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European Technical Assessment

ETA 18/0150
of 19/03/2018

English translation prepared by LNEC; original version in Portuguese language

ISSN 2183-3362

Trade name of the construction product

Designação comercial do produto de construção

Product family to which the construction product belongs

Família de produtos a que o produto de construção pertence

Manufacturer

Fabricante

Manufacturing plant(s)

Instalações de fabrico

This European Technical Assessment contains

A presente Avaliação Técnica Europeia contém

This European Technical Assessment is issued in accordance with Regulation (EU) No. 305/2011, on the basis of

A presente Avaliação Técnica Europeia é emitida ao abrigo do Regulamento (UE) n.º 305/2011, com base no

weber.therm classic

External Thermal Insulation Composite System with rendering on expanded polystyrene for use as external insulation of building walls

Sistema Compósito de Isolamento Térmico pelo Exterior com revestimento aplicado sobre isolante térmico de poliestireno expandido moldado destinado ao isolamento exterior de paredes de edifícios

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16 pages, including 2 annexes which form an integral part of this assessment

16 páginas, incluindo 2 anexos que fazem parte desta avaliação

Guideline for European Technical Approval (ETAG) No. 004, edition 2013, used as European Assessment Document (EAD)

Guia de Aprovação Técnica Europeia (ETAG) n.º 004, edição de 2013, utilizado como Documento de Avaliação Europeu (EAD)

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1. Technical description of the product

The External Thermal Insulation Composite System (from now on, referred to as ETICS) *weber.therm classic* is designed and installed in accordance with the ETA holder's design and installation instructions, deposited with LNEC¹.

weber.therm classic is a bonded system with supplementary mechanical fixings used primarily to provide stability until the adhesive has dried and increase the adherence of the system reducing the risk of detachment.

The ETICS comprises the components identified in Table 1, which are factory produced by the ETA holder or by a supplier.

It is made up on site from these components. The ETA holder is ultimately responsible for the ETICS.

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

This ETICS is intended to be used as external thermal insulation for building walls. The walls are made of masonry (bricks or blocks) or concrete (cast on site or as prefabricated panels) with a reaction to fire classification A1 to A2-s2,d0 according to EN 13501-1 or A1 according to the EC decision 96/603/EC as amended. The ETICS is designed to give the wall to which is applied satisfactory thermal insulation.

The ETICS is made of non load-bearing construction elements. It does not contribute directly to the stability of the wall on which is installed, but it can contribute to its durability by providing enhanced protection from the effect of weathering. The thermal resistance of the ETICS shall be $\geq 1.0 \text{ m}^2 \text{ K/W}$.

This 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 air tightness of the building structure.

Design and installation of ETICS should take into account the principles laid down in chapter 7 of ETAG 004 and shall be done in accordance with national instructions. This ETA covers the application of bonded ETICS where the concrete for testing of bond strength is representative for masonry or concrete. For bonded applications onto other substrates (e.g. organic paints or ceramic tiles), testing on the job site is necessary.

The provisions made in this ETA are based on an assumed working life of at least 25 years, provided that the conditions laid down for the installation, appropriate use, maintenance and repair are met.

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 means for choosing the right product in relation to the expected economically reasonable working life of the works.

Installation

The ETICS is installed on site. It is the responsibility of the ETA holder to guarantee that the information about design and installation of this ETICS is effectively communicated to the concerned people. This information can be given using reproductions of the respective parts of this European Technical Assessment. Besides, all the data concerning the execution shall be clearly indicated on the packaging and/or the enclosed instruction sheets using one or several illustrations.

The wall on which the ETICS is applied shall be sufficiently stable and airtight. Its stiffness shall be big enough to ensure that the ETICS is not subjected to deformations, which could lead to damage. The requirements given in ETAG 004, chapter 7, have to be considered.

Design

The user shall comply with the national regulations particularly concerning fire and wind load resistance. Only the components described in clause 1 with characteristics according to clause 3 of this ETA can be used for this ETICS.

The works including the details (such as connections and joints) shall be designed in order to avoid water penetration behind the system. To bond the ETICS, the minimum surface area and the method of bonding shall comply with the characteristics of the ETICS (see 3.2.4 of this ETA) as well as the national regulations. In any case, the minimum bonded surface shall be at least 20%.

¹ The technical documentation of this European Technical Assessment is deposited with Laboratório Nacional de Engenharia Civil (LNEC) and, as far as relevant for the tasks of the notified body (bodies) involved in the assessment and verification of constancy of performance procedure, is handed over to the notified body (bodies).

TABLE 1
Definition of the components

Components	Trade name	Description ¹	Coverage (kg/m ²)	Thickness (mm)
Insulation product	<i>weber.therm EPS 100</i>	Expanded polystyrene (EPS) Panels with 1000 mm x 500 mm and bulk density of 21 kg/m ³ , with CE marking	–	40 to 80
Adhesive	<i>weber.therm pro</i>	Monocomponent cement based mortar powder with mineral fillers, resins, synthetic fibres and additives requiring addition of about 6 to 7 l of water per bag	5 to 6	–
Base coat	<i>weber.therm pro</i>	Monocomponent cement based mortar powder with mineral fillers, resins, synthetic fibres and additives requiring addition of about 6 to 7 l of water per bag	with standard glass fibre 4 to 5	2.5 to 5
			with reinforced glass fibre 7 to 8	
Key coat	<i>weber.prim regulador</i>	Mineral fillers, watery dispersion of acrylic co-polymer and specific additives (the product requires no added water)	0.3 to 0.4	–
Finishing coat	<i>weber.plast decor</i>	Coloured finishing coat of medium (M) or fine (F) texture containing acrylic resins in watery dispersion, mineral fillers, pigments and additives	2 to 2.5 – M 1.8 to 2.2 – F	1 to 2
Glass fibre meshes	<i>weber.therm rede normal</i>	Standard mesh (glass fibre mesh with mesh size 5 mm x 4 mm) (in accordance with Agrément Certificate DH 942 by LNEC)	–	–
	<i>weber.therm rede reforçada</i>	Reinforced mesh (glass fibre mesh with mesh size 6 mm x 6 mm) (in accordance with Agrément Certificate DH 942 by LNEC)	–	–
Anchors (supplementary mechanical fixings)	<i>weber.therm bucha spit</i>	Description in accordance with ETA 04/0076 ² Remain under the ETA holder responsibility	–	–
Ancillary materials		Description in accordance with clause 3.2.2.5 of ETAG 004 Remain under the ETA holder responsibility		

¹ See clause 3.2 for further description, characteristics and performances of components.

² ETA based on ETAG 014 – *Guideline for European Technical Approval of plastic anchors for fixing of external thermal insulation composite systems with rendering*, edition January 2002, amended February 2011.

Execution

The recognition and preparation of the substrate as well as the generalities about the execution of the ETICS shall be carried out in compliance with:

- chapter 7 of the ETAG 004, with imperative removal of any existing paint finish or renders which may difficult the bond resistance of the system;
- national regulations.

The particularities in execution linked to the method of bonding and the application of the rendering system shall be handled in accordance with the ETA holder prescriptions. In particular it is suitable to comply with the quantities of rendering applied, the thickness regularity and the drying periods between layers.

Use, maintenance and repair of the works

It is accepted that the finishing coats shall normally be maintained in order to fully preserve the system's performance. Maintenance will include at least:

- the repair of localized damaged areas due to accidents;
- the application of various products or paints, possibly after washing or surface preparation.

Necessary repairs should be done rapidly. It is important to be able to carry out maintenance as far as possible using readily available products and equipment, without spoiling appearance.

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

3.1 General

The identification tests and the assessment for the intended use of this ETICS according to the Basic Requirements were carried out in compliance with the ETA Guideline no. 004: *External Thermal Insulation Composite Systems with Rendering* – edition February 2013 (called ETAG 004, in this ETA).

3.2 ETICS characteristics

3.2.1 Mechanical resistance and stability (BWR 1)

Not relevant.

3.2.2 Safety in case of fire (BWR 2)

a) Reaction to fire

The reaction to fire was tested according to EN 13823 and EN 11925-2 and classified according to EN 13501-1:2007+A1.

The ETICS meets the requirements of class B-s1,d0 according to EN 13501-1+A1.

3.2.3 Hygiene, health and environment (BWR 3)

a) Water absorption

The results of the water absorption test of the base coat (system with and without finishing), presented in Table 2, verify the following condition:

- water absorption after 1 hour < 1 kg/m²

The system is therefore judged to have satisfactory performance concerning water absorption, independently of the finishing coat.

TABLE 2
Water absorption (capillarity test)

System specimens	Water absorption after 1 h (kg/m ²)	Water absorption after 24 h (kg/m ²)
EPS + base coat reinforced with standard mesh	0.15	0.43
EPS + base coat reinforced with standard mesh + weber.prim regulador + weber.plast decor	0.05	0.31

b) Hygrothermal behaviour

The ETICS has been assessed on a rig including the thermal insulation and all finishing coats.

During heat-rain and heat-cold cycles, none of the following defects occurs during testing:

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

The ETICS is therefore assessed as resistant to hygrothermal cycles.

c) Freeze / thaw behaviour

The results of the water absorption test of the base coat (system without finishing), presented in Table 2, verify the following condition:

- Water absorption after 24 hour < 0.5 kg/m²

The system is therefore judged as freeze-thaw resistant without further testing.

d) Impact resistance

The resistance to hard body impact (3 and 10 Joules) tests carried out on samples of systems compositions lead to the use categories presented in Table 3.

TABLE 3
Impact resistance to hard body impacts

System	Use categories ¹
EPS + base coat reinforced with standard mesh	III
EPS + base coat reinforced with standard mesh plus reinforced mesh	II
EPS + base coat reinforced with standard mesh + <i>weber.prim regulador</i> + <i>weber.plast decor</i>	II
EPS + base coat reinforced with standard mesh plus reinforced mesh + <i>weber.prim regulador</i> + <i>weber.plast decor</i>	I

¹ Use categories:

Category I – zones readily accessible at ground level to the public and vulnerable to hard body impacts but not subjected to abnormally rough use.

Category II – zones liable to impacts from thrown or kicked objects, but in public locations where the height of the system will limit the size of the impact; or at lower levels where access to the building is primarily to those with some incentive to exercise care.

e) Water vapour permeability

Table 4 presents the resistance to water vapour diffusion of the rendering system (base coat and finishing coat) for the two system configurations, expressed by the equivalent air thickness. In both cases, values don't exceed 2.0 m.

TABLE 4
Equivalent air thickness

System specimens	Equivalent air thickness (m)
Base coat + standard mesh + <i>weber.prim regulador</i> + <i>weber.plast decor</i>	0.38

f) Dangerous substances

This system complies with the provisions of Guidance Paper H². A declaration of conformity in this respect was made by the manufacturer. In addition to the specific clauses relating to dangerous substances contained in this ETA, there may be other requirements applicable to the ETICS falling within its scope (e.g. transposed European legislation and national laws, regulations and administrative provisions). In order to meet the provisions of Regulation (EU) No. 305/11, these requirements need also to be complied with, when and where apply.

3.2.4 Safety on use (BWR 4)

a) Bond strength

– Base coat onto EPS board

Tests were performed on the system applied on the rig, after hygrothermal cycles. The results are summarized in Table 5.

TABLE 5
Bond strength between base coat and insulation product

System (rig) ¹	Bond strength (after ageing) (MPa / Failure pattern) ²
EPS + base coat reinforced with standard mesh	0.18 / FP: C
EPS + base coat reinforced with plus reinforced mesh	0.15 / FP: C
EPS + base coat reinforced with standard mesh + <i>weber.prim regulador</i> + <i>weber.plast decor</i>	0.17 / FP: C
EPS + base coat reinforced with plus reinforced mesh + <i>weber.prim regulador</i> + <i>weber.plast decor</i>	0.17 / FP: C

¹ Rig – system applied on brick masonry with tested dimensions of 3 m × 2 m. The system was subjected to hygrothermal cycles before the adhesion tests.

² Failure pattern: FP:C – cohesion failure (failure in the insulation product).

² Guidance Document H, A harmonized approach related to dangerous substances under the Construction Products Directive.

In all cases, bond strength values are higher than 0.08 MPa and the failure occurred preferentially in the insulation board (cohesion failure).

– Adhesive onto EPS board

Tests were performed on samples of EPS insulation boards faced with adhesive. The results are summarized in Table 6. In all cases, the results are within the limits defined by ETAG 004.

TABLE 6
Bond strength between adhesive and insulation product

Specimen	Bond strength (MPa / Failure pattern) ¹		
	Initial state	After conditioning	
		48 h immersion in water + 2 h 23 °C/50 % RH	48 h immersion in water + 7 days 23 °C/50 % RH
EPS + adhesive	0.27 / FP: B	0.19 / FP: A	0.37 / FP: B

¹ Failure pattern: FP: A – adhesion failure (failure between adhesive and insulation product); FP: B – cohesion failure (failure in the adhesive).

– Adhesive onto concrete

Tests were performed on samples of concrete boards faced with adhesive product. The results are summarized in Table 7. In all cases, the results are within the limits defined by ETAG 004.

TABLE 7
Bond strength between adhesive and substrate (concrete)

Specimen	Bond strength (MPa / Failure pattern) ¹		
	Initial state	After conditioning	
		48 h immersion in water + 2 h 23 °C/ 50% RH	48 h immersion in water + 7 days 23 °C/ 50% RH
Adhesive + substrate (concrete)	1.21 / FP: B	0.53 / FP: A/B	1.85 / FP: B

¹ Failure pattern: FP: A – adhesion failure (failure between adhesive and substrate); FP: B – cohesion failure (failure in the adhesive).

The minimal bonded surface S is calculated as follows, with a minimum of 20%:

$$S (\%) = [0.03 \times 100] / B$$

where:

B minimum mean failure resistance of the adhesive to the insulation product in dry conditions expressed in MPa (0.27 MPa); 0.03 MPa corresponds to the minimum requirement.

The calculated minimum bonded surface S value is 11%, therefore the minimum bonded surface to adopt is 20%.

b) Wind load resistance

Performance not assessed.

3.2.5 Protection against noise (BWR 5)

Performance not assessed.

3.2.6 Energy economy and heat retention (BWR 6)

a) Thermal resistance

The additional thermal resistance R_{ETICS} provided by the ETICS to the substrate wall is calculated in accordance with EN ISO 6946 from the nominal value of the insulation product's thermal resistance R_D given accompanied to the CE marking and from the thermal resistance of the rendering system R_{render} which is about 0.02 m².K/W:

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

Thermal bridges caused by mechanical fixing devices influence the thermal transmittance of the entire wall and shall be taken into account.

The corrected thermal transmittance of the entire wall including ETICS and thermal bridges is calculated using the following expression:

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

where:

U_c corrected thermal transmittance of the entire wall including ETICS and thermal bridges (W/(m².K));

U thermal transmittance of the entire wall including ETICS without thermal bridges (W/(m².K));

n number of anchors (through insulation product) per m²;

χ_p point thermal transmittance value of an anchor (W/K). See EOTA Technical Report TR 025. If not specified in the anchor's ETA, the following values apply:

= 0.002 W/K for anchors with a stainless steel screw with the head covered by plastic material and for anchors with an air gap at the head of the screw ($\chi_p \cdot n$ negligible for $n < 20$);

= negligible for anchors with plastic nails (reinforced or not with glass fibres).

The term $\chi_p \cdot n$ has only to be taken into account if it is greater than 0.04 W/(m².K).

The thermal transmittance of the entire wall including ETICS without thermal bridges is determined as follows:

$$U = 1 / (R_i + R_{\text{render}} + R_{\text{substrate}} + R_{\text{se}} + R_{\text{si}})$$

where:

R_i thermal resistance of the insulation product (see CE marking in reference to EPS EN 13163:2008) in m².K/W;

R_{render} thermal resistance of the render (about 0.02 m².K/W);

$R_{\text{substrate}}$ thermal resistance of the substrate (concrete, brick,...) in m².K/W;

R_{se} external surface resistance in m².K/W;

R_{si} internal surface resistance in m².K/W.

3.2.7 Sustainable use of natural resources (BWR 7)

Performance not assessed.

3.2.8 Aspects of durability and serviceability

a) Bond strength after ageing

Results of the tests for determining the bond strength between the base coat and the insulation product presented in Table 5 show that in all cases they are higher than 0.08 MPa.

3.3 Component characteristics

3.3.1 General

Detailed information on the chemical composition and other identifying characteristics of the components, following Annex C of ETAG 004, has been deposited with LNEC.

Further information can be observed from the product data sheets, which are part of the Technical Documentation for this ETA.

3.3.2 Insulation product

Factory-prefabricated boards, made of expanded polystyrene (EPS), having the description, characteristics and performance (as minimum) defined in Table 8 (EN 13163).

3.3.3 Render

- Render strip tensile resistance

Fatigue tests were performed on specimens to determine the rupture stress of the reinforced render. The results are presented in Table 9

TABLE 8
Characteristics of insulation panels

Component	Trade name	Characteristics		Declared values and classes
Insulation product	weber.therm EPS 100	Reaction to fire (EN 13501-1:2007+A1)		Euroclass E Density (EN 1602): $19 \pm 1 \text{ kg/m}^3$ Thickness: 40 to 80 mm
		Thermal conductivity		0.036 (W/m.K)
		Classes of dimensional tolerances (EN 13163)	Thickness	T(2)
			Length	L(3)
			Width	W(3)
			Squareness	S(5)
			Flatness	P(10)
		Compressive strength (EN 13163)		CS(10)100
		Flexural strength (EN 13163)		BS150
		Water absorption (partial immersion) (EN 1609)		$0.07 \pm 0.01 \text{ kg/m}^2$
		Tensile strength perpendicular to the faces (EN 1607)		$\geq 200 \text{ kPa}$
		Shear strength and shear modulus of elasticity (EN 12090)		Shear strength: $120 \pm 10 \text{ kPa}$ Shear modulus of elasticity: $2400 \pm 100 \text{ kPa}$

TABLE 9
Results of render strip tensile test

System specimen	Characteristics	Test results
Base coat + standard mesh	Tensile strength (N/mm)	24
	Tensile strength while the first crack is formed (N/mm)	6
	Crack width at relative elongation (mm)	Performance not assessed

3.3.4 Glass fibre meshes

The characteristics of the glass fibre meshes are presented in Table 10.

TABLE 10
Results of meshes tensile test

Component	Trade name	Characteristics	Test results
Standard mesh	<i>weber.therm rede normal</i>	Tensile strength after accelerated artificial ageing (N/mm)	22 (≥ 20)
		Relative residual resistance: % (after ageing) of the strength in the as delivered state	58 (> 50)
		Mass per surface unit (g/m^2)	156 ($\pm 10 \%$)
		Mesh dimensions (mm \times mm)	5 \times 4 ($\pm 10 \%$)
Reinforced mesh	<i>weber.therm rede reforçada</i>	Tensile strength after accelerated artificial ageing (N/mm)	64 (> 20)
		Relative residual resistance: % (after ageing) of the strength in the as delivered state	81 (> 50)
		Mass per surface unit (g/m^2)	330 ($\pm 10 \%$)
		Mesh dimensions (mm \times mm)	6 \times 6 ($\pm 10 \%$)

3.3.5 Anchors

Anchors for expanded polystyrene panels act as supplementary fixing if required. They are covered by ETA 04/0076, according to ETAG 014 "Plastic anchors for fixing external thermal insulation composite systems with rendering" (see Table 1).

Their main characteristics and design data are presented in Table 11.

TABLE 11
Description and characteristics of anchors

Component	Trade name	Characteristics	Declared values and design data
Anchors	<i>weber.therm bucha spit</i>	Anchor type	See dimensional characteristics in Table 2 of Annex 3 of ETA 04/0076
		Materials	Anchor (plastic expansion sleeve): polypropylene Nail: polyamide reinforced with glass fibre
		Resistance to tension loads (daN)	≥ 10 (see ETA 04/0076)
		Displacement for the maximum dimensioning load, when applied on concrete (mm)	0.1
		Displacement for the maximum dimensioning load, when applied on masonry (mm)	0.3
		Spacing (mm)	≥ 100
		Edge distance (mm)	≥ 100
		Thickness of the substrate (mm)	≥ 100

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 of the European Commission of 14 July 1997³, as amended by the decision 2001/596/EC⁴ of 8 January of 2001, and considering the class B for the reaction to fire of the ETICS and that no stage in the production process has been identified that could result in an improvement of the reaction to fire characteristic, the system of assessment and verification of constancy of performance 2+ applies.

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

5.1 General

The ETA is issued on the basis of agreed data/information, deposited with LNEC, which identifies the product that has been assessed and judged. It is the manufacturer's responsibility to make sure that all those who use the kit are appropriately informed of the specific conditions laid down in this ETA, including its annexes.

Changes to the ETICS or the components or their production process should be notified to LNEC before the changes are introduced. LNEC will decide whether or not such changes affect the ETA and if so whether further assessment or alterations to the ETA shall be necessary.

5.2 Tasks for the manufacturer

Factory production control

The manufacturer shall exercise permanent internal control of production. All the elements, requirements and provisions adopted by the manufacturer shall be documented in a systematic manner in the form of written policies and procedures, including records of results performed.

This production control system shall ensure that the product is in conformity with this ETA.

³ Official Journal of the European Communities L229/14 of 20.08.1997.

⁴ Official Journal of the European Communities L229/33 of 02.08.2001.

The manufacturer may only use components stated in the technical documentation of this ETA. The incoming raw materials are subjected to verifications by the manufacturer before acceptance.

For the components of the ETICS which the manufacturer does not manufacture by himself, he shall make sure that the factory production control carried out by the other manufacturers gives the guarantee of the components compliance with the ETA.

The factory production control shall be in accordance with the Control Plan⁵, which is part of the Technical Documentation of this ETA. The control plan has been agreed between the manufacturer and the LNEC and is laid down in the context of the factory production control system operated by the manufacturer and deposited within LNEC. The results of factory production control shall be recorded and evaluated in accordance with the provisions of the control plan.

Other tasks for the manufacturer

The manufacturer shall, on the basis of a contract, involve a body (bodies) which is (are) notified for the tasks referred to in section 4 in the field of ETICS in order to undertake the actions laid down in this clause. For this purpose, the control plan shall be handed over by the manufacturer to the notified body (bodies) involved.

For assessing the ETICS and the components the results of the tests performed as part of the assessment for the ETA shall be used unless there are changes in the production line or plant. In such cases the necessary testing has to be agreed with LNEC.

The declaration of performance of the ETICS to be drawn up by the manufacturer following the issuing of this ETA shall include its reference number and issuing date.

5.3 Tasks for the notified body (bodies)

Within the scope of the initial inspection of factory and of factory production control, the notified body (bodies) shall ascertain that, in accordance with the Control Plan, the factory (in particular the employees and the equipment) and the factory production control are suitable to ensure continuous and orderly manufacturing of the components according to the specifications mentioned in this ETA.

Within the scope of continuous surveillance, assessment and evaluation of factory production control, the notified body (bodies) shall visit the factory at least once a year for surveillance. It has to be verified that the factory production control is maintained in suitable conditions.

These tasks shall be performed in accordance with the provisions laid down in the control plan.

The notified body (bodies) shall retain the essential points of its (their) actions referred to above and state the results obtained and conclusions drawn in a written report.

The notified body involved by the manufacturer shall issue a certificate of conformity of the factory production control stating the conformity with the provisions of this ETA.

In cases where the provisions of the ETA and its control plan are no longer fulfilled, the notified certification body shall withdraw the certificate of conformity and inform LNEC without delay.

Issued in Lisbon on 19/03/2018

By

Laboratório Nacional de Engenharia Civil (LNEC)

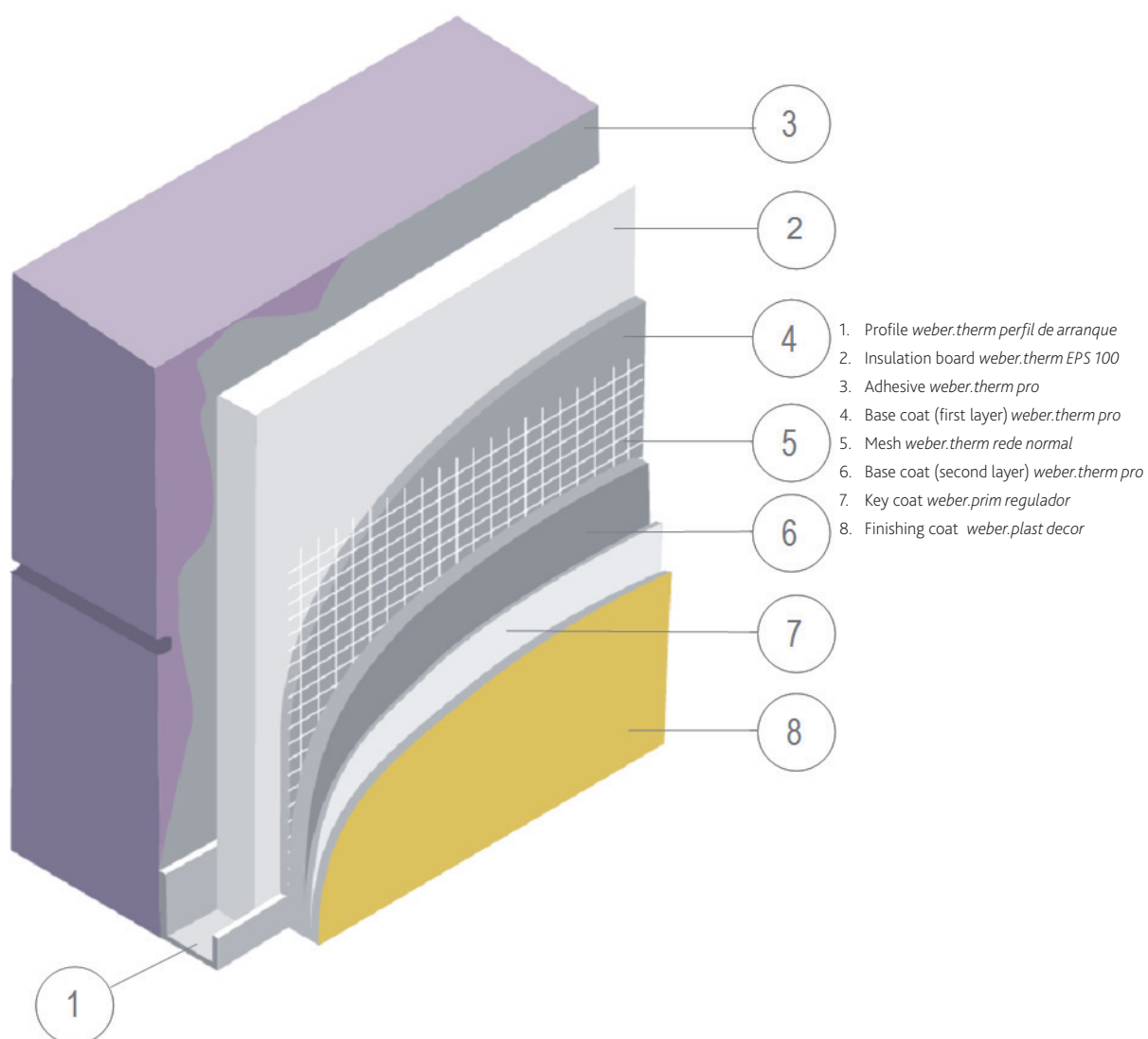
The Board of Directors



Carlos Pina
President

⁵ The control plan is a confidential part of this European Technical Assessment and is only handed over to the notified body or bodies involved in the procedure of assessment and verification of constancy of performance. See section 5.3.

Annex I – ETICS components



Annex II – Constructive details

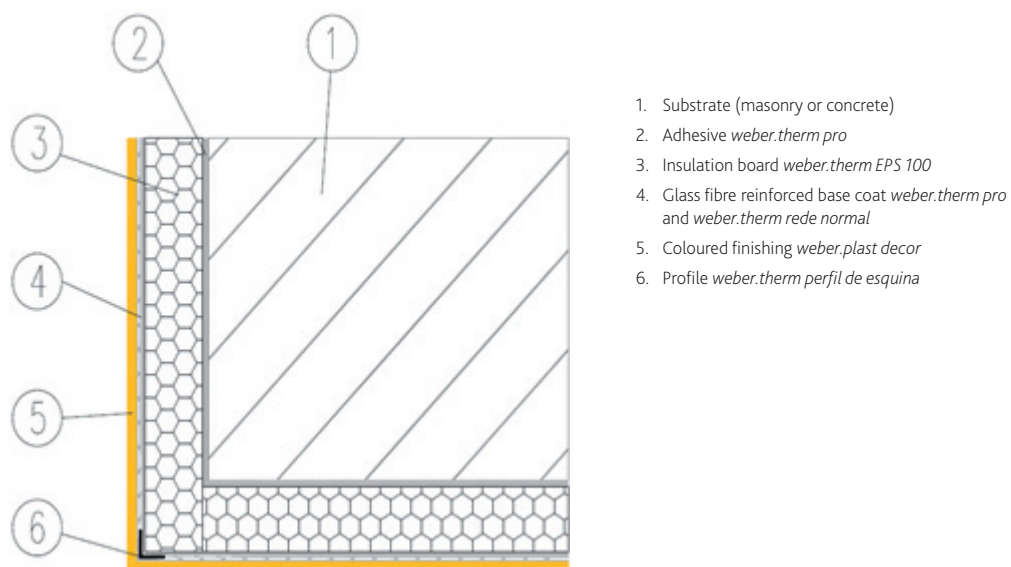


Figure II.1 – Detail of corner with corner profile

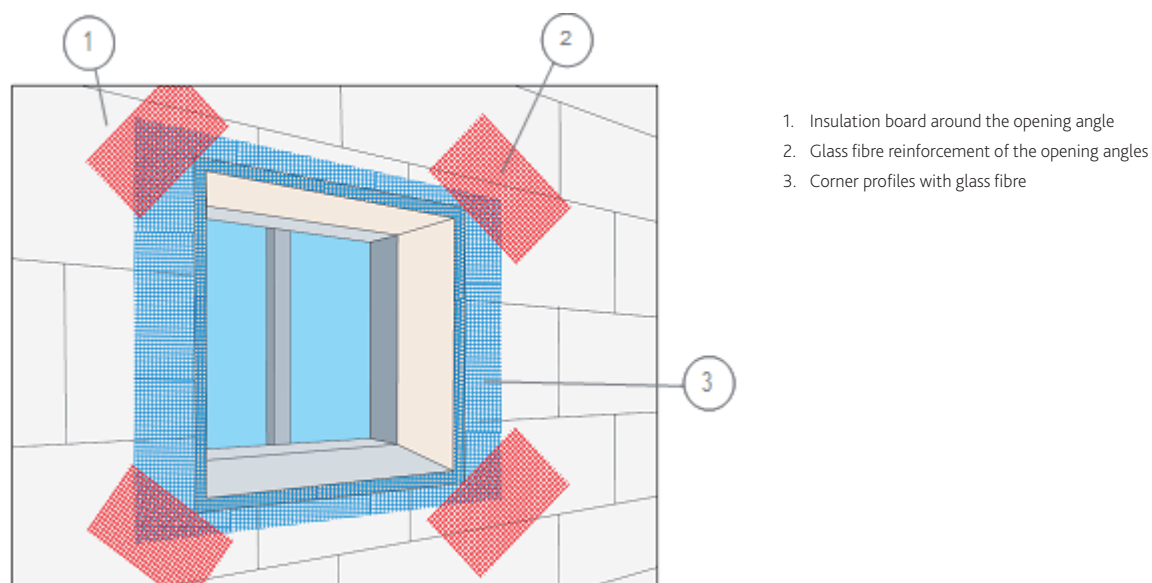


Figure II.2 – Reinforcements in opening angles

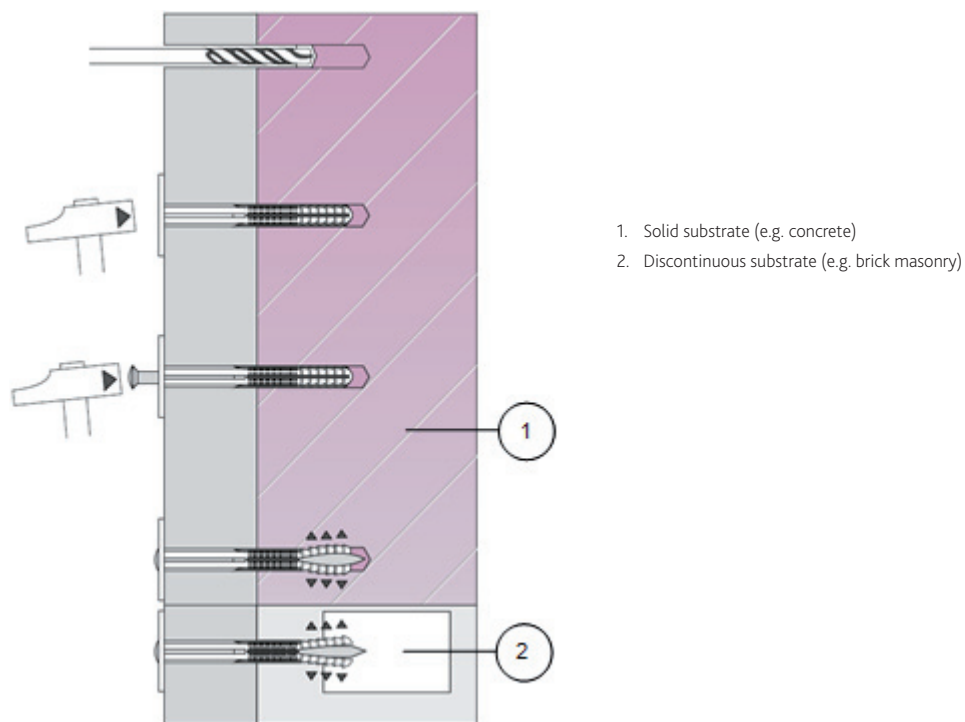


Figure II.3 – Detail of bonded ETICS with supplementary mechanical fixings – anchors

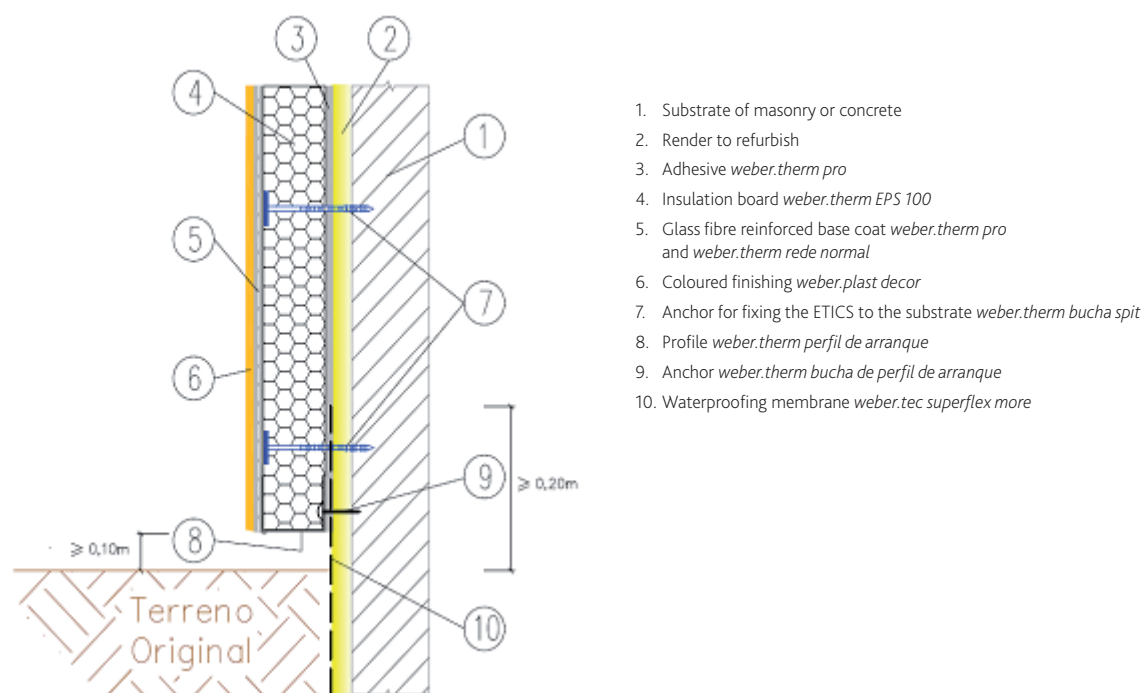


Figure II.4 – Detail of the ETICS start from the ground

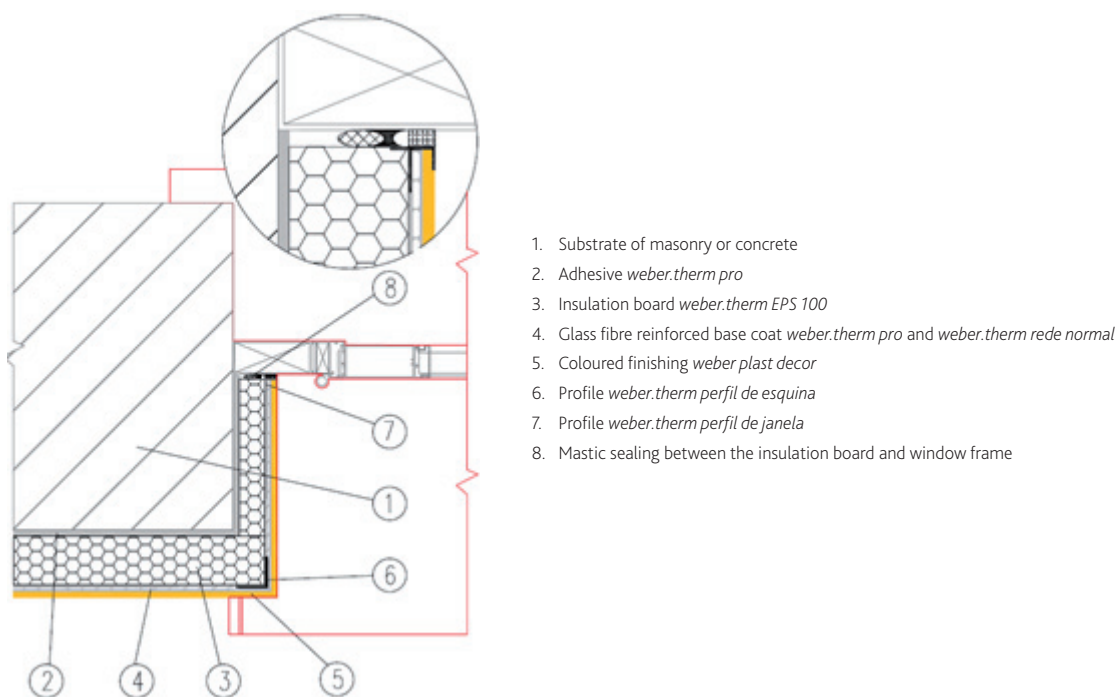


Figure II.5 – Detail of vertical and horizontal sections of openings (windows)

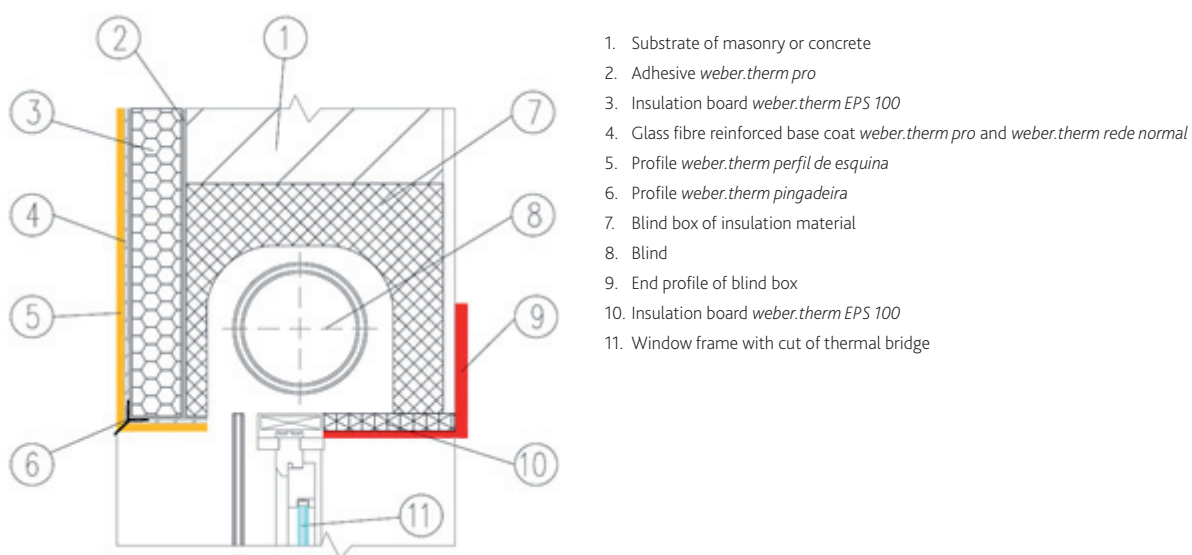


Figure II.6 – Detail of window (with blind box)

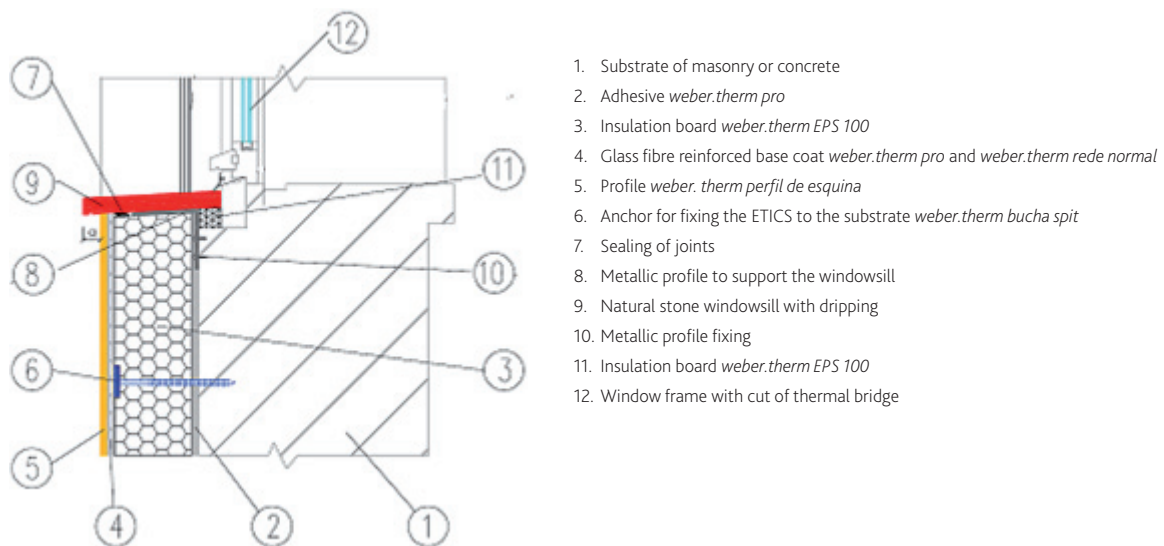


Figure II.7 – Detail of windowsill

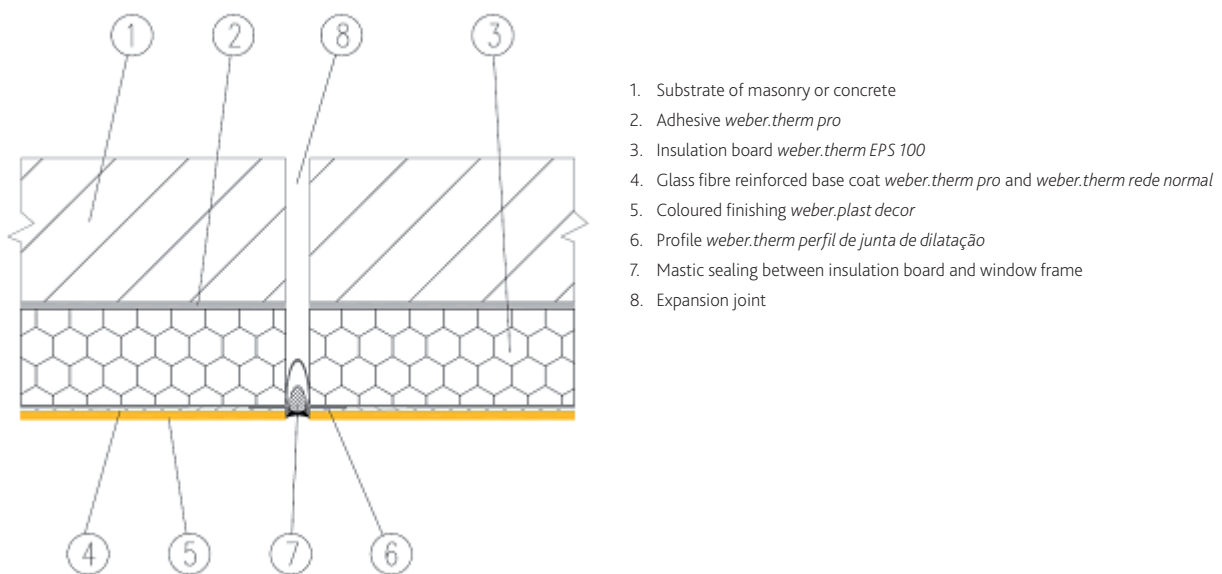


Figure II.8 – Detail of expansion joint

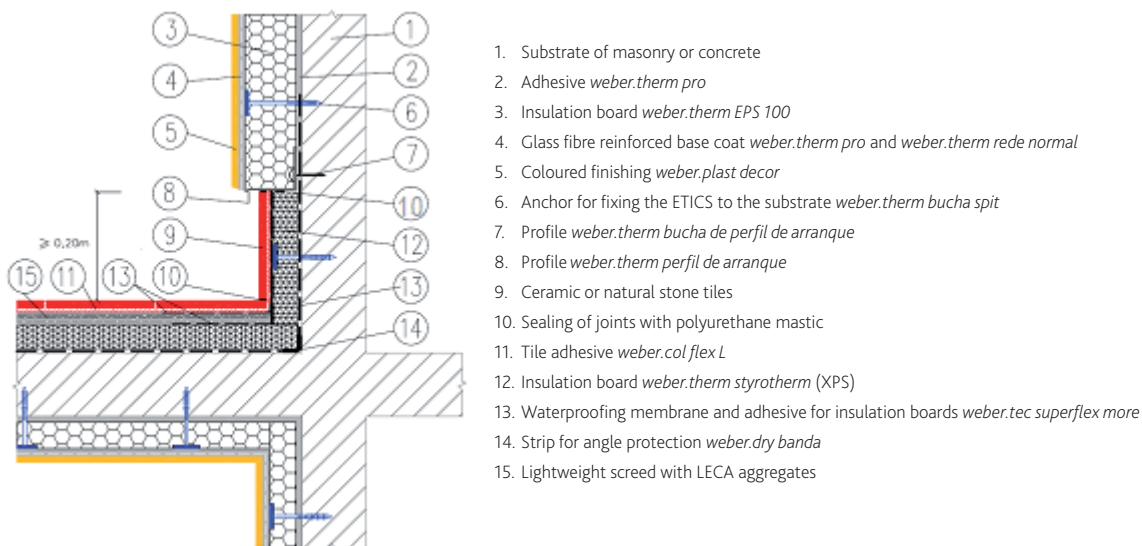


Figure II.9 – Detail of ETICS start from balcony

CDU 693.695:699.86(4)
692.23:699.86(4)
ISSN 2183-3362

Descriptors: Wall coating / External wall / Thermal insulation / Composite material / Europe
Descritores: Revestimento de paredes / Parede exterior / Isolamento térmico / Material composto / Europa

