



European Technical Assessment

**ETA 23/0221
of 21/06/2023**

General Part

**Technical Assessment Body issuing the
ETA:**

TECNALIA RESEARCH & INNOVATION

Trade name of the construction product

TERMOK8 MODULAR IVAS

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

External thermal insulation composite
system (ETICS) with panels as thermal
insulation product and discontinuous
cladding as exterior skin.

Manufacturer

Ivas Industria Vernici Spa
Via Bellaria, 40
IT-47030 San Mauro Pascoli (FC), Italy
www.gruppoivas.com

Manufacturing plants

Via Bellaria, 40
IT-47030 San Mauro Pascoli (FC), Italy

**This European Technical Assessment
contains**

21 pages including one Annex which form
an integral part of this assessment.

**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 cladding as
exterior skin.

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Specific parts

1. Technical description of the product

This ETA refers to the external thermal insulation composite system with discontinuous ceramic cladding on expanded polystyrene (EPS) board for use as external insulation of building walls.

This product is an ETICS (External Thermal Insulation Composite System) with discontinuous ceramic cladding – a kit comprising components which are factory-produced by the manufacturer or component suppliers. The ETICS manufacturer is ultimately responsible for all components of the ETICS specified in this ETA (European Technical Assessment).

The TERMOK8 MODULAR IVAS kit comprises a prefabricated insulation product of expanded polystyrene (EPS) to be bonded and mechanically fixed onto the wall. The methods of fixing and the relevant components are specified in Table 1. The insulation product is faced with a rendering system consisting of one layer (site applied), which contains a reinforcement mesh. The rendering is applied directly to the insulating panels, without any air gap or disconnecting layer. Finally, the ceramic cladding elements are fixed to the rendering by means of a ceramic adhesive and grout.

The ETICS may include special fittings (e.g. base profiles, corner profiles) to treat details such as connections, apertures, corners, parapets, sills, etc. Assessment and performance of these components is not addressed on 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.

The components of the kit are:

Components		Coverage (kg/m ²)	Thickness (mm)
TERMOK8 MODULAR IVAS. ETICS fixed by adhesive with mechanical fixings (Partially or fully adhered. Following the instructions of the ETA holder, the minimum bonding surface must be 40% and with minimum 8 supplementary mechanical fixings per m². National application documents shall be taken into account).			
Insulation material with associated method of fixing	Insulation product:		
	IVAS PANEL EPS FIX Factory prefabricated expanded polystyrene (EPS) board according to EN 13163. See Annex 1.	**	60-300
	Adhesive:		
	KLEBOCEM ULTRA Cement based mortar in powder, according to EN 998-1, requiring addition of 22%-24% water.	5.0-5.5	8.0-9.0 (dry)
	Mechanical fixings		
	Plastic fixing for external thermal insulation composite systems on concrete and masonry, use categories: A, B, C, D, E	See Annex 1	

	Components	Coverage (kg/m ²)	Thickness (mm)
Base coat	KLEBOCEM ULTRA Cement based mortar in powder, according to EN 998-1, requiring addition of 22%-24% water.	8.0-8.5	8.0-9.0 (dry)
Glass fibre mesh	ARMATEX C1-M Alkali and slide resistant glass fibre mesh with mass per unit area 225 g/m ² and mesh size 4.0 x 5 mm.	--	--
Cladding adhesive	GLUEFLEX ULTRA Cement based adhesive in powder, according to EN 12004. Requiring addition of 27%-29% water.	2.5-5.0	5.0-8.0
	GLUEFLEX MODULAR BIG Bi-component cement-based adhesive for large ceramic cladding. CE marked according to EN 12004. Component A: cement powder. Component B: elasticizing resin.	2.5-5.0	5.0-8.0
Grout	SIGIL TOW FL^(*) Cement based grout in powder, according to EN 13888.	0.8	<15
Ancillary materials	Supplementary profiles: Polyvinyl chloride (PVC) or aluminium profiles for corners, expansion joints, junctions with doors and windows, balconies, etc.).		
Discontinuous cladding element	ETICS OPTION 1: TERMOK8 MODULAR FACCIAVISTA		
	LISTELLO FACCIAVISTA Clay tiles acc. to EN 771-1. Dimension from 243*55 mm/250*54 mm	≤43.8	16-25
	ETICS OPTION 2: TERMOK8 MODULAR D		
	LISTELLOTTOT KLINKER Ceramic slips according to EN 14411, groups Alla and Allb. Dimension from 240*52 mm to 1200*600 mm	≤22.5	6-11
	ETICS OPTION 3: TERMOK8 MODULAR BIG		
	PIASTRELLA IN GRES PORCELLANATO Ceramic tiles according to EN 14411, group Bla. Dimension from 125*125 mm to 1500*500/1200*600 mm	≤32	3.5-14
	ETICS OPTION 4: TERMOK8 MODULAR BIOSTONE		
	PIASTRELLA IN PIETRA RICOSTRUITA. Manufactured stone tiles according to EN 771-5. Dimension from 50*215 mm to 1200*600 mm	≤43	10-30

Table 1: Components TERMOK8 MODULAR IVAS

(*) Used in conjunction with RESINTOW (Elasticising liquid additive for mortars) in the ETICS Option 3: TERMOK8 MODULAR BIG

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

2.1. Intended use

TERMOK8 MODULAR IVAS is intended for use as external insulation of building walls. The walls are made of masonry (bricks, block, stones...) or concrete (cast on site or as prefabricated panels). The characteristics of the walls shall be verified prior to use of the ETICS, especially regarding conditions for reaction to fire classification and for fixing of the ETICS either by bonding or mechanically. The ETICS is designed to give the wall, to which it is applied, satisfactory thermal insulation.

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

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

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

The choice of the method of fixing depends on the characteristics of the substrate, which could need preparation and shall be done in accordance with the national instructions.

The provisions made in this ETA are based on an assumed working life of 25 years as minimum, provided that the conditions laid down in the sections below (manufacturing, transport, installation, use, maintenance, etc) are met. The indications given on the working life cannot be interpreted as a guarantee given by the manufacturer, but should only be regarded as a means for choosing the appropriate products in relation to the expected economically reasonable working life of the works.

2.2. Manufacturing

The ETA is issued for TERMOK8 MODULAR IVAS system, on the basis of agreed data/information, deposited at Tecnalia Research & Innovation, which identifies the ETICS that has been assessed and judged. Changes to the ETICS or the components or their production process, which could result in this deposited data/information being incorrect, shall be notified to Tecnalia Research & Innovation before the changes are introduced. Tecnalia Research & Innovation will decide whether or not such changes affect the ETA and consequently the validity of the CE marking on the basis of the ETA and, if so, whether further assessment or alterations to the ETA shall be necessary.

2.3. Design and installation

Installation. The ETICS is installed on site. The installation instructions, including special installation techniques and provisions for the qualification of the personnel, are given in the manufacturer's technical documentation. It is responsibility of the manufacturer to guarantee that the information about design and installation is easily accessible to the concerned people.

This information can be given using reproductions of the respective parts of the 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 TERMOK8 MODULAR IVAS system is applied shall be sufficiently stable and airtight. Its stiffness shall be large enough to ensure that the 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 Table 1 with characteristics according to Annex 1 of this ETA can be used for the ETICS.

The works including the details (connection, joint...) shall be designed 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 minimum bonded surface shall be 40% with a minimum of 8 supplementary fixing per m². For MODULAR FACCIAVISTA, MODULAR D and MODULAR BIG, joint width varies from 5 mm to 8 mm according to the tiles size. For MODULAR BIOSTONE joint width varies from 5 mm to 12 mm according to the tiles size.

Execution. The recognition and preparation of the substrate as well as the generalities about 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 reduce the bond resistance of the system.
- Corresponding national regulations.
- The particularities in execution linked to the method of bonding/mechanical fixing and the application of the rendering system shall be handled in accordance with manufacturer prescriptions. In particular it is suitable to comply with the quantities of rendering applied, the thickness regularity and the drying periods between layers.

2.4. Packaging, transport and storage

The information on packaging, transport and storage is given in the manufacturer's technical documentation. It is responsibility of the manufacturer to ensure that this information is easily accessible for the concerned people.

2.5. Use, maintenance and repair

The finishing coat shall normally be maintained in order to fully preserve the ETICS's performance. Maintenance includes at least:

- Visual inspections of the ETICS.
- The repairing of localised damaged areas due to accidents.

Necessary repairs should be performed as soon as the need has been identified.

It is important to be able to carry out maintenance as far as possible using readily available products and equipment, without spoiling appearance. Only products which are compatible with the ETICS shall be used.

The information on use, maintenance and repair is given in the manufacturer's technical documentation. It is the responsibility of the manufacturer to ensure that this information is made know to the concerned people.

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

The identification tests and the assessment according to the Basic Requirements for the intended use of TERMOK8 MODULAR IVAS system, were carried out in compliance with the European Assessment Document EAD 040287-00-0404 “Kits for external thermal insulation composite system (ETICS) with panels as thermal insulation product and discontinuous cladding as exterior skin”.

Safety in case of fire (BWR 2)

3.1 Reaction to fire (EAD 040287-00-0404, Clause 2.2.1)

The reaction to fire of TERMOK8 MODULAR FACCIAVISTA and TERMOK8 MODULAR D and TERMOK8 MODULAR BIOSTONE according to EN 13501-1 and Commission Delegated regulation (EU) 2016/364, is class B-s1, d0.

The reaction to fire of TERMOK8 MODULAR BIG with tile size from 300x300 mm, according to EN 13501-1 and Commission Delegated regulation (EU) 2016/364, is class B-s1, d0. For smaller tile sizes: performance not assessed.

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

3.2 Facade fire performance (EAD 040287-00-0404, Clause 2.2.2)

Performance not assessed.

Hygiene, health and environment (BWR 3)

3.3 Water absorption (EAD 040287-00-0404, Clause 2.2.3)

TERMOK8 MODULAR IVAS SYSTEM	Water absorption (kg/m ²)		
	After 3 min	After 1 h	After 24 h
Without skin	0	0.148	0.451
MODULAR FACCIAVISTA	0	0.149	0.480
MODULAR D	0	0.114	0.362
MODULAR BIG	0	0.024	0.096
MODULAR BIOSTONE	0	0.141	0.422

Table 2

3.4 Water vapour permeability (resistance to water vapour diffusion) (EAD 040287-00-0404 Clause 2.2.4)

The equivalent resistance to water vapour diffusion of the ETICS systems has been assessed by calculation following the calculation method stated in EAD 040287-00-0404 Annex D (using water vapour permeability of individual components of the ETICS).

The resistance to water vapour diffusion (Z) and the water vapour diffusion-equivalent air layer thickness (S_d) of the components of the TERMOK8 MODULAR IVAS ETICS are the following:

TERMOK8 MODULAR IVAS Components		Thickness (mm)	μ	Z ($m^2 \cdot s \cdot Pa$)/kg)	S_d (m)
Adhesive	KLEBOCEM ULTRA	8-9	25	8.0×10^{-8} - 9.0×10^{-8}	0.16-0.18
Insulation	EPS	60-300	20-70	6.0×10^{-9} - 3.0×10^{-10}	1.2 -6
Base coat	KLEBOCEM ULTRA + mesh ARMATEX C1-M	8-9	25	8.0×10^{-8} - 9.0×10^{-8}	0.16-0.18
Cladding adhesive	GLUEFLEX ULTRA	5-8	5-20	1.3×10^{-8} - 8.0×10^{-8}	0.025 – 0.16
	GLUEFLEX MODULAR BIG	5-8	5-20	1.3×10^{-8} - 8.0×10^{-8}	0.025 – 0.16
Discontinuous cladding element	LISTELLO FACCIAVISTA	16-25	5-10	4.0×10^{-8} - 1.3×10^{-9}	0.08-0.25
	LISTELLOTTOT KLINKER	6-11	10^6	3.0×10^{-13} - 5.5×10^{-13}	6000-11000
	PIASTRELLA IN GRES PORCELLANATO	3.5-20	10^6	1.8×10^{-13} - 1.0×10^{-14}	3500-20000
	PIASTRELLA IN PIETRA RICOSTRUITA	10-30	5-15	2.5×10^{-8} - 2.3×10^{-9}	0.05-0.45
Grout	SIGIL TOW FL	6-15	5-20	1.5×10^{-8} - 1.5×10^{-9}	0.03- 0.3
	SIGIL TOW FL + RESINTOW	3.5-20	5-20	8.8×10^{-7} - 2.0×10^{-9}	0.02- 0.4

Table 3

The minimum and maximum values of the resistance to water vapour diffusion (Z) calculated for TERMOK8 MODULAR IVAS ETICS are the following:

ETICS	Z _{min} (m ² .s.Pa)/kg)	Z _{max} (m ² .s.Pa)/kg)
TERMOK8 MODULAR FACCIAVISTA	8.1x10 ⁹	3.4x10 ¹⁰
TERMOK8 MODULAR D	2.5x10 ¹³	5.4x10 ¹³
TERMOK8 MODULAR BIG	1.5x10 ¹³	9.9x10 ¹³
TERMOK8 MODULAR BIOSTONE	7.9x10 ⁹	3.5x10 ¹⁰

Table 4

3.5 Accelerated ageing behaviour

3.5.1 Hygrothermal behaviour (EAD 040287-00-0404 Clause 2.2.5.1)

The hygrothermal performance of TERMOK8 MODULAR IVAS ETICS has been assessed on the wall.

None of the following defects occurred on the assessed skins or the base coat during and after the hygrothermal cycles:

- Deterioration such as cracking or delamination of the skin that allows water penetration to the internal layers.
- Deterioration or cracking of grout.
- Detachment of the skin.
- Irreversible deformation.

Therefore, the ETICS is considered resistant to hygrothermal cycles.

Mean values of the measured bond strength (according to clause 2.2.5.1 of EAD 040287-00-0404) before and after hygrothermal cycles are given in Table 6.

3.5.2 Freeze-thaw behaviour (EAD 040287-00-0404 Clause 2.2.5.2)

Water absorption of the base coat with the skin is lower than 0.5 kg/m² after 1 hour and 24 hours. Based on these test results, the TERMOK8 MODULAR IVAS system can be considered freeze-thaw resistant and there is no need for further testing.

Safety and accessibility in use (BWR 4)

3.6 Wind load resistance EAD 040287-00-0404 Clause 2.2.6)

Not relevant for TERMOK8 MODULAR IVAS ETICS.

3.7 Impact resistance (EAD 040287-00-0404 Clause 2.2.7)

ETICS	Impacts	Test result	Use category (*)
TERMOK8 MODULAR IVAS SYSTEM	Hard body (0.5 kg), 3 Joules impacts	No defects	I
	Hard body (1.0 kg), 10 Joules impacts	No defects	
	Soft body (3.0 kg), 60 Joules impact	No defects	
	Soft body (50.0 kg), 400 Joules impact	No defects	

Table 5

(*) Category I: This category means that the degree of exposure in use should be a zone readily accessible at ground level to the public and vulnerable to hard body impacts but not subjected to abnormally rough use.

Category II: This category means that the degree of exposure in use should be a zone liable to impacts from thrown or kicked objects, but in public locations where the height of the kit 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.

Category III: This category means that the degree of exposure in use should be a zone not likely to be damaged by normal impacts caused by people or by thrown or kicked objects.

Category IV: This category means that the degree of exposure in use should be a zone out of reach from ground level.

3.8 Bond strength

3.8.1 Bond strength between skin, reinforced base coat and insulation material (EAD 040287-00-0404 Clause 2.2.8)

TERMOK8 MODULAR IVAS SYSTEM	Ageing	Mean value (MPa)	Minimum value (MPa)	Rupture (*)	Ratio (%) (**)
MODULAR FACCIAVISTA	In dry conditions	0.085	0.084	100% CS	...
	After 2 d. in H ₂ O + 2 h drying	0.081	0.080	100% CS	95
	After 2 d. in H ₂ O + 7 d. drying	0.083	0.082	100% CS	98
	After hygrothermal cycles	0.086	0.085	100% CS	101
	After freeze-thaw cycles	According to water absorption test results, system can be considered freeze-thaw resistant			
MODULAR D	In dry conditions	0.087	0.086	100% CS	...
	After 2 d. in H ₂ O + 2 h drying	0.085	0.085	100% CS	98
	After 2 d. in H ₂ O + 7 d. drying	0.086	0.086	100% CS	99
	After hygrothermal cycles	0.092	0.091	100% CS	106
	After freeze-thaw cycles	According to water absorption test results, system can be considered freeze-thaw resistant			
MODULAR BIG	In dry conditions	0.105	0.104	100% CS	...
	After 2 d. in H ₂ O + 2 h drying	0.095	0.094	100% CS	90
	After 2 d. in H ₂ O + 7 d. drying	0.097	0.096	100% CS	92
	After hygrothermal cycles	0.082	0.080	100% CS	78
	After freeze-thaw cycles	According to water absorption test results, system can be considered freeze-thaw resistant			
MODULAR BIOSTONE	In dry conditions	0.084	0.083	100% CS	...
	After 2 d. in H ₂ O + 2 h drying	0.080	0.080	100% CS	95
	After 2 d. in H ₂ O + 7 d. drying	0.083	0.081	100% CS	95
	After hygrothermal cycles	0.082	0.080	100% CS	98
	After freeze-thaw cycles	According to water absorption test results, system can be considered freeze-thaw resistant			

Table 6

(*) Rupture Type: AS = adhesive rupture. CS = cohesive rupture in support. CA = cohesive rupture in adhesive.

(**) Value after ageing vs. value in dry conditions.

3.8.2 Bond strength between insulation material and adhesive (EAD 040287-00-0404 Clause 2.2.8)

TERMOK8 MODULAR IVAS SYSTEM	Ageing	Mean value (MPa)	Minimum value (MPa)	Rupture (*)	Ratio (%) (**)
Adhesive KLEBOCEM ULTRA + EPS panel	In dry conditions	0.089	0.088	100% CS	...
	After 2 d. in H ₂ O + 2 h drying	0.082	0.081	100% CS	92
	After 2 d. in H ₂ O + 7 d. drying	0.086	0.084	100% CS	97

Table 7

(*) Rupture Type: AS = adhesive rupture. CS = cohesive rupture in support. CA = cohesive rupture in adhesive.

(**) Value after ageing vs. value in dry conditions.

3.8.3 Bond strength between substrate and adhesive (EAD 040287-00-0404 Clause 2.2.8)

TERMOK8 MODULAR IVAS SYSTEM	Ageing	Mean value (MPa)	Minimum value (MPa)	Rupture (*)	Ratio (%) (**)
Concrete substrate + adhesive KLEBOCEM ULTRA	In dry conditions	0.849	0.801	100% CA	...
	After 2 d. in H ₂ O + 2 h drying	0.437	0.399	100% CA	51
	After 2 d. in H ₂ O + 7 d. drying	0.752	0.744	100% CA	89

Table 8

(*) Rupture Type: AS = adhesive rupture. CS = cohesive rupture in support. CA = cohesive rupture in adhesive.

(**) Value after ageing vs. value in dry conditions.

3.9 Tensile strength of thermal insulation panel (EAD 040287-00-0404 Clause 2.2.9)

Tensile strength of thermal insulation panels in dry conditions has been obtained from the DoP of the thermal insulation panels according to EN 13163. See Annex 1 for declared values.

Tensile strength of thermal insulation panels in wet conditioning has not been assessed.

3.10 Shear strength and shear modulus of thermal insulation panel (EAD 040287-00-0404 Clause 2.2.10)

See Annex 1 for values of shear strength and shear modulus of thermal insulation panel in dry conditions.

Shear strength and shear modulus of thermal insulation panel in wet conditioning has not been assessed.

3.11 Dead load behaviour (EAD 040287-00-0404 Clause 2.2.11)

Maximum dead load applied for TERMOK8 MODULAR IVAS has been 192 N. The maximum difference of displacement has been 4,38 mm.

Deflection curves in function of time for TERMOK8 MODULAR IVAS are the following:



Figure 1: Deflection curve in function of time

3.12 Pull-through resistance (EAD 040287-00-0404 Clause 2.2.12)

Not relevant.

3.13 Pull-out resistance (foam block test) (EAD 040287-00-0404 Clause 2.2.13)

Not relevant.

Protection against noise (BWR 5)

3.14 Improvement of airborne sound insulation (EAD 040287-00-0404 Clause 2.2.14)

No performance assessed.

Energy economy and heat retention (BWR 6)

3.15 Thermal conductivity and thermal resistance (EAD 040287-00-0404 Clause 2.2.15)

Thermal resistance (R) of the TERMOK8 MODULAR IVAS SYSTEM has been calculated using the thermal values and geometry of the components of the system (see Annex 1) according to the section 6.2 of EN ISO 6946 and the Annex K of EAD 040287-00-0404.

TERMOK8 MODULAR IVAS	Minimum value R_{ETICS} (m ² .K)/W)	Maximum value R_{ETICS} (m ² .K)/W)
TERMOK8 MODULAR FACCIAVISTA	1.78	9.77
TERMOK8 MODULAR D	1.76	9.74
TERMOK8 MODULAR BIG	1.76	9.75
TERMOK8 MODULAR BIOSTONE	1.77	9.77

Table 9

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

According to the European Commission Decision 1997/556/EC system AVCP 2+ applies.

The AVCP system 2+ is described in Annex V of Regulation (EU) N° 305/2011, as amended by Delegated Regulation (EU) N° 568/2014.

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

Technical details necessary for the implementation of the Assessment and Verification of Constancy of Performance (AVCP) system are laid down in the control plan deposited at Tecnalia Research & Innovation.

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

Issued in Azpeitia, on 21/06/2023

Miguel Mateos

Innovation and Conformity Assessment Point

Tecnalia Research & Innovation

ANNEX 1: Characteristics of the components

Detailed information on the chemical composition and other identifying characteristics of the TERMOK8 MODULAR IVAS System, according to EAD 040287-00-0404, has been deposited at Tecnalia Research & Innovation. Further information can be observed from the products data sheets, which are part of the Technical Documentation of this ETA.

Adhesive and base coat

KLEBOCEM ULTRA Cement based mortar in powder, according to EN 998-1, requiring addition of 22%-24% water.

Characteristics	Reference	Value
Designation	EN 998-1	GP CS IV
Water percentage (%)	-	22-24
Coverage (kg/m ² for 1 mm thickness)	-	1.3
Hardened mortar density (kg/m ³)	EN 1015-10	1300 ± 50
Water absorption (kg/m ² .min ^{0.5})	EN 1015-18	W2 (≤ 0.2)
Water vapour permeability, μ	EN 1015-19	< 80
Shrinkage (mm/m)	EAD 040287-00-0404 (L.6)	< 2
Compressive strength (MPa)	EN 1015-11	≥ 6 (CS VI)
Thermal conductivity, λ _d (W/m.K)	EN 1745	λ _{10, dry} 0.47 (P=50%)
Reaction to fire	EN13501-1	A1
Ash content at 450°C (%)	EAD 040287-00-0404 (L4.1)	96.3 ± 1
Organic content (%)	-	< 3.61

Thermal insulation panels

IVAS PANEL EPS FIX Expanded polystyrene panels (EPS) with or without graphite according to EN 13163.

Characteristics	Reference	Value
Dimensions	Thickness (mm)	EN 822
	Length (mm)	EN 823
	Width (mm)	
	Squareness (mm)	
	Length (mm)	
	Thickness (mm)	
	Width (mm)	
	Flatness (mm)	
Density (kg/m ³)	EN 1602	≤ 20
Reaction to fire	EN 13501-1	E
Water absorption	EN 12087	WL(T)3
Water vapour resistance factor, μ	EN 12086	20-70
Dimensional stability (%)	EN 1604	DS(N) ± 0,2%
Tensile strength perpendicular to the faces (kPa)	EN 1607	≥ 120
Shear strength (kPa)	EN 12090	≥ 20
Shear modulus (kPa)		≥ 1000

Characteristics	Reference	Value	
Thermal conductivity, λ_d (W/m.K)	EN 13163	With graphite	≤ 0.031
		Standard	≤ 0.035

Mesh

ARMATEX C1-M Alkali and slide resistant glass fibre mesh with mass per unit area 225 g/m² and mesh size 4.0 x 5.0 mm.

Characteristics		Reference	Value
Mass per unit area (g/m ²)		EAD 040016-01-0404	210 ± 5%
Mesh size (mm)			4.2 x 4.6 (± 0,5)
Thickness (mm)			0.60 ± 0.2
Ash content (625°C) (%)			80 ± 4%
Organic content (%)			20 ± 4%
Heat of combustion (PCS-value) (MJ/kg)			7,48
Tensile strength (N/mm)	Without ageing		≥ 50 (warp) ≥ 64 (weft)
	After ageing		≥ 48 (warp) ≥ 39 (weft)
	Residual (%)		≥ 50
Deformation n.c. (%)	Without ageing		3.2 (warp) 3.6 (weft)
	After ageing	3.0 (warp) 2.1 (weft)	

Cladding adhesive

GLUEFLEX ULTRA Cement based adhesive in powder for ceramic cladding. CE marked according to EN 12004. Designation C2TE S1

Characteristics		Reference	Value
Designation		EN 12004	C2TE S1
Water percentage (%)		-	27-29 (white) 25-27 (grey)
Thickness (mm)		-	<5
Ash content (%)		EAD 040287-00-0404 (L4.1)	95.8 ± 1
Organic content (%)		-	< 4.25
Reaction to fire		EN 13501-1	Euroclass F
Slip (mm)		EN 12004-2	≤ 0.5
Hardened mortar	Hardened mortar density (kg/m ³)	EN 1015-10	1400 ± 50
	Transverse deformation (mm)	EN 12004-2	≥ 2.5
	Water vapour resistance factor, μ	EN 1745 (Table A.12)	5-20
	Thermal conductivity		$\lambda_{10, dry} \leq 0.45$ (P=50%)
	Initial bond strength (N/mm ²)	EN 12004-2	≥ 1
	Bond strength after water immersion (N/mm ²)	EN 12004-2	≥ 1
	Bond strength after heat ageing (N/mm ²)	EN 12004-2	≥ 1
	Bond strength after freeze/thaw cycles (N/mm ²)	EN 12004-2	≥ 1
	Open time: bond strength after 20 min	EN 12004-2	≥ 1.0
	Open time: bond strength after 30 min	EN 12004-2	≥ 0.5

GLUEFLEX MODULAR BIG Bi-component cement-based adhesive for large ceramic cladding. CE marked according to EN 12004. Component A: cement powder. Component B: elasticizing resin. Designation C2E S2.

Characteristics		Reference	Value
Designation		EN 12004	C2E S2
Thickness (mm)		-	> 5
Ash content (%)		EAD 040287-00-0404 (L4.1)	91.1 ± 1
Organic content (%)		-	< 9
Reaction to fire		EN 13501-1	A2-s1, d0
Slip (mm)		EN 12004-2	≥ 0.5
Hardened mortar	Hardened mortar density (kg/m ³)	EN 1015-10	1300 ± 50
	Transverse deformation (mm)	EN 12004-2	> 5
	Water vapour resistance factor, μ	EN 1745	5-20
	Thermal conductivity		$\lambda_{10, dry} \leq 0.45$ (P=50%)
	Initial bond strength (N/mm ²)	EN 12004-2	≥ 1
	Bond strength after water immersion (N/mm ²)	EN 12004-2	≥ 1
	Bond strength after heat ageing (N/mm ²)	EN 12004-2	≥ 1
	Bond strength after freeze/thaw cycles (N/mm ²)	EN 12004-2	≥ 1
	Open time: bond strength after 20 min	EN 12004-2	≥ 1.0
	Open time: bond strength after 30 min	EN 12004-2	≥ 0.5

Grout

SIGIL TOW FL. Cement based grout in powder. According to EN 13888.

Characteristics			Reference	Value
Designation			EN 13888	CG2
Water percentage (%)				18-20
Thickness (mm)				≤ 30
Joint width (mm)				5-10
Ash content (450°C) (%)			EAD 040287-00-0404 (L4.1)	99.1 ± 1
Organic content (%)			-	< 0.93
Hardened mortar	Hardened mortar density (kg/m³)		EN 1015-10	1400 ± 50
	Water absorption (g)	Absorption 30 min	EN 12808-5	≤ 0.1
		Absorption 240 min		≤ 0.2
	Water vapour permeability		EN ISO 10456	< 20
	Shrinkage (mm/m)		EN 12808-4	≤ 1.5
	Resistance to abrasion (mm³)		EN 12808-2	≤ 700
	Water vapour resistance factor, μ		EN 1745	5-20
	Thermal conductivity			λ _{10, dry} ≤ 0.45 (P=50%)
	Flexural and compressive strength n.c.	Flexural strength (N/mm²)	EN 12808-3	≥ 5.5
		Compressive strength (N/mm²)		≥ 30
	Flexural and compressive strength after freeze/thaw cycles	Flexural strength (N/mm²)	EN 12808-3	≥ 6.5
		Compressive strength (N/mm²)		≥ 37

Plastic fixings:

Screw-in plastic fixing for external thermal insulation composite systems with render on concrete and masonry, use categories: A, B, C, D, E

GENERAL CHARACTERISTICS	
Plate diameter (mm)	≥ 60
Load resistance (kN)	≥ 1,4
Plate stiffness (kN/m)	≥ 0.6
Thermal transmittance (W/K)	≤ 0.002

Cladding elements

LISTELLO FACCIAVISTA Clay tiles CE marked according to EN 771-1.

Characteristics:		Reference	Value
Dimensions	Thickness (mm)	EN 772-16	16-25
	Length (mm)		243-250
	Width (mm)		53-55
	Area (cm ²)		128-138
Reaction to fire			A1
Water absorption (%)		EN 772-21	≤ 15,5 %
Relative apparent density (kg/m ³)		EN 772-13	≤ 1800
Weight per m ² (kg/m ²)			≤ 44
Frost resistance		EN 772-22	F2
Moisture expansion (mm/m)		EN 772-19	-
Water vapour permeability, μ		EN 1745	5/10
Thermal conductivity, λ (W/m.K)		EN 1745	≤ 0.595
Compressive strength (MPa)		EN 772-1	-

LISTELLOTTOT KLINKER Ceramic slips CE marked according to EN 14411, group AIIa and AIIb.

Characteristics:		Reference	Value
Dimensions	Thickness (mm)	EN ISO 10545-2	6-11
	Length (mm)		240-1200
	Width (mm)		52-600
	Area (cm ²)		124-7200
Reaction to fire		EN 14411	A1
Water absorption (%)		EN ISO 10545-3	E ≤ 10%
Relative apparent density (kg/m ³)		EN ISO 10545-3	-
Weight per m ² (kg/m ²)			≤ 22.5
Frost resistance		EN ISO 10545-12	Pass
Moisture expansion (mm/m)		EN ISO 10545-10	-
Linear thermal expansion		EN ISO 10545-8	-
Water vapour permeability, μ		EN 12524	10 ⁶
Thermal conductivity, λ (W/m.K)		EN 12524	1.3
Flexural strength (MPa)		EN ISO 10545-4	Acc. to EN 14411
Breaking strength (N)			

PIASTRELLA IN GRES PORCELLANATO Ceramic tiles CE marked according to EN 14411, group Bla.

Characteristics:		Reference	Value
Dimensions	Thickness (mm)	EN ISO 10545-2	3.5-14
	Length (mm)		125-1500
	Width (mm)		125-600
	Area (cm²)		156-7500
Reaction to fire		EN 13501-1	A2 -s1, d0
Water absorption (%)		EN ISO 10545-3	E ≤ 0.5%
Relative apparent density (kg/m³)		EN ISO 10545-3	≤ 2400
Weight per m² (kg/m²)			≤ 32
Frost resistance		EN ISO 10545-12	Pass
Moisture expansion (mm/m)		EN ISO 10545-10	≤ 0.1
Linear thermal expansion		EN ISO 10545-8	< 7 x 10 ⁻⁶
Water vapour permeability, μ		EN 12524	10 ⁶
Thermal conductivity, λ (W/m.K)		EN 12524	1.3
Flexural strength (MPa)		EN ISO 10545-4	Acc. to EN 14411
Breaking strength (N)			

PIASTRELLA IN PIETRA RICOSTRUITA Manufactured stone tiles CE marked according to EN 771-5.

Characteristics:		Reference	Value
Dimensions	Thickness (mm)	EN 772-16	10-30
	Length (mm)		215-1200
	Width (mm)		50-600
	Area (cm ²)		107-7200
Reaction to fire		EN 771-5	A1
Water absorption (g/m ² x s ^{0.5})		EN 772-11	< 55
Relative apparent density (kg/m ³)		EN 772-13	≤ 1970
Weight per m ² (kg/m ²)			≤ 50
Frost resistance		EN 771-5	Pass
Moisture expansion (mm/m)		EN 772-14	≤ 36.03
Water vapour permeability, μ		EN 1745	5/15
Thermal conductivity, λ (W/m.K)		EN 771-5	λ _{10, dry} ≤ 1.00 (P=50%)
Compressive strength (MPa)		EN 772-1	≥ 37.9
Breaking strength (kN)		EN 772-1	376.3