



**INSTITUTO DE CIENCIAS  
DE LA CONSTRUCCIÓN  
EDUARDO TORROJA**

*C/ Serrano Galvache n. 4. 28033 Madrid (Spain)  
Tel.: (34) 91 302 04 40 / Fax: (34) 91 302 07 00  
[direccion.ietcc@csic.es](mailto:direccion.ietcc@csic.es) [www.ietcc.csic.es](http://www.ietcc.csic.es)*



# European Technical Assessment

**ETA 18/0499  
of 27/ 11/ 2018**

English translation prepared by IETcc. Original version in Spanish language

## General Part

**Technical Assessment Body issuing the ETA and designated according to Article 29 of the Regulation (EU) Nº305/2011:**

Instituto de Ciencias de la Construcción Eduardo Torroja (IETcc)

**Trade name of the construction product**

**Sistema RHONATHERM® CERAMIC**

**Product family to which the construction product belongs**

Kits for external thermal insulation composite system (ETICS) with panels as thermal insulation product and discontinuous claddings as exterior skin.

**Manufacturer**

**Pinturas ISAVAL® SL**

C/ Velluters, parcela 2-14 - Pol. Ind. Casanova  
46394 - Ribarroja del Turia, Valencia - Spain

**Manufacturing plant(s)**

C/ Velluters, parcela 2-14 - Pol. Ind. Casanova  
46394 - Ribarroja del Turia, Valencia - Spain

**This European Technical Assessment contains**

10 pages.  
Annex 1. Contain confidential information and is not included in the ETA when that assessment is publicly available.

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

EAD 040287-00-0404. Kits for external thermal insulation composite system (ETICS) with panels as thermal insulation product and discontinuous claddings as exterior skin.

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## SPECIFIC PARTS OF THE EUROPEAN TECHNICAL ASSESSMENT

### 1 Technical description of the product

The External Thermal Insulation Composite System (ETICS) "RHONATHERM CERAMIC" is designed and installed in accordance with the manufacturer, design and installation instructions, deposited at IETcc<sup>(1)</sup>.

It is made up on site from these components. The manufacturer is ultimately responsible for the ETICS RHONATHERM CERAMIC, which is a bonded system with supplementary mechanical fixings with EPS panel. The minimum number of fasteners per square metres are 6 for EPS.

This ETICS comprises the following components, which are factory produced by the manufacturer or a supplier. All components of the kit are supplied by the manufacturer except the discontinuous cladding.

	Components	Coverage Aprox [(kg/m <sup>2</sup> )	Thickness Aprox [mm]
Insulation material with associated method of fixing	<b>RHONATHERM® Panel EPS:</b> Bonded Board of Expanded poliestirene (EPS) (EN 13163) with supplementary mechanical fixings (minimum 6 fasteners/m <sup>2</sup> )(TR ≥ 100)	0,15 - 5	10 - 300
	<b>Adhesive: RHONATHERM® RHONA T-700.</b> Minimum bonded surface: 80 % for EPS and 80% for MW. (cement based mortar in powder requiring addition and mixing with 29 ± 1,0% water)	1,3-1,5, (per mm thickness)	4,0 - 5,0 without mesh
Base coat	<b>RHONATHERM® RHONA T-700</b> . See above.		
Glass fibre mesh	<b>Malla RHONAMESH T-150.</b> Glass fibre mesh resistant to the alkalis.	0,16	0,5
Adhesive for tile	<b>RHONA FLEX</b> (EN 12004) Cement based mortar in powder requiring addition and mixing with 28,0 ± 2,% water.	5 - 6	3,0-8,0
	<b>ADHESIVO PLAQUETA CV-FELX:</b> High quality organic adhesive with mineral aggregates.	3 - 4	1.5-2.0
Discontinuous cladding	<b>PLAQUETA CV-FLEX:</b> Plastic cladding (T1) Plastic pieces of 240 x 71mm, and ≥ 4mm of thickness	≤ 4	≥4
	<b>Ceramic Cladding:</b> Blb according to EN 14411. Maximum dimensions 30x30cm, maximum weight 33 kg/m <sup>2</sup> (T2)	≤ 33	≥4
	<b>Porcelanic Cladding:</b> la according to EN 14411. Maximum dimensions 100x50cm, maximum weight 13 kg/m <sup>2</sup> (T3), with additional mechanically fastener	≤ 13	3.5 - 5
Grout	<b>RHONA JUNTA</b> (EN 13888) Cement based mortar in powder requiring addition and mixing with 35,0 ± 1,% water. The thickness of the joint.	---	5 - 10
	<b>ADHESIVO PLAQUETA CV-FLEX:</b> See above		
Fasteners	<b>RHONATHERM® ANCLAJE :</b> Plastic anchors (expansion element and sleeve) for insulation material with different lengths in relation with thickness of insulation board. Fastener with CE marking with ETA nº 04/0023. Plate dimensions 60mm diameter and Stiffness 0,6 kN/mm <sup>2</sup> . <b>Anclaje pieza cerámica.</b> AISI 304 stainless steel staples.		Remain under the manufacturer responsibility
Ancillary elements	<b>Aluminium profiles:</b> Base, corners, top and window sills, and its fixing devices		

The Characteristics of the components are enclosing in annex I.

### 2 Specification of the intended use in accordance with the applicable EAD

This ETICS is intended to be used as external thermal insulation for building walls. The walls are made of masonry (bricks, 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.

This 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 its durability by providing enhanced protection from the effect of weathering.

This ETICS can be used on new or existing (retrofit) vertical walls. The ETICS is not intended to ensure the airtightness of the building structure.

Design and installation of ETICS should take into account principles laid down by the manufacturer and shall be done in accordance with national instructions. This ETA covers 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 25 years as minimum, 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.

(1) The technical documentation of this European Technical Assessment is deposited at the *Instituto de Ciencias de la Construcción Eduardo Torroja* (IETcc) and, as far as relevant for the tasks of the approved bodies involved in the attestation of conformity procedure, is handed over to the approved bodies.

**Installation.** The ETICS is installed on site. It is the responsibility of the manufacturer 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 ETA. 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 large enough to ensure that ETICS is not subjected to deformations, which could lead to damage.

**Design.** In any case, the user shall comply with the national regulations and particularly concerning fires 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 (connection, joint,..) shall be designed in order to avoid water penetration behind the system. The minimal surface area for the bonded ETICS, and the method of bonding shall comply with the characteristics of the ETICS as well as the national regulations. In any case, the minimal surface shall be at least 80 % for EPS.

**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:

- Manufacturer recommendations, with imperative removal of any existing paint finish or renders which may difficult the bond resistance of the system.
- Corresponding national regulations.

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

**Use, maintenance and repair of the works.** It is accepted that the system shall normally be maintained in order to fully preserve the system's performance. Maintenance will include at least:

- The repairing of localised damaged areas due to accidents
- The application of various products, possibly after washing or "ad hoc" 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

The assessment for the intended use of this ETICS according to the Essential Requirements were carried out in compliance with the EAD 040287-00-0404: Kits for external thermal insulation composite system (ETICS) with panels as thermal insulation product and discontinuous claddings as exterior skin.

#### 3.1 ETICS Characteristics

Mechanical resistance and stability (BWR 1). No relevant.

Safety in case of fire ((BWR 2). Reaction to Fire: NPA

Hygiene, health and environment (BWR 3)

#### Water absorption.

Time	RHONATHERM® RHONA T-700	Base cape + adhesive + T1+ grout	Base cape + adhesive + T2 + grout	Base cape + adhesive + T3 + grout
After 3 min	00014	0,0018	0,01	0,002
After 1h	0,1	0,1	0,1	0,03
After 24h	0,48	0,3	0,4	0,4

The discontinuous cladding was done by ceramic pieces of 25 x 6 cm and a grout of 8 mm of widthness.

#### Water vapour permeability (EN 12086)

Equivalent air thickness	Base coat/adhesive	Adhesive cladd		Grout	Cladding	Full system without insulation panel		
		RHONA FLEX	PLAQUETA CV-FELX			T1	T2	T3
m	0,1	0,2	0,2	0,2	NPA	0,3	0,4	0,3
m (with the EPS)	NPA							

\* For the calculation to the final water vapour permeability is necessary to consider to this product as water vapour barrier.

The water vapour diffusion resistance Z (or equivalent air thickness, etc..) of ETICS can be calculated by the addition of water vapour diffusion resistance of the different layers:

$$\text{ZETICS} = \text{Zskin} + \text{Zcladd-adhesive} + \text{Zbase\_coat} + \text{Zinsulation} + \text{Zbase-adhesive}$$

When relevant, because the skin is configured of the cladding element and the grout of the joints, the water vapour diffusion resistance, ZSKIN, can be calculated by proportionality of the areas of both components.

$$\text{Zskin} = \text{Zcladding} \cdot \text{Pcladding} + \text{Zgrout} \cdot \text{Pjoint}$$

Where: Pcladding = percentage surface of cladding element (%) and Pjoint = percentage surface of joints (%)

**Hygrothermal behaviour.** It has been assessed on one rig. During heat rain and heat – cold cycles, none of the following defects occurs during testing: deterioration such as cracking or delamination of the cladding elements that allows water penetration to the internal layers; deterioration or cracking of grout between the cladding elements; detachment of the skin and irreversible deformation.

This system is therefore assessed as resistant to hygrothermal cycles. The discontinuous cladding was done by: Plastic pieces of 240x 71mm, and 4 mm of total thickness and a grout of 20 mm of widthness. Ceramic pieces of 25 x 6 cm with a water absorption of  $0,5\% \leq I_b \leq 3\%$  according to EN 14411 and a grout of 10 mm of widthness. Ceramic pieces of 100x50 cm with additional mechanically fasteners (4-6 per ceramic pieces) and a grout of 8 mm of widthness.

**Freeze / thaw behaviour. Freeze-thaw performance.** The water absorption of the whole ETICS isn't greater or equal than  $0.5 \text{ kg/m}^2$  after 24 hours and so the systems were assessed as freeze/thaw resistant. But this test was performed in samples with the base coat without any top coat. The base coat shows a good aspect after the cycles.

**Impact resistance.** The resistance to hard body impacts (3 -10 Joules) and the soft body impact (60/400J) tests carried out on samples of systems compositions lead to the following categories:

System: The Whole ETICS	Hard Impact			Soft Impact	
	1J (H1)	3J (H2)	10J (H3)	S2	S4
<b>RHONATHERM® RHONA T-700 + PLAQUETA CV-FELX + T1+ grout.</b>	No deteriorated		Superficial cracking (no penetration) Mark: 13 mm	Not deteriorated	Not deteriorated
<b>RHONATHERM® RHONA T-700 + RHONA FLEX + T2 + grout</b>	No deteriorated			Not deteriorated	Not deteriorated
<b>RHONATHERM® RHONA T-700 + RHONA FLEX + T3 + grout</b>	No deteriorated			Not deteriorated	Not deteriorated
<b>Category</b>	<b>I</b>				

#### Safety in use (BWR 4)

**Bond strength: Base coat onto insulation board.** The tests were performed on samples of EPS boards faced with base coat, in all cases breakage location was 100% on insulation:

Base coat onto insulation board (MPa) (mean value/ minimum value)			
Thermal insulation	Initial state	After hygrothermal cycles (on the rigs)	After free/thaw cycles (on the samples)
EPS	0,2 / 0,18	0,17 / 0,16	-----

**Bond strength: external layers onto insulation board.** The tests were performed on samples of EPS boards faced with base coat and the cladding:

Adhesive onto insulation board (MPa) (mean value/ minimum value)			
Thermal insulation	Initial state	Immersion 48 h and 2 h drying	Immersion 48 h and 7 d drying
<b>RHONATHERM® RHONA T-700 + PLAQUETA CV-FELX + T1+ grout.</b>	0,2 / 0,18	0,08 / 0,06	0,2 / 0,17
<b>RHONATHERM® RHONA T-700 + RHONA FLEX + T2 + grout</b>	0,17 / 0,15	0,14 / 0,10	0,16 / 0,14
<b>RHONATHERM® RHONA T-700 + RHONA FLEX + T3 + grout</b>	0,2 / 0,14	0,17 / 0,15	0,17 / 0,15

**Bond strength: adhesive onto insulation board.** The tests were performed on samples of EPS boards faced with the adhesive, in all cases breakage location was 100% on insulation:

Adhesive onto insulation board (MPa) (mean value/ minimum value)			
Thermal insulation	Initial state	Immersion 48 h and 2 h drying	Immersion 48 h and 7 d drying
EPS	0,20 / 0,14	0,16 / 0,14	0,17 / 0,15

**Bond strength: Adhesive onto concrete**

Adhesive onto concrete (MPa) (mean value/ minimum value)		
Initial state	Immersion 48 h and 2 h drying	Immersion 48 h and 7 d drying
1,5 / 1,4	1,2 / 1,1	1,4 / 1,3

**Bond strength after ageing of the whole system.** The bond strength of the whole system after ageing has been determined following the method on the rig after hydrothermal cycles. In all cases breakage location was 100% on EPS.

Whole system (base coat + cladding coat)	Initial state	After Hygrothermal cycles (rigs) (cohesive) (MPa) (mean value/ minimum value)	Variation %
<b>RHONATHERM® RHONA T-700 + PLAQUETA CV-FELX + T1+ grout.</b>	0,2 /0,18	0,16 / 0,12	20
<b>RHONATHERM® RHONA T-700 + RHONA FLEX + T2 + grout</b>	0,17 /0,15	0,18/0,17	0
<b>RHONATHERM® RHONA T-700 + RHONA FLEX + T3 + grout</b>	0,2 /0,14	0,18 / 0,17	10

The bond strength mean value after hygrothermal cycles test is  $\geq 75\%$  of the mean value in the bond strength tests without ageing cycles.

#### Tensile strength of the thermal insulation panel (EN 1607).

EPS panel	Dry conditions (kPa)	70°C, 95%HR, 7 days (kPa)	70°C, 95%HR, 28 days(kPa)
	164	139	193

#### Shear strength and shear modulus of the thermal insulation panel (EN 12090).

EPS panel	Dry conditions (kPa)		70°C, 95%HR, 7 days (kPa)		70°C, 95%HR, 28 days(kPa)	
	S Strength	S. Modulus	S Strength	S. Modulus	S Strength	S. Modulus
	68	1860	69	2020	79	2240

#### Dead load behavior (Annex I EAD). For a load of 622N.

Step	Load (N)	RHONATHERM® RHONA T-700 + PLAQUETA CV-FELX + T1+ grout.	RHONATHERM® RHONA T-700 + RHONA FLEX + T2 + grout	RHONATHERM® RHONA T-700 + RHONA FLEX + T3 + grout
		Displacement (mm)		
1	0	0	0	0
2	155	0,1	0,1	0,1
3	311	0,1	0,1	0,1
4	467	0,1	0,1	0,1
5	622	0,1	0,1	0,35
6	0	-0,5	-0,5	-0,5

Protection against noise (BWR 5). Improvement of airborne sound insulation; NPA

Energy economy and heat retention (BWR 6)

#### Thermal conductivity

Component	Thermal conductivity a 10 °C (W/m.K)
SATEFFIC PANEL EPS	0,037
<b>RHONATHERM® RHONA T-700</b> (base coat)	NPA
<b>RHONA JUNTA</b> (Grout)	NPA
<b>RHONA FLEX</b>	NPA
<b>PLAQUETA CV-FLEX</b>	NPA
<b>Cladding elements</b>	According to the density of the material

**Thermal resistance.** The additional thermal resistance  $R_{ETICS}$  provided by the ETICS to the substrate wall is calculated in accordance with EN ISO 6946 and 10456 from the nominal value of the insulation product's thermal resistance  $R_D$  given accompanied to the CE marking + the thermal resistance of the rest of components.

$$R_{ETICS} = R_{skin} + R_{cladd-adhesive} + R_{base\_coat} + R_{insulation} + R_{base-adhesive} \text{ (W/m}^2\text{K)}$$

$$R_{Skin} = R_{cladding} \cdot P_{cladding} + R_{grout} \cdot P_{joint} \text{ (W/m}^2\text{K)}$$

Where:

$P_{cladding}$  = percentage surface of cladding element (%) /  $P_{joint}$  = percentage surface of joints (%)

The thermal bridges caused by mechanical fixing devices influence the thermal transmittance of the entire wall and shall be taken into account using the following calculation:

$$U_c = U + \Delta U \text{ (W/m}^2\text{K)},$$

$U_c$ : Corrected thermal transmittance (W/(m<sup>2</sup>.K)) of the entire wall,, including thermal bridges.

$U$ : thermal transmittance of the entire wall, including ETICS, without thermal bridges) (W/(m<sup>2</sup>.K):

$$U = 1 / R_{si} + R_{substrate} + R_{ETICS} + R_{se}$$

$R_{si}$ : External surface thermal resistance //  $R_{substrate}$ : thermal resistance of the substrate of the building (concrete,brick...)((m<sup>2</sup>.K)/W) //

$R_{se}$ : external superficial thermal resistance ((m<sup>2</sup>.K)/W).

$\Delta U$ : Correction term of the thermal transmittance for mechanical fixing devices

$$\Delta U = X_p \cdot n,$$

$n$ : number of anchors (through insulation product) per m<sup>2</sup> //  $X_p$ :point thermal transmittance value of the anchor (0.002 W/K).

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

**System of attestation of conformity.** According to the decision 97/556/EC of the European Commission<sup>(2)</sup> amended by 2001/596/EC<sup>(3)</sup> the system of assessment and verification of constancy of performance (see Annex V to Regulation (EU) n° 305/2011) given in the following table applies.

Product	Intended uses	Level or Classes	System
RHONATHERM CERAMIC	Kits for external thermal insulation composite system (ETICS) with discontinuous claddings as exterior skin	Any	2+

This system of attestation of conformity +2 is defined as follows:

Tasks for the manufacturer: Initial type-testing of the product, Factory production control and Testing of samples taken at the factory in accordance with a prescribed test plan.

Tasks for the notified body: Certification of factory production control on the basis of:

- Initial inspection of factory and of factory production control.
- Continuous surveillance (annual), assessment and assessment of factory production control.

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

The ETA is issued for this kit on the basis of agreed data/information, deposited at IETcc, 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 specific conditions according to sections 1, 2, 4 and 5 including the annexes of this ETA. Changes to the ETICS or the components or their production process, should be notified to the IETcc before the changes are introduced. IETcc will decide whether or not such changes affect the ETA and if so whether further assessment or alterations to the ETA shall be necessary.

##### 5.1 Tasks of 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.

The manufacturer may only use components stated in the technical documentation of this ETA including Control Plan. 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 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 Plan<sup>(4)</sup> which is part of the Technical Documentation of this ETA. The Control Plan has been agreed between the manufacturer and the IETcc and is laid down in the context of the factory production control system operated by the manufacturer and deposited at the IETcc. The results of factory production control shall be recorded and evaluated in accordance with the provisions of the Control Plan.

**Other tasks of manufacturer.** The manufacturer shall, on the basis of a contract, involve a body which is 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 bodies involved.

For initial type - testing of 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 initial type- testing has to be agreed with the IETcc.

The manufacturer shall make a declaration of conformity, stating that the ETICS is in conformity with the provisions of this ETA.

<sup>(2)</sup> Official Journal of the European Communities L229/14 of 20.08.1997

<sup>(3)</sup> Official Journal of the European Communities L209/33 of 02.08.2001

<sup>(4)</sup> The control plan is a confidential part of this European Technical Assessment and only handed over to the notified body involved in the procedure of attestation of conformity. See section 3.2.2.

**5.2** Tasks of notified bodies. The notified body shall perform:

**Initial inspection of factory and of factory production control.** The Notified Body 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 clause 2 of this ETA.

**Continuous surveillance, assessment and assessment of factory production control,** in accordance with the provisions laid down in the control plan, at least one per year.

The notified body shall retain the essential points of its actions referred to above and state the results obtained and conclusions drawn in a written report. The notified certification body involved by the manufacturer shall issue an EC Certificate of factory production control stating the conformity of 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 to IETcc without delay.

Issued in Madrid on 27/ 11/ 2018

by

Instituto de Ciencias de la Construcción Eduardo Torroja

**CONSEJO SUPERIOR DE INVESTIGACIONES CIENTÍFICAS**

c/ Serrano Galvache 4. 28033 Madrid (Spain).

director.ietcc@csic.es www.ietcc.csic.es



On behalf of the Instituto de Ciencias de la Construcción Eduardo Torroja



Director IETcc - CSIC



## Annex I. Characteristics of the components

**RHONATHERM® PANEL EPS.** The performances of the CE marked EPS panels used in accordance with the description and the characteristics given in EN 13163 are:

Characteristics	Standard	Values
Reaction to fire Euroclass	EN 13501-1	E
Length (mm) / Tolerance type	EN 822	1000 / L2
Width (mm) / Tolerance type	EN 822	500/ W2
Thickness (mm) / Tolerance type	EN 823	10 - 300 / T1
Squareness	EN 824	S2
Flatness	EN 825	P5
Density (kg/m <sup>3</sup> )	EN 1602	15- 20
Thermal conductivity a 10 °C (W/m.K)	EN 12667 EN 12939	0,037
Dimensional stability under Temperature and humidity specific conditions	EN 1604	DS(70,90) 1
Tensile strength perpendicular to the faces in dry conditions (N/mm <sup>2</sup> )	EN 1607	≥ TR 100
Water absorption ((partial immersion) (kg/m <sup>2</sup> ) (24h)	EN 1609	<1 WS
Water vapour diffusion (μ)	EN 12086	30-70
Shear strength (N/mm <sup>2</sup> )	EN 12090	0,075
Shear modulus (N/mm <sup>2</sup> )	EN 12090	≥ 1

### Adhesive/ Base coat **RHONATHERM® RHONA T-700**

Characteristics	Standard	Values
Range of thickness application (mm)		4,0- 5,0
Density (kg/m <sup>3</sup> )	EN 1015-7	1285 ± 100
Ash content (residue) at 450° C (%)		95 ± 10 %
Ash content (residue) at 900° C (%)		84 ± 10 %
Ratio water mixing (%)		29,00 ± 1,00
Density of paste (kg/m <sup>3</sup> )		1800 ± 100
Density of hardened (kg/m <sup>3</sup> )	EN 1015-10	1560
Water retention capability (%)	CSTB-2669-4 (apartado 2.3 / ASTM 1506-03)	≥ 90%
Shrinkage (mm/m)	EN 12808-4	< 1,00
Water absorption (kg/m <sup>2</sup> x min <sup>0,5</sup> )	EN 1015-18	≤ 0,20
Mechanical resistance (MPa) Compressive	EN 1015-11	7,8
Thermal conductivity a 10 °C (W/m.K)	EN 1745	0,75
Water vapour permeability (Equivalent air thickness m)	EN 12086	0,1

### RHONA FLEX C2TES1 (EN 12004)

Characteristics	Standard	Values
Range of thickness application (mm)		5,0 -10,0
Fire reaction Euroclass	EN 13501-1	NPA
Adhesion initial / ageing heat /ageing water/ freeze and thaw (MPa)	EN 1348	1,5 / 1,3/ 1,5 / 1,59
Open time 30 minutes (MPa)	EN 1346	0,5 ≥ 1
Resistance to sliding (mm)	EN 1308	0,1 ≤ 0,5
Deformability (mm)	EN 12002	≥ 2,5
Water mixing		28 %± 1,0
Thermal conductivity a 10 °C (W/m.K)	EN 1745	NPA
Water vapour permeability (Equivalent air thickness m)	EN 12086	0,2
Density (kg/m <sup>3</sup> )	EN 1015-7	NPA

**Reinforcement.** The reinforcement has the CE marking with ETA 13/0392. The reinforcement has the CE marking with ETA 13/0392.

**Tearing strength.** The tests on tearing strength and on elongation of the reinforcement were carried out in accordance with § 5.6.7.1 of ETAG 004 at the as-delivered state and after ageing.

Status	Units	150	
		Warp direction L(15 thread)	Weft direction T(12 thread)
Initial	N / mm (≥ 20)	44	45
After ageing	N / mm (≥ 20)	22	25
Difference	%	≤ 50	≤ 50

**Ash content.** This test applies to glass fibre mesh only. The ash content is determined at (625 + 20)°C on three 100 mm square samples, cut parallel to the yarn and at least 100 mm apart from the side to constant mass. The result is expressed, as a percentage loss relative to the initial mass is 16%.

**Mass per unit area.** The mass per unit area is determined by measuring and weighing a one-metre length of mesh is 160 g/m<sup>2</sup>. For reinforcement in roll form, the width of the sample should be the same as the roll width.

## Cladding elements.

Characteristics	Standard	Plastic cladding	Ceramic Ib	Porcelanic Ia
Type of material		Mineral	Ceramic	Ceramic
Dimensions (cm)	10545-2/ 1469 / 15286	24 X 7.1	≤ 30 x30	100x50
Maximum weight per square metre (kg/m <sup>2</sup> )	10545-3/ 1936 / 14617-1	≤4	≤33	≤13
Reaction to fire Euroclass	EN 13501-1	B, S1-d0	A1	A2-s1,d0
Bending strength	10545-4	-	R ≥45 N/mm <sup>2</sup> S ≥1800 N	R ≥90 N/mm <sup>2</sup> S ≥700 N
Water absorption (%)	10545-3	-	0,5 ≤ I ≤ 3	I ≤ 0,3
Water vapour transmission	10456 / 12086	-	NPA	NPA
Freeze-thaw behavior	10545-12	-	OK	OK
Moisture expansion (mm/m)	10545-10	-	0,1	-----
Thickness (mm)		≥4	≥4,5 mm	≥3 mm
Thermal conductivity a 10 °C (W/m.K)	EN 1745	According to the density of the material		

## Grout RHONA JUNTAS CG2 Ar W (EN 13888)

Characteristics	Standard	Values
Density (kg/m <sup>3</sup> )	EN 1015-7	1,80 ± 0,05
Ratio water mixing (%)		35,00 ± 1,00
Density of hardened (kg/m <sup>3</sup> )	EN 1015-10	1,68 ± 0,05
Shrinkage (mm/m)	EN 12808-4	< 2
Water absorption (g)	EN 12808-5	30 min ≤ 2,0 240 min ≤ 2,0
Water vapour permeability (Equivalent air thickness m)	EN 12086	0,2
Abrasion resistance	EN 128008-2	453
Flexural and compressive resistance	EN 128008-3	8 / 35
Flexural and compressive resistance after freeze and thaw	EN 128008-3	6 / 26
Reaction to fire	EN 13501-1	NPA
Thermal conductivity a 10 °C (W/m.K)	EN 1745	NPA

## ADHESIVO PLAQUETA CV-FLEX

Characteristics	Standard	Values
Density (kg/m <sup>3</sup> )	EN 1015-7	1,70 ± 0,1
Water vapour permeability (Equivalent air thickness m)	EN 12086	0.49 – 0.58
Reaction to fire	EN 13501-1	NPA
Thermal conductivity a 10 °C (W/m.K)	EN 1745	NPA

**Fasteners.** Fastener with CE marking with ETA n° ETA 04/0023. Plate dimensions of 60 mm diameter and plate and Stiffness 0,6 kN/mm<sup>2</sup>. Other fasteners with CE marking and with ≥ plate diameter and/or the same or higher plate Stiffness (see EOTA Technical Report n° 26) can be used.