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European Technical Assessment

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General part

Technical Assessment Body issuing the ETA: ITeC

ITeC has been designated according to Article 29 of Regulation (EU) No 305/2011 and is member of EOTA (European Organisation for Technical Assessment)

Trade name of the construction product

PRB THERMOBOIS COB

Product family to which the construction product belongs

Product Area Code: 04

External Thermal Insulation Composite Systems (ETICS) with rendering applied on wood fibre insulation boards for the use on timber frame buildings.

Manufacturer

PRB SA

Rue de la Tour – CS 10018
FR-85150 LES ACHARDS
France

Manufacturing plant(s)

PRB SA

Rue de la Tour – CS 10018
FR-85150 LES ACHARDS
France

This European Technical Assessment contains

19 pages including 3 annexes which form an integral part of this assessment.

This European Technical Assessment is issued in accordance with Regulation (EU) 305/2011, on the basis of

EAD 040089-00-0404 *ETICS with rendering for the use on timber frame buildings.*

General comments

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Specific parts of the European Technical Assessment

1 Technical description of the product

PRB THERMOBOIS COB is an External Thermal Insulation Composite System (ETICS) with rendering for external wall insulation on timber frame buildings. PRB THERMOBOIS COB comprises a prefabricated insulation product of wood fibres (WF) to be mechanically fixed onto the wood structure of the building. The walls of common timber frame buildings can be with or without external boards; the WF panels of THERMOBOIS COB can be mounted directly to the timber frame. The insulation product is faced with a rendering system consisting of different layers (site applied), one of which (the base coat) contains reinforcement. The rendering is applied directly to the insulating panels, without any air gap or disconnecting layer. The methods of fixing and the relevant components are specified in the table below.

The ETICS system is composed by products which are factory-produced by the manufacturer (adhesives, base coat, key coats and rendering coats) or by suppliers (meshes), and by other components that are not part of the kit (insulation boards and fixings). The ETICS manufacturer is ultimately responsible for the components that are part of the kit.

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:

Component	Description	Coverage (kg/m ²)	Thickness (mm)
	Pure mechanically fixed ETICS		
	Insulation product		
	Wood fibre insulation boards (WF), STEICO PROTECT DRY H. See Annex 1 for product characteristics.	--	40 to 60
	Wood fibre insulation boards (WF), STEICO PROTECT DRY M. See Annex 1 for product characteristics.	--	60 to 200
Insulation product	Wood fibre insulation boards (WF), STEICO PROTECT DRY L. See Annex 1 for product characteristics.	--	100 to 240
	Wood fibre insulation boards (WF), STEICO PROTECT H. See Annex 1 for product characteristics.	--	40 to 60
	Wood fibre insulation boards (WF), STEICO PROTECT M. See Annex 1 for product characteristics.	--	80 to 100
Fixing	Screws: screw fixings (a metallic screw with a plastic plate) for surface assembly on timber frame, EJOTHERM STR H and FISCHER THERMOFIX 6H-NT. See Annex 2.	-	-
	Staples: metallic staples. See Annex 2.	--	--
Base coat	PRB FONDISOL F: grey or white powder requiring the addition of about 24% to 26% in weight of water, consisting of grey or white cement, hydraulic lime, mineral pigments, calcium carbonate and silica as particles and specific additives.	6,9 (paste) AVN+ANV: 8,9 AVR+AVN: 9,4	3 (dry) AVN+AVN: 4 AVR+AVN: 5

Component	Description	Coverage (kg/m ²)	Thickness (mm)	
Mesh	Standard glass fibre meshes and reinforced meshes. See Annex 3.	--	--	
Key coat	PRB CRÉPIFOND G: ready to use coloured liquid to be mandatory applied before the finishing coats (dilution rate 0% to 10%): <ul style="list-style-type: none"> - PRB CRÉPIMUR FR - PRB CRÉPIRIB FR - PRB CRÉPOXANE FR - PRB CRÉPILIS FR 	0,2 to 0,3	-	
	PRB CRÉPIFOND MINÉRAL: ready to use coloured liquid, optional application before the finishing coats: <ul style="list-style-type: none"> - PRB CRÉPITAL - PRB CRÉPIXATE 	0,2 to 0,3	-	
Finishing coat	Ready to use pastes - acrylic binder: <ul style="list-style-type: none"> - PRB CRÉPIMUR F FR: particle size 1 mm. Floated finishing aspect. - PRB CRÉPIMUR M FR: particle size 1,5 mm. Floated finishing aspect. - PRB CRÉPIRIB F FR: particle size 2 mm. Ribbed finishing aspect. 	2,0 to 2,2 2,2 to 2,8 2 to 2,6	Regulated by particle size	
	Ready to use pastes - acryl-siloxane binder: <ul style="list-style-type: none"> - PRB CRÉPOXANE F FR: particle size 1 mm. Floated finishing aspect. - PRB CRÉPOXANE M FR: particle size 1,5 mm. Floated finishing aspect. 	2,0 to 2,2 2,2 to 2,8	Regulated by particle size	
	PRB CRÉPILIS FR: finishing coat composed of two coats of ready to use pastes – acrylic binder: <ul style="list-style-type: none"> - PRB CRÉPILIS SC FR (particle size 0,7 mm) + - PRB CRÉPILIS F FR: particle size 0,3 mm. Stippled finishing aspect. 	1,1 to 1,5 0,6 to 1,0	Regulated by particle size	
	Ready to use pastes – silicate binder: <ul style="list-style-type: none"> - PRB CRÉPIXATE F: particle size 1 mm. Floated finishing aspect. - PRB CRÉPIXATE M: particle size 1,5 mm. Floated finishing aspect. 	2,0 to 2,3 2,4 to 2,8	Regulated by particle size	
	Powder requiring addition of 23% to 26% wt. water - hydraulic binder: <ul style="list-style-type: none"> - PRB THERMOLOOK GF: particle size 1,8 mm to 2 mm. - PRB THERMOLOOK GM: particle size 3,0 mm to 3,15 mm. For both products: rough, scratched or partially smooth finishing aspect.	Rough or partially smoothed: 8,0 to 9,0. Scratched: 11 to 15	Rough or partially smoothed: 7 to 8. Scratched: 7 to 10	
	Powder requiring addition of 25% to 27% wt. water - hydraulic binder: <ul style="list-style-type: none"> - PRB CRÉPITAL: particle size 1,5 mm. Floated finishing aspect. 	2,0 to 2,4	Regulated by particle size	
	Ancillary materials	Descriptions in accordance with section 1.3.6 of the EAD. These components remain under the ETA-Manufacturer's responsibility.		

Table 1.1: ETICS components.

2 Specification of the intended use(s) in accordance with the applicable European Assessment Document (hereinafter EAD)

The PRB THERMOBOIS COB ETICS is intended for use as external insulation of timber frame buildings. The WF insulation board can be mounted on the external boards or directly on the timber frame. The characteristics of the walls shall be verified prior to use of the ETICS, especially regarding conditions for reaction to fire classification. 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 timber frame building 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 provisions made in this ETA are based on an assumed working life of at least 25 years for PRB THERMOBOIS COB 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 PRB THERMOBOIS COB related to the basic requirements for construction works (hereinafter BWR) were determined according to EAD 040089-00-0404 for *ETICS with renderings for the use on timber frame buildings*. Essential characteristics of PRB THERMOBOIS COB are indicated in table 2.

Essential characteristic	ETA section	Performance
Basic Works Requirement 2: Safety in case of fire		
Reaction to fire	3.1	B-s1,d0 when WF boards are fixed to an external board. Not assessed when WF boards are directly mounted on the timber frame.
Basic Works Requirement 3: Hygiene, health and the environment		
Water absorption	3.3	<u>Water absorption of the base coat</u> < 1 kg/m ² after 1 hour < 0,5 kg/m ² after 24 hours <u>Water absorption of the rendering system</u> < 1 kg/m ² after 1 hour < 0,5 kg/m ² after 24 hours except for the combination of STEICO PROTEC insulation boards with PRB CRÉPITAL as finishing coat. See results on table 3.6.

Essential characteristic	ETA section	Performance
Water tightness: hygrothermal behaviour	3.4	The ETICS is assessed as resistant to hygrothermal cycles.
Water tightness: freeze-thaw behaviour	3.5	All combinations are freeze-thaw resistant except for PRB CRÉPITAL when it is applied in combination of STEICO PROTECT insulation boards (this combination is not assessed).
Water tightness: moisture content and gradient	--	Not assessed.
Water vapour permeability	3.6	See results on table 3.7.
Basic Works Requirement 4: Safety and accessibility in use		
Bond strength between base coat and insulation product.	3.9	Cohesive rupture in the insulation product. See results on table 3.8.
Fixing strength (transverse displacement).	3.10	Test not required. See section 3.10.
Wind load resistance:		
- Pull-through test of fixings.	Annex 2	Not relevant for WF insulation boards according to table 3 of the EAD.
- Static foam block.	Annex 2	Not relevant for WF insulation boards according to table 3 of the EAD.
- Dynamic wind uplift test.	3.11	See section 3.11.
- Resistance to soft body impact.	--	Not assessed.
Impact resistance.	3.19	See tables 3.14, 3.15 and 3.16.
Bond strength after ageing.	3.20 3.21	Cohesive rupture in the insulation product. See results on tables 3.17 and 3.18.
Basic Works Requirement 5: Protection against noise.		
Airborne sound insulation.	--	Not assessed.
Basic Works Requirement 6: Energy economy and heat retention.		
Thermal resistance and thermal transmittance	3.24	See section 3.23 and calculation on table 3.23.

Table 3.1: Essential characteristics of the ETICS PRB THERMOBOIS COB.

Essential characteristic	ETA section	Performance
Basic Works Requirement 2: Safety in case of fire		
Reaction to fire	3.2	Class E
Basic Works Requirement 3: Hygiene, health and the environment		
Water absorption	3.7	WS1,0 ($\leq 1 \text{ kg/m}^2$)
Water vapour permeability	3.8	STEICO PROTECT DRY: MU3 STEICO PROTECT DRY: MU5
Basic Works Requirement 4: Safety and accessibility in use		
Tensile strength	3.12 3.13	Dry conditions: see table 3.9. STEICO PROTECT H: TR20 STEICO PROTECT M: TR15 STEICO PROTECT DRY H: TR30 STEICO PROTECT DRY M: TR20 STEICO PROTECT DRY H: TR10 Wet conditions: see table 3.10.
Shear strength and shear modulus of elasticity test	3.14	See table 3.11.
Bending strength	3.15	See table 3.12.
Dimensional stability	3.16	DS(70,90)3
Basic Works Requirement 5: Protection against noise.		
Dynamic stiffness	--	Not assessed.
Basic Works Requirement 6: Energy economy and heat retention.		
Thermal resistance	3.25	See section 3.23.
Air flow resistance	--	Not assessed.

Table 3.2: Essential characteristics of the insulation products.

Essential characteristic	ETA section	Performance
Basic Works Requirement 2: Safety in case of fire		
Reaction to fire	--	Not assessed.
Basic Works Requirement 4: Safety and accessibility in use		
Pull-out strength of mechanical fixings	3.17	See section 3.17.
Protection against corrosion	3.22	See table A2.3.

Table 3.3: Essential characteristics of the mechanical fixings.

Essential characteristic	ETA section	Performance
Basic Works Requirement 4: Safety and accessibility in use		
BASE COAT Performances	3.18	See results on table 3.13.
RENDERING SYSTEM Tensile strength	--	Not assessed.
REINFORCEMENT Tearing strength and elongation	3.23	See results on tables 3.19, 3.20, 3.21 and 3.22. See description on Annex 2.

Table 3.4: Essential characteristics of other components.

3.1 Reaction to fire of the ETICS

The reaction to fire of PRB THERMOBOIS COB has been assessed according to section 2.2.1.1 of the EAD. Two cases are considered depending on where the ETICS is fixed to (see 4.1 of Annex A of the EAD 040089-00-0404).

3.1.1 ETICS fixed to an external board

The reaction to fire of PRB THERMOBOIS COB system (with the configurations described in table 1.1) according to EN 13501-1 is class B-s1,d0.

Configuration (the combination of key coat + finishing coat is described in table 1.1)	Max. organic content declared (% weight)	Declared flame retardant content (% weight)
<ul style="list-style-type: none"> Adhesives: PRB THERMICOL PRB FONDISOL F 	2,6 to 3,0	0
<ul style="list-style-type: none"> Insulation: STEICO PROTECT DRY H STEICO PROTECT DRY M STEICO PROTECT DRY L Note: According to the DoP the reaction to fire class is E. 	--	--
<ul style="list-style-type: none"> Base coat: PRB FONDISOL F 	2,6	0
<ul style="list-style-type: none"> Glass fibre mesh: PRB AVN (03-1 C+). This is the most calorific mesh; meshes with PCS lower than 1,3 MJ/m² can also be considered. PRB AVN (04-161 B) PRB AVN (0161-CA) PRB AVN (0161RA20) PRB AVN (SSA-1363 F+) PRB AVN (R 131 A 101 C+) PRB AVN (R 131 A 102 C+) 	--	--

Configuration (the combination of key coat + finishing coat is described in table 1.1)	Max. organic content declared (% weight)	Declared flame retardant content (% weight)
<ul style="list-style-type: none"> Key coat: PRB CRÉPIFOND G PRB CRÉPIFOND MINERAL 	3,5 to 12,0	0
<ul style="list-style-type: none"> Finishing coat: PRB CRÉPIMUR F FR / M FR 		
PRB CRÉPIRIB F FR		
PRB CRÉPOXANE F FR / M FR		
PRB CRÉPILIS SC FR + PRB CRÉPILIS F FR	2,5 to 7,8	0 to 20
PRB CRÉPIXATE F / M		
PRB THERMOLOOK GF / GM		
PRB CRÉPITAL		

Table 3.5: Reaction to fire information of the PRB THERMOBOIS COB ETICS components.

The classification is valid taking into consideration the following aspects:

- Adhesives, base coat, key coat and finishing coats: as defined in table 1.1 of the ETA.
- Insulation product:
 - o Wood fibre panels (WF).
 - o Thickness: all thicknesses.
 - o Nominal density: $\leq 365 \text{ kg/m}^3$
 - o Reaction to fire classification: E.
- Mesh: $\text{PCS} \leq 1,3 \text{ MJ/m}^3$
- Support: a wood based panel or derivative wood based panel with a density $\geq 337 \text{ kg/m}^3$ and a thickness $\geq 8 \text{ mm}$ or on any substrate with a reaction to fire class A1 or A2-s1,d0 with a density $\geq 337 \text{ kg/m}^3$ and a thickness $\geq 8 \text{ mm}$.
- No air gaps.

Note: A European reference fire scenario has not been laid down for façades. In some Member States, the classification of external wall claddings according to EN 13501-1 might not be enough for the use in façades. An additional assessment of external wall claddings 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.

3.1.2 ETICS fixed to timber frame

Not assessed.

3.2 Reaction to fire of the thermal insulation material

EAD 040089-00-0404, clause 2.2.1.3.

The reaction to fire class of the thermal insulation boards is given in the DoP (Declaration of Performance). The characteristics of the DoP are listed in the Annex 1 of the ETA.

The declared reaction to fire class of STEICO PROTECT and STEICO PROTECT DRY insulation panels is **E**.

3.3 Water absorption of the ETICS (capillarity test)

EAD 040089-00-0404, clause 2.2.2.1.

3.3.1 Water absorption of the base coat

- After 1 hour: water absorption < 1 kg/m²
- After 24 hours: water absorption < 0,5 kg/m²

3.3.2 Water absorption of the rendering system

- After 1 hour: water absorption < 1 kg/m²
- After 24 hours: see table 3.2.

Rendering system: Base coat (PRB Fondisol F) + key coat (if necessary) + finishing coat indicated below	Water absorption after 24 hours	
	< 0,5 kg/m ²	≥ 0,5 kg/m ²
Key coat: PRB CRÉPIFOND G Finishing coats:		
- PRB CRÉPIMUR F FR		
- PRB CRÉPIMUR M FR		
- PRB CRÉPIRIB F FR	X	
- PRB CRÉPOXANE F FR		
- PRB CRÉPOXANE M FR		
- PRB CRÉPILIS SC FR + PRB CRÉPILIS F FR		
Key coat: PRB CRÉPIFOND MINERAL Finishing coats:		
- PRB CRÉPIXATE F		
- PRB CRÉPIXATE M	X	
Key coat: PRB CRÉPIFOND MINERAL Finishing coats:		
- PRB CRÉPITAL in combination with STEICO PROTECT DRY insulation boards	X	
- PRB CRÉPITAL in combination with STEICO PROTECT insulation boards		X

Rendering system: Base coat (PRB Fondisol F) + key coat (if necessary) + finishing coat indicated below	Water absorption after 24 hours	
	< 0,5 kg/m ²	≥ 0,5 kg/m ²
Without key coat		
Finishing coats:		
- PRB THERMOLOOK GF	X	
- PRB THERMOLOOK GM		

Table 3.6: Water absorption of the rendering system.

3.4 Water tightness of the ETICS: hygrothermal behaviour

EAD 040089-00-0404, clause 2.2.2.2.

Heat-rain and heat-cold cycles have been performed on a rig where PRB THERMOBOIS COB system was applied on WF insulation boards directly mounted on timber frame. None of the following defects occurred during and after the tests on the assessed renderings and base coat:

- blistering or peeling of any finishing,
- failure or cracking associated with joints between insulation product boards or profiles fitted with system,
- detachment of render,
- cracking allowing water penetration to the insulation layer.

3.5 Water tightness of the ETICS: freeze-thaw behaviour

EAD 040089-00-0404, clause 2.2.2.3.

All combinations are freeze-thaw resistant according to the water absorption test results except for PRB CRÉPITAL when it is applied in combination of STEICO PROTECT insulation boards (this combination is not assessed).

3.6 Water vapour permeability of the ETICS (resistance to water vapour diffusion)

EAD 040089-00-0404, clause 2.2.2.6.

Rendering system: Base coat (PRB Fondisol F) + key coat (if necessary) + finishing coat	Maximum particle size (mm)	Equivalent air thickness S _d (m)
Base coat: PRB FONDISOL F	1,0 mm	≤ 1,0 (Test result: 0,13)
PRB CRÉPIFOND G + PRB CRÉPIMUR F FR	1,0 mm	≤ 1,0 (Test result: 0,5)
PRB CRÉPIFOND G + PRB CRÉPIMUR M FR*	1,5 mm	≤ 1,0 (Test result: 0,6)
PRB CRÉPIFOND G + PRB CRÉPIRIB F FR*	2,0 mm	≤ 1,0 (Test result: 0,5)

Rendering system: Base coat (PRB Fondisol F) + key coat (if necessary) + finishing coat	Maximum particle size (mm)	Equivalent air thickness S_d (m)
PRB CRÉPIFOND G + PRB CRÉPOXANE F FR	1,0 mm	$\leq 1,0$
PRB CRÉPIFOND G + PRB CRÉPOXANE M FR*	1,5 mm	(Test result: 0,7)
PRB CRÉPIFOND G + PRB CRÉPILIS SC FR + PRB CRÉPILIS F FR*	1,0 mm + 0,3 mm	$\leq 1,0$ (Test result: 0,5)
PRB CRÉPIFOND MINERAL + PRB CRÉPIXATE F	1,0 mm	$\leq 1,0$
PRB CRÉPIFOND MINERAL + PRB CRÉPIXATE M*	1,5 mm	(Test result: 0,2)
PRB CRÉPIFOND MINERAL + PRB CRÉPITAL*	1,5 mm	$\leq 1,0$ (Test result: 0,2)
PRB THERMOLOOK GF	2,0 mm	$\leq 1,0$ (Test result: 0,3)
PRB THERMOLOOK GM*	3,15 mm	$\leq 1,0$ (Test result: 0,2)
PRB CRÉPITAL	1,5 mm	$\leq 1,0$ (Test result: 0,2)
PRB CRÉPIXATE M*	1,0 mm	$\leq 1,0$
PRB CRÉPIXATE F	1,5 mm	(Test result: 0,2)

* Finishing coat tested.

Table 3.7: Resistance to water vapour diffusion.

3.7 Water absorption of the insulation product

EAD 040089-00-0404, clause 2.2.2.7.

The water absorption class of the thermal insulation boards is given in the DoP (Declaration of Performance). The characteristics of the DoP are listed in the Annex 1 of the ETA.

The declared water absorption class of STEICO PROTECT and STEICO PROTECT DRY insulation panels is WS1,0 ($\leq 1 \text{ kg/m}^2$).

3.8 Water permeability of the insulation product

EAD 040089-00-0404, clause 2.2.2.8.

The μ of the thermal insulation boards is given in the DoP (Declaration of Performance). The characteristics of the DoP are listed in the Annex 1 of the ETA.

The declared value of water vapour permeability factor of STEICO PROTECT DRY insulation panels is 3 and of STEICO PROTECT insulation panels is 5.

3.9 Bond strength between base coat and insulation product

EAD 040089-00-0404, clause 2.2.3.1.

Cases	Bond strength results	
	Mean value (MPa)	Rupture typology
On the samples after 28 days curing:		
STEICO PROTECT DRY L	0,030	Cohesive rupture (100%) in the insulation product
STEICO PROTECT DRY M	0,026	
STEICO PROTECT DRY H	0,024	
STEICO PROTECT M	0,009	Cohesive rupture (100%) in the insulation product
STEICO PROTECT H	0,019	
After hygrothermal cycles on the rig*:		
STEICO PROTECT DRY H	0,039	Cohesive rupture (100%) in the insulation product
STEICO PROTECT H	0,028	

* Bond strength tests carried out with square metal pieces of 100 mm x 100 mm.

Table 3.8: Results of the bond strength test between base coat and insulation product.

3.10 Fixing strength (transverse displacement)

EAD 040089-00-0404, clause 2.2.3.5.

Test not required because the ETICS fulfils the following criteria:

E-d < 50.000 N/mm

E modulus of elasticity of the base coat without mesh.

d mean dry thickness of the base coat.

3.11 Wind load resistance of mechanically fixed ETICS – Dynamic wind uplift test

EAD 040089-00-0404, clause 2.2.3.6.3.

No damages occurred in any of the specimens:

- The insulation panel did not break.
- There was not delamination in the insulation product or between the insulation product and the rendering.
- The rendering system did not detach.
- The insulation panel was not pulled off of the fastener.
- The mechanical fasteners were not torn out of the substrate.
- The insulation panel did not detach form the supporting structure.

Maximum load reached: $W_{100\%}$ of 6.000 kPa (Q_1).

According to section 2.2.3.6.3 of the EAD, the admissible value of the characteristic resistance, R_k is:

$$R_k = Q_1 \times C_s \times C_a = 6.000 \times 0,98 \times 1 = 5.880 \text{ kPa}$$

where

$$Q_1 = 6.000 \text{ kPa}$$

$$C_s = 0,98$$

$$C_a = 1$$

3.12 Tensile strength of the insulation product in dry conditions

EAD 040089-00-0404, section 2.2.3.7.

Insulation product	DoP (kPa)	Mean value (kPa)	Minimum value (kPa)
Steico Protect Dry H	30	43,4	41,2
Steico Protect Dry M	20	41,8	39,1
Steico Protect Dry L	10	16,9	15,6
Steico Protect H	20	28,3	24,4
Steico Protect M	15	18,9	17,5

Table 3.9: Results of the tensile resistance test of the insulation product in dry conditions.

3.13 Tensile strength of the insulation product in wet conditions

EAD 040089-00-0404, section 2.2.3.8.

Insulation product	Series 1 7 days at (70 ± 2) °C and (95 ± 5) %RH		Series 2 28 days at (70 ± 2) °C and (95 ± 5) %RH	
	Mean value (kPa)	Minimum value (kPa)	Mean value (kPa)	Minimum value (kPa)
Steico Protec Dry H	31,9	28,8	31,0	28,0
Steico Protect Dry M	35,3	33,3	29,6	23,7
Steico Protect Dry L	17,4	16,4	14,0	11,3
Steico Protect H	26,3	21,3	27,2	21,0
Steico Protect M	17,1	14,6	16,6	14,9

Table 3.10: Results of the tensile resistance test of the insulation product in wet conditions.

3.14 Shear strength and shear modulus of elasticity of insulation product

EAD 040089-00-0404, section 2.2.3.9.

Insulation product	Minimum value (N/mm ²)
Shear strength	
Steico Protec Dry H, M, L	≥ 0,02
Steico Protect H, M	
Shear modulus	
Steico Protec Dry H, M	≥ 1
Steico Protect Dry L	≥ 0,9
Steico Protect H, M	≥ 1

Table 3.11: Shear strength and shear modulus of elasticity of the insulation product.

3.15 Bending strength of insulation product

EAD 040089-00-0404, section 2.2.3.10.

Insulation product	Thickness (mm)	Mean value (N/mm ²)	Minimum value (N/mm ²)
Steico Protec Dry H	60	L: 0,905; T: 0,824	L: 0,846; T: 0,776
Steico Protect Dry M	60	L: 0,673; T: 0,703	L: 0,618; T: 0,683
Steico Protect Dry L	60	L: 0,353; T: 0,368	L: 0,326; T: 0,353
Steico Protect H	60	L: 0,879; T: 0,965	L: 0,853; T: 0,945
Steico Protect M	60	L: 0,590; T: 0,618	L: 0,570; T: 0,593

Table 3.12: Bending strength of the insulation products.

3.16 Dimensional stability

EAD 040089-00-0404, section 2.2.3.11.

The dimensional stability of the thermal insulation boards is given in the DoP (Declaration of Performance). The characteristics of the DoP are listed in the Annex 1 of the ETA.

The declared dimensional stability in the DoP for all wood fibre panels of this ETA is DS(70,90)3.

3.17 Pull-out strength of mechanical fixings

EAD 040089-00-0404, section 2.2.3.14.

In accordance with the DoP, the characteristic value of the pull-out strength of Alsafix staples is $f_{ax,k} = 5,6 \text{ N/mm}^2$.

3.18 Hardened base coat: static modulus of elasticity, tensile strength and elongation at break for products with a thickness up to 5 mm.

EAD 040089-00-0404, section 2.2.3.16.

Mechanical characteristics:	PRB FONDISOL F	
	Initial state	After ageing
Failure load at break (N)	87	306
Tensile strength at break (MPa)	0,7	2,0
Elongation at break (%)	0,2	0,1
Static modulus of elasticity E (MPa)	675	2571

Table 3.13: Mechanical characteristics of PRB Fondisol F as hardened base coat.

3.19 Impact resistance of the ETICS

EAD 040089-00-0404, section 2.2.3.19.

Rendering system: Base coat (PRB Fondisol F) + key coat (if necessary) + finishing coat indicated below	Single standard mesh (AVN)			Reinforced mesh + standard mesh (AVR + AVN)		
	Impact Ø mark (mm)		Category	Impact Ø mark (mm)		Category
	3 J	10 J		3 J	10 J	
Insulation board: STEICO PROTECT DRY						
PRB CRÉPIFOND G + PRB CRÉPIMUR F FR	17	33	III	9	26	II
	18	28		7	21	
	16	30		6	22	
	19	27		7	18	
	15	33		7	19	
	(2)	(3)		(1b)	(2)	
PRB CRÉPIFOND G + PRB CRÉPIRIB F FR	12	43	III	8	21	II
	11	32		10	16	
	12	33		8	15	
	10	25		7	17	
	17	29		7	19	
	(1b)	(3)		(1b)	(2)	

Rendering system: Base coat (PRB Fondisol F) + key coat (if necessary) + finishing coat indicated below	Single standard mesh (AVN)			Reinforced mesh + standard mesh (AVR + AVN)		
	Impact Ø mark (mm)		Category	Impact Ø mark (mm)		Category
	3 J	10 J		3 J	10 J	
PRB CRÉPIFOND G + PRB CRÉPOXANE F FR	16	23	II	9	22	II
	13	20		12	20	
	12	23		12	23	
	13	21		7	24	
	15	22		9	26	
	(1b)	(2)		(1b)	(2)	
PRB CRÉPIFOND G + PRB CRÉPILIS SC FR + CRÉPILIS F FR	11	23	II	8	25	II
	15	23		8	23	
	14	25		8	24	
	10	29		9	30	
	13	29		10	27	
	(1b)	(2)		(1b)	(2)	
PRB CRÉPIXATE F	14	26	II	0 (1a)	28	II
	14	25		0 (1a)	26	
	11	31		0 (1a)	24	
	12	30		0 (1a)	22	
	14	35		11 (1b)	24	
	(1b)	(2)			(2)	
PRB THERMOLOOK GF	14	23	I	16	19	I
	12	20		14	20	
	12	23		13	21	
	13	23		12	17	
	13	25		10	20	
	(1b)	(1b)		(1b)	(1b)	
PRB CRÉPITAL	14	29	II	12	24	II
	12	26		9	24	
	11	28		9	25	
	16	25		11	24	
	13	29		10	27	
	(1b)	(2)		(1b)	(2)	

Legend of the description of the observations after the impacts (observation in, at least, three of five impacts):

- (1a) No deterioration.
- (1b) Superficial damages without cracks formation.
- (2) Rendering not penetrated (presence of microcracks).
- (3) Presence of not penetrating cracks.

Table 3.14: Impact resistance of the rendering system PRB THERMOBOIS COB applied on STEICO PROTECT DRY insulation panels.

Rendering system: Base coat (PRB Fondisol F) + key coat (if necessary) + finishing coat indicated below	Single standard mesh (AVN)		Reinforced mesh + standard mesh (AVR + AVN)			
	Impact Ø mark (mm)		Category	Impact Ø mark (mm)		Category
	3 J	10 J		3 J	10 J	
Insulation board: STEICO PROTECT						
PRB CRÉPIFOND G + PRB CRÉPIMUR F FR	17	33	III	9	26	II
	18	28		7	21	
	16	30		6	22	
	19	27		7	18	
	15	33		7	19	
	(2)	(3)		(1b)	(2)	
PRB CRÉPIFOND G + PRB CRÉPIRIB F FR	13	38	III	8	21	II
	14	37		10	16	
	16	29		8	15	
	12	34		7	17	
	10	32		7	19	
	(1b)	(3)		(1b)	(2)	
PRB CRÉPIFOND G + PRB CRÉPOXANE F FR	16	23	II	9	22	II
	13	20		12	20	
	12	23		12	23	
	13	21		7	24	
	15	22		9	26	
	(1b)	(2)		(1b)	(2)	
PRB CRÉPIFOND G + PRB CRÉPILIS SC FR + CRÉPILIS F FR	11	23	II	8	25	II
	15	23		8	23	
	14	25		8	24	
	10	29		9	30	
	13	29		10	27	
	(1b)	(2)		(1b)	(2)	
PRB CRÉPIXATE F	14	26	II	0 (1a)	28	II
	14	25		0 (1a)	26	
	11	31		0 (1a)	24	
	12	30		0 (1a)	22	
	14	35		11 (1b)	24	
	(1b)	(2)			(2)	
PRB THERMOLOOK GF	11	30	II	16	19	I
	10	26		14	20	
	10	25		13	21	
	11	29		12	17	
	10	27		10	20	
	(1b)	(2)		(1b)	(1b)	
PRB CRÉPITAL	14	29	II	12	24	II
	12	26		9	24	
	11	28		9	25	
	16	25		11	24	
	13	29		10	27	
	(1b)	(2)		(1b)	(2)	

Rendering system: Base coat (PRB Fondisol F) + key coat (if necessary) + finishing coat indicated below	Single standard mesh (AVN)			Reinforced mesh + standard mesh (AVR + AVN)		
	Impact Ø mark (mm)		Category	Impact Ø mark (mm)		Category
	3 J	10 J		3 J	10 J	

Legend of the description of the observations after the impacts (observation in, at least, three of five impacts):

- (1a) No deterioration.
- (1b) Superficial damages without cracks formation.
- (2) Rendering not penetrated (presence of microcracks).
- (3) Presence of not penetrating cracks.

Table 3.15: Impact resistance of the rendering system PRB THERMOBOIS COB applied on STEICO PROTECT insulation panels.

Rendering system: Base coat (PRB Fondisol F) with single standard mesh (AVN) + finishing coat indicated below	STEICO PROTECT DRY			STEICO PROTECT		
	Impact Ø mark (mm)		Category	Impact Ø mark (mm)		Category
	3J	10J		3J	10J	
PRODUCTS TESTED ON THE WALL AFTER HYGROTHERMAL CYCLES						
PRB THERMOLOOK GM	16	20	I	15	27	I
	16	25		15	28	
	15	14		14	29	
	(1b)	(1b)		(1b)	(1b)	
PRB CRÉPIXATE M	9	30	II	9	20	I
	9	23		9	21	
	9	20		9	20	
	(1b)	(2)		(1b)	(1b)	

Legend of the description of the observations after the impacts:

- (1a) No deterioration.
- (1b) Superficial damages without cracks formation.
- (2) Rendering not penetrated (presence of microcracks).
- (3) Presence of not penetrating cracks.

Table 3.16: Impact resistance of the rendering system PRB THERMOBOIS COB when the tests are carried out on the wall after hygrothermal cycles.

3.20 Bond strength after ageing of ETICS: finishing coats tested on the rig

EAD 040089-00-0404, section 2.2.3.20.

Rendering system: Base coat (PRB Fondisol F) + finishing coat indicated below	Bond strength results	
	Mean value (MPa)	Rupture typology
Insulation panel: STEICO PROTECT DRY		
PRB CRÉPIXATE M	0,033	Cohesive rupture (100%) in the insulation product.
PRB THERMOLOOK GM	0,033	
Insulation panel: STEICO PROTECT		
PRB CRÉPIXATE M	0,029	Cohesive rupture (100%) in the insulation product.
PRB THERMOLOOK GM	0,022	

* Bond strength tests carried out with square metal pieces of 100 mm x 100 mm.

Table 3.17: Bond strength between the base coat and the insulation products.

3.21 Bond strength after ageing of ETICS: finishing coats not tested on the rig

EAD 040089-00-0404, section 2.2.3.21.

Rendering system: Base coat (PRB Fondisol F) + key coat (if necessary) + finishing coat indicated below	Bond strength results		
	Mean value (MPa)	Rupture typology	
Insulation panel: STEICO PROTECT DRY			
PRB CRÉPIFOND G + PRB CRÉPIMUR M FR PRB CRÉPIFOND G + PRB CRÉPIMUR F FR	0,016	Cohesive rupture (100%) in the insulation product.	
PRB CRÉPIFOND G + PRB CRÉPIRIB F FR	0,021		
PRB CRÉPIFOND G + PRB CRÉPOXANE M FR PRB CRÉPIFOND G + PRB CRÉPOXANE F FR	0,021		
PRB CRÉPIFOND G + PRB CRÉPILIS SC FR + PRB CRÉPILIS F FR	0,018		
PRB CRÉPIXATE M PRB CRÉPIXATE F	0,021		
PRB THERMOLOOK GM PRB THERMOLOOK GF	0,022		
PRB CRÉPITAL	0,020		
Insulation panel: STEICO PROTECT			
PRB CRÉPIFOND G + PRB CRÉPIMUR M FR PRB CRÉPIFOND G + PRB CRÉPIMUR F FR	0,011		

Rendering system: Base coat (PRB Fondisol F) + key coat (if necessary) + finishing coat indicated below	Bond strength results	
	Mean value (MPa)	Rupture typology
PRB CRÉPIFOND G + PRB CRÉPIRIB F FR	0,011	
PRB CRÉPIFOND G + PRB CRÉPOXANE M FR PRB CRÉPIFOND G + PRB CRÉPOXANE F FR	0,009	
PRB CRÉPIFOND G + PRB CRÉPILIS SC FR + PRB CRÉPILIS F FR	0,013	Cohesive rupture (100%) in the insulation product.
PRB CRÉPIXATE M PRB CRÉPIXATE F	0,008	
PRB THERMOLOOK GM PRB THERMOLOOK GF	0,015	
PRB CRÉPITAL	0,013	

Table 3.18: Bond strength after ageing.

3.22 Protection against corrosion of mechanical fixings

EAD 040089-00-0404, clause 2.2.3.22.

The declared intended service class according to EN 1995-1-1 of the staples Alsafix WP and BeA NR HZ A2 type 246 are declared in table A2.3 of Annex 2.

3.23 Tearing strength and elongation of the reinforcement of the glass fibre mesh

EAD 040089-00-0404, clause 2.2.3.23.

Characteristic		PRB AVF	PRB AVN		
		0161-CA	0161RA20	04-161 B	03-1 C+
Tensile strength in the as-delivered state (N/mm)	Warp	46.0	53.0	46.0	44.5
	Weft	39.3	49.6	39.3	52.9
Tensile strength after ageing (N/mm)	Warp	23.0	39.5	23.0	43.1
	Weft	22.8	38.8	22.8	46.8
Relative residual resistance after ageing (%)	Warp	50.0	74.6	50.0	97.9
	Weft	58.1	78.2	58.1	88.5
Elongation at break in the as-delivered state (%)	Warp	4.0	4.0	4.0	4.0
	Weft	3.0	3.6	3.0	4.0

Table 3.19: Characteristics of the standard glass fibre meshes.

Characteristic		PRB AVF	PRB AVN	
		R 131 A 102 C+	R 131 A 101 C+	SSA-1363 F+
Tensile strength in the as-delivered state (N/mm)	Warp	48,1	40,2	42,3
	Weft	46,4	48,3	47,6
Tensile strength after ageing (N/mm)	Warp	29,6	31	44,0
	Weft	32,8	25,9	45,9
Relative residual resistance after ageing (%)	Warp	61,6	76,9	100,0
	Weft	70,8	53,6	96,5
Elongation at break in the as-delivered state (%)	Warp	4,0	4,0	4,0
	Weft	3,9	4,6	4,0

Table 3.20: Characteristics of the standard glass fibre meshes.

Characteristic		PRB AVR 0510-A
Tensile strength in the as-delivered state (N/mm)	Warp	147,7
	Weft	127,6
Tensile strength after ageing (N/mm)	Warp	60,5
	Weft	68,9
Relative residual resistance after ageing (%)	Warp	41,0
	Weft	54,0
Elongation at break in the as-delivered state (%)	Warp	1,9
	Weft	2,0

Table 3.21: Characteristics of the reinforcement glass fibre mesh PRB AVR 0510-A.

Characteristic		PRB AVR	
		G-WEAVE 660L 55AB x 100CM	R 585 A 101
Tensile strength after ageing (N/mm)	Warp	104,1	107,6
	Weft	76,6	112,3
Relative residual resistance after ageing (%)	Warp	46,5	51,9
	Weft	40,0	55,8

Table 3.22: Characteristics of the reinforced glass fibre meshes.

3.24 Thermal resistance and thermal transmittance of the ETICS

EAD 040089-00-0404, clause 2.2.5.1.

Insulation product	Thermal conductivity (W/m·K)	Thickness ¹ (mm)	Thermal resistance (m ² ·K/W) ⁽²⁾		
			R _{insulation}	R _{render}	R _{ETICS}
STEICO PROTECT DRY H	0,043	40	0,93	0,02	0,95
		60	1,40		1,42
STEICO PROTECT DRY M	0,040	60	1,50		1,52
		200	5,00		5,02
STEICO PROTECT DRY L	0,037	100	2,70		2,72
		240	6,50		6,52
STEICO PROTECT H	0,048	40	0,83		0,85
		60	1,25		1,27
STEICO PROTECT M	0,046	80	1,74		1,76
		100	2,17		2,19

(1) Minimum and maximum thickness considered in the ETA.

(2) 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 2.2.5.1 of EAD 040089-00-0404.

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

Table 3.23: Thermal resistance of the ETICS.

The thermal transmittance of the substrate wall covered by the ETICS is calculated in accordance with the standard EN ISO 6946 or EN 12664 (depending on expected thermal resistance:

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

Where:

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

χ_p * n: correction term of the thermal transmittance for mechanical fixings devices for anchors.

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 considered if they are not specified in the anchor's ETA:

= 0,002 W/K for anchors with a plastic screw/nail, stainless steel screw/nail with the head covered by plastic material and for anchors with an air gap at the head of the screw/nail.

= 0,004 W/K for anchors with a galvanized steel screw/nail with the head covered by a plastic material.

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

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

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

Where:

$R_{insulation}$: thermal resistance of the insulation product (according to declaration in reference to EN 13171) in (m²·K)/W.

R_{render} : thermal resistance of the render (about 0,02 (m²·K)/W) or determined by test according to EN 12667 or EN 12664 in (m²·K)/W.

$R_{substrate}$: thermal resistance of the substrate wall (m²·K)/W.

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

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

The influence of the thermal bridges can also be calculated as described in EN ISO 10211. It shall be calculated according to this standard if there are more than 16 anchors per m² foreseen. The declared χ_p -values do not apply in this case.

3.25 Thermal resistance of the insulation product

EAD 040089-00-0404, clause 2.2.5.2.

See column $R_{insulation}$ on the table of section 3.15.

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 4.1 applies.

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.

Trade name of the system	Intended use(s)	Level or class	AVCP system
PRB THERMOBOIS COB	External thermal insulation composite system/kits (ETICS) with rendering in externals wall subject to fire regulations.	A1 ⁽¹⁾ , A2 ⁽¹⁾ , B ⁽¹⁾ , C ⁽¹⁾	1
		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 externals wall not subject to fire regulations.	Any	2+

Note:

- (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 footnote 1.
- (3) Products/materials that do not require to be tested for reaction to fire (e.g. products/materials of classes A1 according to Commission Decision 96/603/EC).

Table 4.1: Applicable AVPC system.

5 Technical details necessary for the implementation of the AVCP system, as provided for 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*.

Issued in Barcelona on 16 July 2020

by the Catalonia Institute of Construction Technology.



Ferran Bermejo Nualart
Technical Director, ITeC

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.

ANNEX 1: Insulation product characteristics

Descriptions and characteristics		Wood fibre insulation board		
Trade name		STEICO PROTECT DRY H	STEICO PROTECT DRY M	STEICO PROTECT DRY L
Board designation		WF – EN 13171 – T5 – WS1,0 – MU3 – CS(10\Y)200 – DS(70,90)3 – TR30	WF – EN 13171 – T5 – WS1,0 – MU3 – CS(10\Y)100 – DS(70,90)3 – TR20	WF – EN 13171 – T5 – WS1,0 – MU3 – CS(10\Y)50 – DS(70,90)3 – TR10
Description		Factory-prefabricated uncoated boards STEICO PROTECT made of wood fibres (WF) according to EN 13171.		
Colour		Light brown		
Density (kg/m ³) EN 1602		180	140	110
Reaction to fire class* EN 13501-1		E		
Thermal conductivity* (W/m·K) EN 12667		0,043	0,040	0,037
Thickness* (mm) EN 823		See thicknesses declared in table 1.1.		
Thickness tolerance* EN 823		T5		
Dimensional stability* under	specified temperature and humidity EN 1604: 48h at 70 °C	DS (70,90)3		
	specified temperature and humidity EN 1604: 48h at 70 °C and 90% RH			
	laboratory conditions EN 1603			
Compression strength* (kPa) EN 826		≥ 200 CS(10\Y)200	≥ 100 CS(10\Y)100	≥ 50 CS(10\Y)50
Tensile strength* (kPa) EN 1607		≥ 30 TR30	≥ 20 TR20	≥ 10 TR10
Water absorption* (kg/m ²) EN 1609 - method A		WS1,0		
Water vapour transmission* EN 12086		MU3		
Shear strength (N/mm ²) EN 12090		≥ 0,02	≥ 0,02	≥ 0,02
Shear modulus (N/mm ²) EN 12090		≥ 1,0	≥ 1,0	≥ 0,9

* Characteristics declared by the manufacturer in the DoP.

Table A1.1: Characteristics of the insulation product (wood fibre insulation boards).

Descriptions and characteristics		Wood fibre insulation board	
Trade name		STEICO PROTECT H	STEICO PROTECT M
Board designation		WF – EN 13171 – T5 – WS1,0 – MU5 – CS(10\Y)150 – DS(70,90)3 - TR20	WF – EN 13171 – T5 – WS1,0 – MU5 – CS(10\Y)100 – DS(70,90)3 – TR15
Description		Factory-prefabricated uncoated boards STEICO PROTECT made of wood fibres (WF) according to EN 13171.	
Colour		Brown	
Density (kg/m ³) EN 1602		180	140
Reaction to fire class* EN 13501-1		E	
Thermal conductivity* (W/m·K) EN 12667		0,048	0,046
Thickness* (mm) EN 823		See thicknesses declared in table 1.1.	
Thickness tolerance* EN 823		T5	
Dimensional stability* under	specified temperature and humidity EN 1604: 48h at 70 °C	DS (70,90)3	
	specified temperature and humidity EN 1604: 48h at 70 °C and 90% RH		
	laboratory conditions EN 1603		
Compression strength* (kPa) EN 826		≥ 150 CS(10\Y)150	≥ 100 CS(10\Y)100
Tensile strength* (kPa) EN 1607		≥ 20 TR20	≥ 15 TR15
Water absorption* (kg/m ²) EN 1609 - method A		WS1,0	
Water vapour transmission* EN 12086		MU5	
Shear strength (N/mm ²) EN 12090		≥ 0,02	
Shear modulus (N/mm ²) EN 12090		≥ 1,0	

* Characteristics declared by the manufacturer in the DoP.

Table A1.2: Characteristics of the insulation product (wood fibre insulation boards).

ANNEX 2: Characteristics of the fixings (screws and the staples)

A2.1 Screws

Trade name	Description	Mounting / Assembly	Thickness of the insulation when surface assembly (mm)
EJOTHERM STR H	Screwed-in anchor with a steel screw and a plastic head. Screw diameter: 6 mm Plate diameter: 60 mm Screw-in depth: 30 to 40 mm Point thermal transmission when surface fixed installation in timber substrates: 0,002 W/K	Surface	40 to 260
FISCHER THERMOFIX 6H-NT	Screwed-in anchor with a steel screw and a head made of polyamide. Screw diameter: 6 mm Plate diameter: 60 mm Screw-in depth: min. 30 mm	Surface	30 to 290

Table A2.1: Characteristics of the screws.

Anchors	Plate diameter (mm)	≥ 60	
Insulation product	Type	STEICO PROTECT H	STEICO PROTECT M
	Tensile strength perpendicular to the faces in dry conditions (kPa)	28,3	18,9
	Thickness (mm)	≥ 60	
Pull-through test			
Anchors placed at the body of the insulation product	R_{panel} (N/fixing) in dry conditions	Minimal: 2230 Average: 2340	Minimal: 1380 Average: 1520
Anchors placed at joints of the insulation product	R_{joint} (N/fixing) in dry conditions	Minimal: 1100 Average: 1230	Minimal: 540 Average: 620

Table A2.2: Pull-through tests of screws in combination with STEICO PROTECT insulation panels.

A2.2 Staples

Trade name	Description	Dimensions
Alsafix WP	<p>Declared characteristics in the Declaration of Performance in accordance with EN 14592:</p> <ul style="list-style-type: none"> - Yield moment: $M_{y,Rk} = 1240 \text{ N}\cdot\text{mm}$ - Withdrawal: $f_{ax,k} = 5,6 \text{ N/mm}^2$ - Head pull-through: $f_{head,k} = 29,0 \text{ N/mm}^2$ <p>Tool: Alsafix 27/160 P1.</p>	<p>Length: 75 to 160 mm Outside crown width: 27 mm Wire diameter: 2,03 mm</p> <p>Finishing: stainless steel A2</p> <p>Service class*: 1 (galva), 2 (galva 12 μm) and 3 (inox).</p>
BeA NR HZ A2 type 246	<p>Declared characteristics in the Declaration of Performance in accordance with EN 14592:</p> <ul style="list-style-type: none"> - Yield moment: $M_{y,Rk} = 1474 \text{ N}\cdot\text{mm}$ - Withdrawal: $f_{ax,k} = 6,05 \text{ N/mm}^2$ - Head pull-through: $f_{head,k} = 35,90 \text{ N/mm}^2$ <p>Tool: 246/160-964, or 246/130-944E or 246/110-851E.</p>	<p>Length: 75 to 130 mm Outside crown width: 27,03 mm Wire diameter: 2,02 mm Flattened wire dimension: 1,83 mm / 2,21 mm.</p> <p>Finishing: stainless steel.</p> <p>Service class*: 3.</p>
Haubold BS29000	<p>Declared characteristics in the Declaration of Performance in accordance with EN 14592:</p> <ul style="list-style-type: none"> - Yield moment: $M_{y,Rk} = 1040 \text{ N}\cdot\text{mm}$ - Withdrawal: $f_{ax,k} = 5,1 \text{ N/mm}^2$ - Head pull-through: $f_{head,k} = 25,5 \text{ N/mm}^2$ <p>Tool: Haubold PN29130 or Haubold PN29150.</p>	<p>Length: 65 to 130 Outside crown width: 27 mm Wire diameter: 2,00 mm Flattened wire dimension: 1,77 mm / 2,08 mm. Standard point: Chisel point "C".</p> <p>Finishing:</p> <ul style="list-style-type: none"> - Zinc galv. 12 μm. - Stainless Steel A2.

* Service class according to EN 1995-1-1. This class corresponds to the essential characteristic *Protection against corrosion of mechanical fixings* of the EAD 040089-00-0404.

Table A2.3: Characteristics of the staples.

Insulation product	Thickness (mm)	Staple placement	Number of staples per sample	Min.	Average	Units	
Steico Protect Dry H	≥ 40	Out of the joint	5	0,38	0,42	kN/staple	
				5,44	6,00	kN/m	
		At the joint		0,22	0,25	kN/staple	
				3,20	3,56	kN/m	
Steico Protect Dry M	≥ 60	Out of the joint	5	0,27	0,33	kN/staple	
				3,79	4,65	kN/m	
		Out of the joint		3	0,38	0,48	kN/staple
					3,29	4,08	kN/m
Steico Protect Dry L	≥ 100	Out of the joint	5		0,22	0,24	kN/staple
					3,12	3,43	kN/m
		At the joint		5	0,09	0,13	kN/staple
					1,26	1,86	kN/m
At the joint (double joint)	10	0,10	0,11		kN/staple		
		2,87	3,09		kN/m		

Table A2.4: Pull-through tests of staples in combination with STEICO PROTECT DRY insulation panels.

Insulation product	Thickness (mm)	Staple placement	Number of staples per sample	Min.	Average	Units
Steico Protect H	≥ 40	Out of the joint	3	0,74	0,75	kN/staple
				6,36	6,43	kN/m
	≥ 60	At the joint		0,49	0,51	kN/staple
				4,18	4,36	kN/m
Steico Protect M	≥ 40	Out of the joint	3	0,34	0,36	kN/staple
				2,93	3,09	kN/m
		Out of the joint	4	0,32	0,33	kN/staple
				3,67	3,78	kN/m
	At the joint	4	0,21	0,22	kN/staple	
			2,40	2,51	kN/m	
	At the joint	5	0,17	0,18	kN/staple	
			2,42	2,57	kN/m	
	≥ 60	Out of the joint	4	0,43	0,44	kN/staple
				4,87	4,98	kN/m
At the joint		4	0,22	0,24	kN/staple	
			2,53	2,72	kN/m	

Table A2.5: Pull-through tests of staples in combination with STEICO PROTECT insulation panels.

ANNEX 3: Glass fibre mesh characteristics

Trade name and description	Mass per unit area (g/m ²)	Residual resistance after ageing in alkaline solution (N/mm)		Relative residual resistance: % of the strength value after ageing in alkaline solution in relation to the as-delivered state	
		Warp	Weft	Warp	Weft
Standard meshes					
PRB AVN (04-161 B)	156	≥ 20	≥ 20	≥ 50	≥ 50
PRB AVN (0161-CA)	156	≥ 20	≥ 20	≥ 50	≥ 50
PRB AVN (0161RA20)	160	≥ 20	≥ 20	≥ 50	≥ 50
PRB AVN (03-1 C+)	160	≥ 20	≥ 20	≥ 50	≥ 50
PRB AVF (R 131 A 102 C+)	161	≥ 20	≥ 20	≥ 50	≥ 50
PRB AVN (SSA-1363 F+)	167	≥ 20	≥ 20	≥ 50	≥ 50
PRB AVN (R 131 A 101 C+)	167	≥ 20	≥ 20	≥ 50	≥ 50
Reinforced meshes					
PRB AVR (0510-A)	516	≥ 20	≥ 20	≥ 40	≥ 40
PRB AVR (R 585 A 101)	696	≥ 20	≥ 20	≥ 40	≥ 40
PRB AVR (G-weave 660L 55AB X 100CM)	710	≥ 20	≥ 20	≥ 40	≥ 40

Table A3: Glass fibre mesh characteristics.