachino	$\leq 1,0$ (test result: 0,19)
Silancolor Primer	Silancolor AC Tonachino	$\leq 1,0$ (test result: 0,21)
Silancolor Base Coat	Silancolor AC Tonachino Plus	$\leq 1,0$ (test result: 0,21)
Silancolor Primer Plus	Silancolor AC Tonachino Plus	$\leq 1,0$ (test result: 0,23)
Silancolor Base Coat Plus	Silancolor AC Tonachino Plus	$\leq 1,0$ (test result: 0,24)
Malech	Elastocolor Tonachino Plus	$\leq 1,0$ (test result: 0,27)
Quarzolite Base Coat	Elastocolor Tonachino Plus	$\leq 1,0$ (test result: 0,25)
Silancolor Primer Plus	Elastocolor Tonachino Plus	$\leq 1,0$ (test result: 0,23)
Silancolor Base Coat Plus	Elastocolor Tonachino Plus	$\leq 1,0$ (test result: 0,29)

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	6	7	C	≥ 80 (A/B)
After hygrothermal cycles on the rig	5	7	C	or < 80 (C)
After freeze-thaw test	Test not required because freeze/thaw cycles not necessary.			
Mapetherm AR1 GG / AR1 LIGHT / AR1 MAXI				
On samples after 28 days drying under the same conditions of the rig	10	12	C	≥ 80 (A/B)
After hygrothermal cycles on the rig	6	7	C	or < 80 (C)
After freeze-thaw test	12	12	C	

Cases tested on the samples with a MW with TR7,5.

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 Wind load resistance of mechanically fixed ETICS

EAD 040083-00-0404, clause 2.2.13. – Pull-through test of fixings.

3.3.2.1 Mineral wool with TR10

Insulation: MW EN 13162 – T5 – CS(10)25-TR10-WS.

Description: One density

Fixing:

- Diameter of the plate: 60 mm.
- Plate stiffness $\geq 0,6$ kN/mm.
- Installation: surface assembly.

Position	Conditions	Individual values (kN)					Average (kN)
R_{panel} (out of the joint, at the body of the insulation product)	Dry	0,519	0,322	0,354	0,350	0,316	0,372
R_{joint} (at the joint)	Dry	0,121	0,136	0,194	0,220	0,179	0,170

Table 7a: Failure loads of the pull-through test.

See the load/displacement graphs in Annex 4.

3.3.2.2 Mineral wool with TR7,5

Insulation: MW EN 13162 – T5 – CS(10)25-TR7,5-WS.

Description: One density

Fixing:

- Diameter of the plate: 60 mm.
- Plate stiffness $\geq 0,6$ kN/mm.
- Installation: surface assembly.

Position	Conditions	Individual values (kN)					Average (kN)
R_{panel} (out of the joint, at the body of the insulation product)	Dry	0,125	0,125	0,123	0,107	0,127	0,121
R_{joint} (at the joint)	Dry	0,104	0,090	0,105	0,094	0,093	0,097

Table 7b: Failure loads of the pull-through test.

Insulation: MW EN 13162 – T5 – CS(10)15-TR7,5-WS-MU1.

Description: Double density

Fixing:

- Diameter of the plate: 60 mm.
- Plate stiffness $\geq 0,6$ kN/mm.
- Installation: surface assembly.

Position	Conditions	Individual values (kN)					Average (kN)
R_{panel} (out of the joint, at the body of the insulation product)	Dry	Dry	0,27	0,29	0,27	0,31	0,27
R_{joint} (at the joint)	Dry	Dry	0,24	0,28	0,26	0,26	0,26

Table 7c: Failure loads of the pull-through test.

See the load/displacement graphs in Annex 4.

The design load resistance of the ETICS fixed with anchors is determined as follows:

$$R_d = \frac{R_{\text{panel}} \cdot n_{\text{panel}} + R_{\text{joint}} \cdot n_{\text{joint}}}{\gamma}$$

Where:

n_{panel} : number of anchors not placed at the panel joint, per m²

n_{joint} : number of anchors placed at the panel joint, per m²

γ : national safety factor

The test results are also valid for:

- Insulation product of the same type with higher thickness and/or higher tensile strength perpendicular to the faces.
- Anchors with the same or larger plate diameter and/or the same or higher plate stiffness (see Annex G of the EAD 040083-00-0404).
- The specified failure loads for tables 7a, 7b, and 7c are applicable only to anchors installed on the surface of the thermal insulation.

3.3.3 Bond strength after ageing

EAD 040083-00-0404, clauses 2.2.20.

Base coat	Rendering systems: key coat + finishing coats indicated hereafter:	Bond strength		
		Individual values (kPa)	Mean value (kPa)	Rupture typology
Mapetherm AR1	Quarzolite Base Coat + Quarzolite Tonachino*	14 / 10 / 15 / 11 / 13	13	C
	Silancolor Base Coat + Silancolor Tonachino*	15 / 15 / 14 / 11 / 10	13	C
	Silancolor Base Coat + Silancolor Tonachino**	7 / 8 / 6 / 7 / 6	7	C
	Silancolor Base Coat + Silancolor AC Tonachino Plus**	6 / 6 / 8 / 8 / 7	7	C
	Quarzolite Base Coat + Elastocolor Tonachino Plus**	6 / 9 / 6 / 8 / 7	7	C
	Quarzolite Base Coat + Quarzolite Tonachino**	7 / 6 / 8 / 9 / 9	8	C
	Quarzolite Base Coat + Quarzolite Tonachino PRO**	5 / 5 / 4 / 5 / 5	5	C
	Quarzolite Base Coat + Quarzolite Tonachino PRO S**	6 / 6 / 6 / 7 / 6	6	C
Mapetherm AR1 GG / AR1 Light / AR1 MAXI	Quarzolite Base Coat + Quarzolite Tonachino**	11 / 10 / 11 / 10 / 11	11	C
	Silancolor Base Coat + Silancolor Tonachino**	11 / 13 / 12 / 13 / 12	12	C
	Silancolor Base Coat + Silancolor AC Tonachino Plus*	13 / 12 / 9 / 10 / 12	11	C
	Quarzolite Base Coat + Elastocolor Tonachino Plus*	9 / 11 / 9 / 11 / 12	10	C
	Quarzolite Base Coat + Quarzolite Tonachino PRO**	6 / 5 / 5 / 5 / 5	5	C
	Quarzolite Base Coat + Quarzolite Tonachino PRO S**	7 / 7 / 6 / 6 / 6	6	C
	<i>After freeze-thaw test</i>			
	Silancolor Base Coat + Silancolor AC Tonachino Plus**	11 / 11 / 10 / 9 / 9	10	C

* Cases tested on the wall after hygrothermal cycles with a MW with TR10.

** Cases tested on the aged small samples with a MW with TR7,5.

C: cohesive rupture in insulation product.

Table 8: Bond strength after ageing test results.

3.4 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:

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

Where: $\chi_p \cdot n$: 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 ($\chi_p \cdot n$ negligible for $n < 20$).

= 0,004 W/K for anchors with a galvanized steel screw with the head covered by a plastic material ($\chi_p \cdot n$ 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 Commission¹, 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 MW 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 9: Applicable AVPC 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 ITeC², 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.

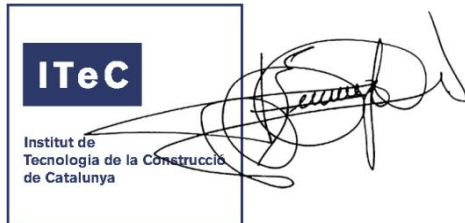
Any change in the manufacturing procedure which may affect the properties of the product shall be notified and the necessary type-testing revised according to the *Control Plan*.

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.

Issued in Barcelona on 04 September 2024
by the Catalonia Institute of Construction Technology.



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ANNEX 1: Insulation product characteristics

Descriptions and characteristics	Performance		
Description	Generic factory-prefabricated uncoated boards with straight edges for mechanically fixed ETICS, made of mineral wool (MW) according to EN 13162.		
	One density	Double density	One density
Reaction to fire EN 13501-1 (*)	A1 or A2,s1-d0	A1	A1 or A2,s1-d0
Thermal resistance ((m ² ·K)/W)	Defined in the CE marking	Defined in the CE marking	Defined in the CE marking
Thermal conductivity (W/(m·K)) (*)	Defined in the CE marking	Defined in the CE marking	Defined in the CE marking
Thickness EN 823 (*)	T5 [-1% or -1 mm and + 3 mm]	T5 [-1% or -1 mm and + 3 mm]	T5 [-1% or -1 mm and + 3 mm]
Tensile strength (kPa) (*) EN 1607	TR7,5	TR7,5	TR10
Compressive strength (kPa) (*) EN 826	CS(10\Y)15	CS(10\Y)15	CS(10\Y)25
Water absorption (short term) (*) EN 1609	WS [≤ 1,0 kg/m ²]	WS [≤ 1,0 kg/m ²]	WS [≤ 1,0 kg/m ²]
Water absorption (long term) (*) EN 12087	WL(P) [≤ 3,0 kg/m ²]	WL(P) [≤ 3,0 kg/m ²]	WL(P) [≤ 3,0 kg/m ²]
Water vapour diffusion resistance factor (μ) EN 12086	MU1	MU1	MU1

* Characteristics of the insulation products declared in the DoP.

Table A1.1: Characteristics of insulation products.

Descriptions and characteristics	Performance	
Description	Factory-prefabricated boards with straight edges for mechanically fixed ETICS, made of mineral wool (MW) according to EN 13162.	
	One density	Double density
Trade name	Mapetherm MW 1	Mapetherm MW 2
Reaction to fire EN 13501-1 (*)	A1 or A2,s1-d0	A1
Thermal resistance ($m^2 \cdot K/W$)	Defined in the CE marking	Defined in the CE marking
Thermal conductivity ($W/(m \cdot K)$) (*)	Defined in the CE marking	Defined in the CE marking
Thickness EN 823 (*)	T5 [-1% or -1 mm and + 3 mm]	T5 [-1% or -1 mm and + 3 mm]
Tensile strength (kPa) (*) EN 1607	TR $\geq 7,5$	TR $\geq 7,5$
Compressive strength (kPa) EN 826	CS(10\Y)15	CS(10\Y)15
Water absorption (short term) (*) EN 1609	WS [$\leq 1,0 \text{ kg/m}^2$]	WS [$\leq 1,0 \text{ kg/m}^2$]
Water absorption (long term) (*) EN 12087	WL(P) [$\leq 3,0 \text{ kg/m}^2$]	WL(P) [$\leq 3,0 \text{ kg/m}^2$]
Water vapour diffusion resistance factor (μ) EN 12086	MU1	MU1

* Characteristics of the insulation products declared in the DoP.

Table A1.2: Characteristics of insulation products.

Descriptions and characteristics	Performance	
Description	Factory-prefabricated uncoated boards with straight edges for mechanically fixed ETICS, made of mineral wool (MW) according to EN 13162.	
	One density	One density
Trade name	Smartwall N500	Smartwall FKD S Thermal
Reaction to fire EN 13501-1 (*)	A1	A1
Thermal resistance (m ² ·K)/W	Defined in the CE marking	Defined in the CE marking
Thermal conductivity (W/(m·K)) (*)	Defined in the CE marking	Defined in the CE marking
Thickness EN 823 (*)	T5 [-1% or -1 mm and + 3 mm]	T5 [-1% or -1 mm and + 3 mm]
Tensile strength (kPa) (*) EN 1607	TR ≥7,5	TR ≥10
Compressive strength (kPa) (*) EN 826	CS(10\Y)25	CS(10\Y)30
Water absorption (short term) (*) EN 1609	WS [≤ 1,0 kg/m ²]	WS [≤ 1,0 kg/m ²]
Water absorption (long term) (*) EN 12087	WL(P) [≤ 3,0 kg/m ²]	WL(P) [≤ 3,0 kg/m ²]
Water vapour diffusion resistance factor (μ) EN 12086	MU1	MU1

* Characteristics of the insulation products declared in the DoP.

Table A1.3: Characteristics of insulation products.

Descriptions and characteristics	Performance	
Description	Factory-prefabricated boards with straight edges for mechanically fixed ETICS, made of mineral wool (MW) according to EN 13162.	
	One density	One density
Trade name	Smartwall N C1	Smartwall S C1
Reaction to fire EN 13501-1 (*)	A1	A1
Thermal resistance ($\text{m}^2 \cdot \text{K} / \text{W}$)	Defined in the CE marking	Defined in the CE marking
Thermal conductivity ($\text{W} / (\text{m} \cdot \text{K})$) (*)	Defined in the CE marking	Defined in the CE marking
Thickness EN 823 (*)	T5 [-1% or -1 mm and + 3 mm]	T5 [-1% or -1 mm and + 3 mm]
Tensile strength (kPa) (*) EN 1607	TR $\geq 7,5$	TR ≥ 10
Compressive strength (kPa) (*) EN 826	CS(10\Y)25	CS(10\Y)30
Water absorption (short term) (*) EN 1609	WS [$\leq 1,0 \text{ kg/m}^2$]	WS [$\leq 1,0 \text{ kg/m}^2$]
Water absorption (long term) (*) EN 12087	WL(P) [$\leq 3,0 \text{ kg/m}^2$]	WL(P) [$\leq 3,0 \text{ kg/m}^2$]
Water vapour diffusion resistance factor (μ) EN 12086	MU1	MU1

* Characteristics of the insulation products declared in the DoP.

Table A1.4: Characteristics of insulation products.

Descriptions and characteristics	Performance		
Description	Factory-prefabricated uncoated boards with straight edges for mechanically fixed ETICS, made of mineral wool (MW) according to EN 13162.		
	Double density	Double density	One density
Trade name	Frontrock Pro	RockSATE Duo Plus Frontrock Max Plus	RockSATE MD Plus
Reaction to fire EN 13501-1 (*)	A1	A1	A1
Thermal resistance ($\text{m}^2 \cdot \text{K} / \text{W}$)	Defined in the CE marking	Defined in the CE marking	Defined in the CE marking
Thermal conductivity ($\text{W} / (\text{m} \cdot \text{K})$) (*)	Defined in the CE marking	Defined in the CE marking	Defined in the CE marking
Thickness EN 823 (*)	T5 [-1% or -1 mm and + 3 mm]	T5 [-1% or -1 mm and + 3 mm]	T5 [-1% or -1 mm and + 3 mm]
Tensile strength (kPa) (*) EN 1607	TR 7,5	TR 7,5	TR 10
Compressive strength (kPa) (*) EN 826	CS(10\Y)10	CS(10\Y)15	CS(10\Y)30
Water absorption (short term) (*) EN 1609	WS [$\leq 1,0 \text{ kg/m}^2$]	WS [$\leq 1,0 \text{ kg/m}^2$]	WS [$\leq 1,0 \text{ kg/m}^2$]
Water absorption (long term) (*) EN 12087	WL(P) [$\leq 3,0 \text{ kg/m}^2$]	WL(P) [$\leq 3,0 \text{ kg/m}^2$]	WL(P) [$\leq 3,0 \text{ kg/m}^2$]
Water vapour diffusion resistance factor (μ) EN 12086	MU1	MU1	MU1

* Characteristics of the insulation products declared in the DoP.

Table A1.5: Characteristics of insulation products.

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: $\geq 0,6$ kN/mm.

ANNEX 3: Glass fibre mesh characteristics

Trade name: Mapetherm Net.

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

Weight per unit area: 150 g/m² ($\pm$ 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 %	$\geq 50\%$
Elongation after artificial ageing (mean value)	$\leq 3,0$ %	$\leq 3,0$ %	--

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 %	$\geq 50\%$
Elongation after artificial ageing (mean value)	$\leq 3,0$ %	$\leq 3,0$ %	--

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

ANNEX 4: Load/Displacement graphs of the pull-through test

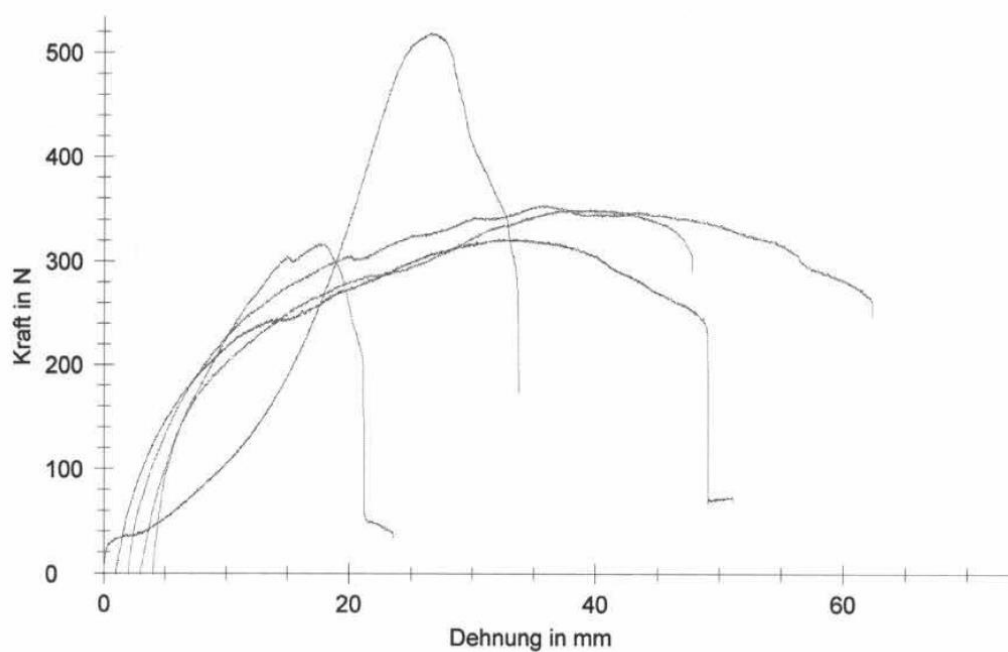


Figure A4.1: Load/Displacement graph of pull-through test of the MW (TR 10) in dry conditions. Anchors placed at the body of the insulation product (R_{panel}).

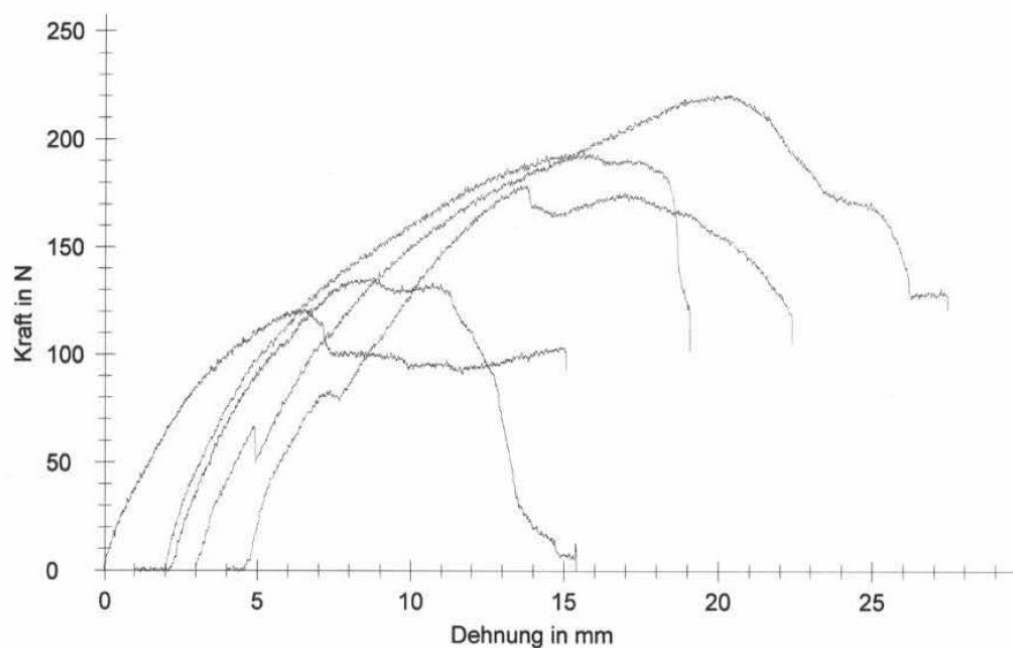


Figure A4.2: Load/Displacement graph of pull-through test of the MW (TR 10) in dry conditions. Anchors placed at the panel joint of the insulation product (R_{joint}).

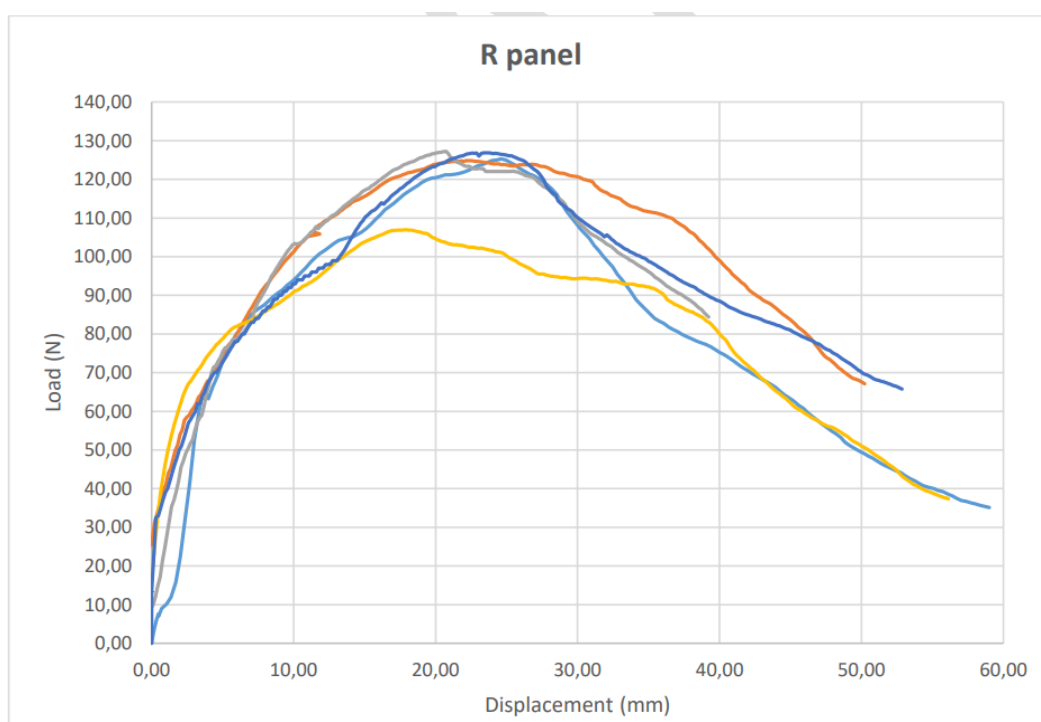


Figure A4.3: Load/Displacement graph of pull-through test of the MW (TR 7,5) one density in dry conditions. Anchors placed at the body of the insulation product (R_{panel}).

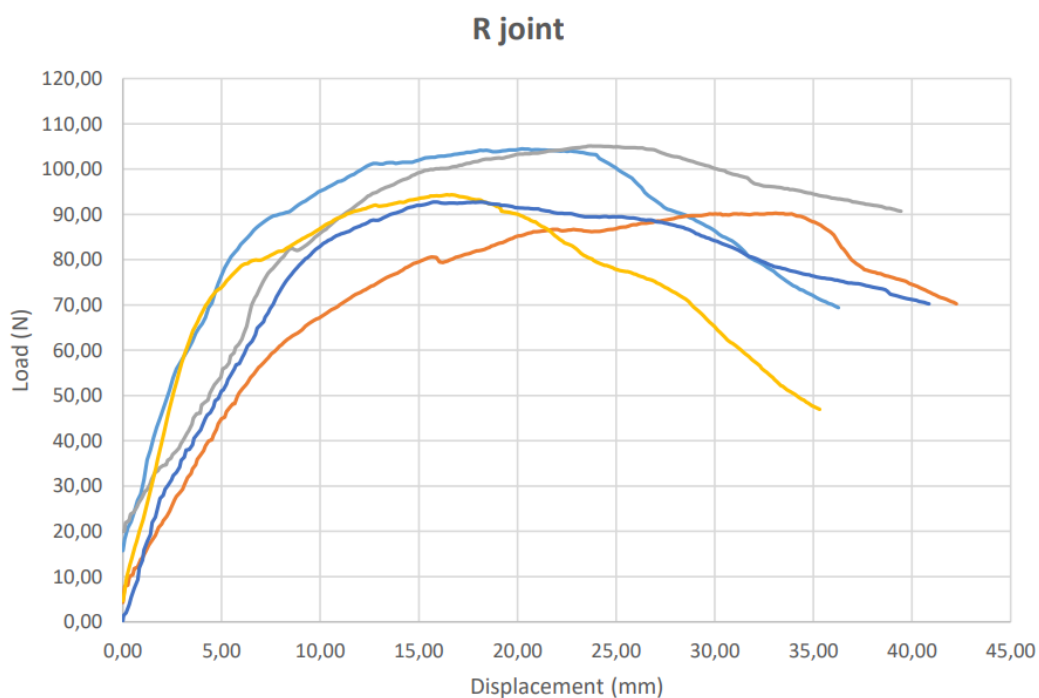


Figure A4.4: Load/Displacement graph of pull-through test of the MW (TR 7,5) one density in dry conditions. Anchors placed at the panel joint of the insulation product (R_{joint}).

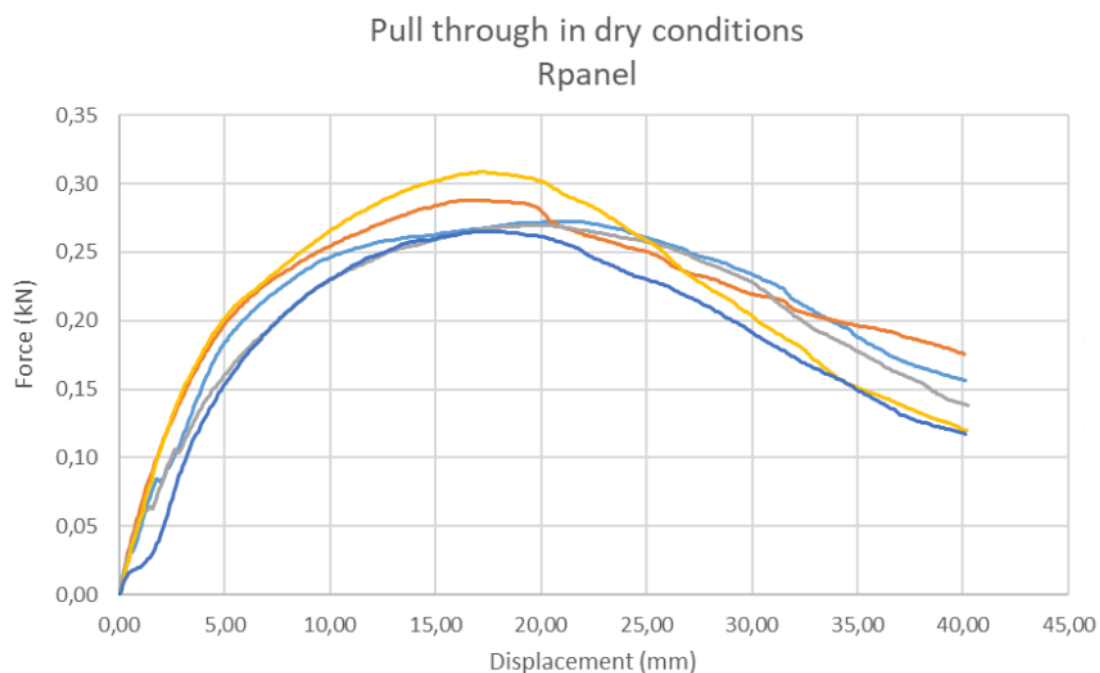


Figure A4.5: Load/Displacement graph of pull-through test of the MW (TR 7,5) double density in dry conditions. Anchors placed at the body of the insulation product (R_{panel}).

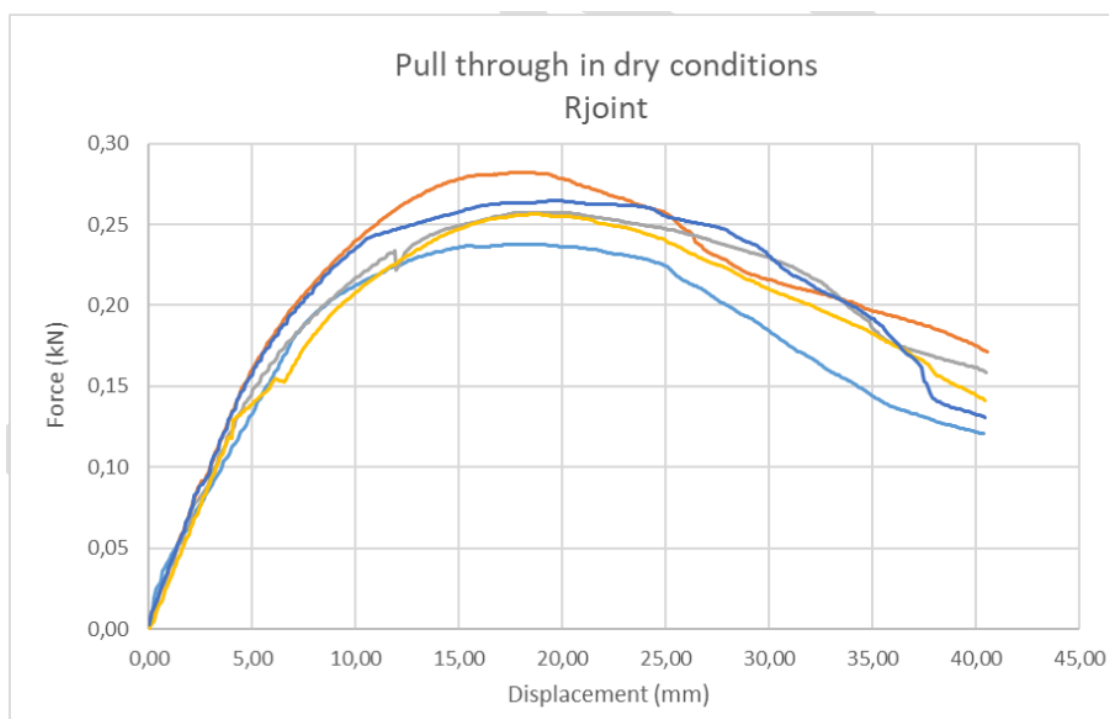


Figure A4.6: Load/Displacement graph of pull-through test of the MW (TR 7,5) double density in dry conditions. Anchors placed at the panel joint of the insulation product (R_{joint}).