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European Technical Assessment

**ETA 15/0916
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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

FRONTEK PLUS and
FRONTEK OMEGA PLUS

Product family to which the construction product belongs

Kits for external wall claddings

Manufacturer

GRECO GRES INTERNACIONAL, S.L.
Avda. Castilla La Mancha, 1.
45240 ALAMEDA DE LA SAGRA
(Toledo) España
website: www.grecogres.com

Manufacturing plant(s)

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(Toledo) España

This European Technical Assessment contains

21 pages including 4 Annexes which form an integral part of this assessment. Annex D contains confidential information and is not included in the ETA when is publicly available

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

Guideline for European Technical Approval (ETAG) nº 034 ed. April 2012, part 1 and 2 used as European Assessment Document (EAD)

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SPECIFIC PART

1. Technical description of the product

The assessed kits for ventilated external wall claddings “FRONTEK PLUS” and “FRONTEK OMEGA PLUS” consist of an external cladding, mechanically fastened to a framework, which is fixed to the external wall of new or existing buildings (retrofit). An insulation layer is usually fixed on the external wall.

These kits for vertical exterior wall claddings, based on ceramic plates fastened to the subframe by invisible fixings, are classified as family C, according to the ETA Guidance nº 034: *Kits for external wall claddings. Part 1: Ventilating cladding kits comprising cladding components and associated fixings and Part 2: Cladding kits comprising cladding components, associated fixings, subframe and possible insulation layer*, edition April 2012 (hereinafter ETAG 034) and comprise the components specified in table 1, which are factory produced by the ETA holder or a supplier.

TABLE 1 – DEFINITION OF THE KIT COMPONENTS							
Components			Material	Sizes [mm]			
F. PLUS	Cladding elements	Ceramic plates FRONTEK ⁽¹⁾ produced by GRECO GRES INTERNACIONAL, S.L.	Extruded porcelain stoneware	405	600 800 900 1000	19.5	
		Ceramic plates FRONTEK OMEGA ⁽¹⁾ produced by GRECO GRES INTERNACIONAL, S.L.					Extruded porcelain stoneware
FRONTEK PLUS y FRONTEK OMEGA PLUS	Cladding fixings		Elements (clips) used to secure the cladding plates to the subframe ⁽²⁾	Stainless steel A2 (AISI 304)	e= 1 mm		
	Subframe ⁽³⁾	Vertical profiles	Vertical elements ⁽⁴⁾ used to fix the plates by means of invisible fixings	Extruded aluminium ⁽⁵⁾	e= 2mm; 60 x 100		
		Brackets	Metalic elements ⁽⁶⁾ used as load trasmission between the subframe and the substrate wall.	Extruded aluminium	Retention e=3mm	60	60 80 100 120
	Supporting e=3mm	123			60 80 100 120	50	
Ancillary material		Self-drilling screws anchoring subframe elements	Vertical profile to brackets Clips to vertical profile	A2 Stainless steel	Ø 5,5 L=22		
Auxiliary components		Anchorage to substrate ⁽⁷⁾	-		Ø 4,2 L=13		
					-		

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

2.1 Intended use

FRONTEK PLUS and FRONTEK OMEGA PLUS are intended to be used for ventilated external wall claddings which can be fixed to the external wall of new or existing buildings.

The substrate walls are made of masonry (bricks or blocks), concrete (cast on site or as prefabricated panels), timber or metal frame. Insulation material is defined in accordance with an EN standard or an ETA and is not manufactured by GRECOGRES INTERNACIONAL, S.L.

Kit for ventilated external wall claddings are non-load-bearing construction system. It does not contribute to the stability of the wall on which is installed, neither to ensure the air tightness of the

⁽¹⁾ Dimensional features, physical – mechanical properties in Annex A and Geometric features in figure 2

⁽²⁾ Geometric features in figure 3

⁽³⁾ Not manufactured by GRECOGRES INTERNACIONAL, S.L.

⁽⁴⁾ Geometric and mechanical features in Annex B and figure 4

⁽⁵⁾ Physical and mechanical properties in Annex B

⁽⁶⁾ Geometric and mechanical features in Annex B and figures 5.1 and 5.2

⁽⁷⁾ See Annex C

building structure but it can contribute to durability of the works by providing enhanced protection from the effect of weathering.

2.2 Relevant general conditions for the use of the kit

The provisions made in this European Technical Assessment are based on an assumed working life of 25 years as minimum according to ETAG 034, provided that the conditions lay down for the installation, packaging, transport and storage as well as 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.

2.3 Design of the kits

The design of the external wall cladding system for ventilated façade using the “FRONTEK PLUS” and “FRONTEK OMEGA PLUS” kits should take into account:

- The mechanical characteristic values of the kit components (e.g. plates, cladding fixings and subframe) in order to resist the actions applying on the specific work. National safety factor must be used.
- The substrate material to define the suitable anchorages.
- The possible movements of the substrate and the position of the building expansion joints.
- The dilation of the kit components and of the plates.
- The category of corrosivity of the atmosphere of the works ⁽⁸⁾..
- Because joints are not watertight, the first layer behind ventilated air space must be composed by materials with low water absorption.
- The construction of façade specific parts (e.g. base, top, corners, windows etc.)
- If the entire building must comply with the specific building regulations, particularly concerning fire and wind-load resistances of the Member State where the work is to be built.

2.4 Installation of the kits in works

Installation should be carried out according to the ETA holder's specifications and using the specific kit components, manufactured by the ETA holder or by suppliers recognized by the ETA holder.

Installation should be carried out by appropriately qualified staff and under the supervision of the technical responsible of the site.

2.5 Use, maintenance and repair of the works

Maintenance of the assembled systems or kit components includes inspections on site, taking into account the following aspects:

- Regarding the plates: appearance of any damage such as cracking or detachment due to permanent and irreversible deformation.
- Regarding metallic components: presence of corrosion or water accumulation.

Necessary repairs should be done rapidly, using the same kit components and following the repair instructions given by ETA holder.

⁽⁸⁾ (E.g. See table 1 of Standard EN ISO 12944-2: 1998. Paints and varnishes. Corrosion protection of steel structures by protective paint systems. Part 2: Classification of environments.

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

The identification tests and the assessment for the intended use of these kits for ventilated external wall claddings according to the Basic Work Requirements (BWR) were carried out in compliance with the ETAG 034 used as an EAD. The characteristics of the components shall correspond to the respective values laid down in the technical documentation of this ETA, checked by IETcc.

3.1 Mechanical resistance and stability (BWR1)

Requirements with respect to the mechanical resistance and stability of non-load bearing parts of the works are not included in this Basic Requirement but are treated under the Basic Requirement Safety in use (See section 3.4)

3.2 Safety in case of fire (BWR2)

3.2.1 Reaction to fire

The reaction to fire of the whole kits according to standard EN 13501-1: 2007 + A1:2010⁽⁹⁾, is Class A1 without need of testing in agreement with Decision 96/603/EEC as amended.

This classification is only valid if the insulation layer placed in the ventilated air space is made of a non-combustible material (mineral wool) or if the layer behind the cladding elements is a mineral substrate like masonry or concrete (A1 or A2-s1,d0).

In other cases the class of reaction to fire is F (No performance determined – NPD)

A European reference fire scenario has not been laid down for facades. In some Member States, the classification of external wall cladding kits according to Standard EN 13501-1 might not be sufficient for the use in facades. An additional assessment of the system according to the national provision (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.

3.2.2 Fire resistance

The fire resistance requirement is applicable to the wall itself (made of masonry, concrete, timber or metal frame) and not on the cladding kits. The cladding kit alone does not meet any fire resistance requirements. The evaluation of “fire propagation to upper levels” is not part of the European classification and thus, cannot be evaluated, i.e. to be omitted.

3.3 Hygiene, health and the environment (BWR3)

3.3.1 Watertightness of joints

Joints in “FRONTEK PLUS” and “FRONTEK OMEGA PLUS” kits are open, therefore they are not watertight.

3.3.2 Water permeability and Water vapour permeability

These performances are not relevant for external wall cladding kits with ventilated air space.

⁽⁹⁾ EN 13501-1:2007 + A1:2010 Fire classification of construction products and building elements - Part 1: Classification using data from reaction to fire tests

3.3.3 Drainability

On the basis of the standard construction details (see figures 6, 7, 8 and 9) and the installation criteria of these kits and the technical knowledge and experience, it may be said the water which penetrates into the air space or the condensation water can be drained out from the cladding without accumulation or moisture damage into the substrate.

3.3.4 Release of dangerous substances

This performance has not been determined (NPD)

For dangerous substances falling under the scope of the CPR for which “no performance determined” is declared there might be the necessity for an additional assessment

In addition to the specific clauses relating to dangerous substances contained in this ETA, there may be other requirements applicable to the kits falling within its scope (e.g. transposed European legislation and national laws, regulations and administrative provisions). In order to meet the provisions of the Construction Products Regulations EU n° 305/2011, these requirements need also to be complied with, when and where apply.

3.4 Safety in use (BWR4)

3.4.1 Wind load resistance

3.4.1.1 Wind suction resistance

Wind suction resistance has been determined by test carried out according to ETAG 034 part 1, § 5.4.1.1.

The weakest designs mechanically have been tested:

a. FRONTEK PLUS

Subframe Vertical distance between brackets: 1000mm
Maximum distance between vertical profiles and cladding fixings according to the plate format: 1000mm
Each plate is fixed on its four corners by clamps
Cladding elements FRONTEK – Largest format of plates 1000mm x 405mm x 19.5mm

b. FRONTEK OMEGA PLUS

Subframe Vertical distance between brackets: 1000mm
Maximum distance between vertical profiles and cladding fixings according to the plate format: 1000mm
Each plate is fixed on its four corners by clamps
Cladding elements FRONTEK OMEGA – Largest format of plates 1000mm x 307mm x 20mm

The test results and calculated values for the tested specimenes are indicated in table 2

TABLE 2: WIND SUCTION TEST RESULT			
TEST SPECIMEN ⁽¹⁰⁾	LOAD (Pa) ⁽¹¹⁾	TYPE OF FAILURE ⁽¹²⁾	DEFLECTION UNDER MAXIMUM LOAD (mm)
a. FRONTEK PLUS	3200 ⁽¹³⁾	None	8.92
b. FRONTEK OMEGA PLUS	4000 ⁽¹⁴⁾	None	4.13

⁽¹⁰⁾ Characteristics of component are indicated in Annex A and B

⁽¹¹⁾ Maximum admissible load should be calculated taken into account maximum other criteria (e.g. national regulations) if required.

⁽¹²⁾ The type of failures are considering according to ETAG 034: Breakage of any cladding element, failure of fixing, failure or detachment of the frame and significant permanent deflection.

⁽¹³⁾ The test had to be stopped at 3400Pa because the equipment did not achieve stabilization. No failure occurs.

⁽¹⁴⁾ Test equipment limit. No failure occurs.

3.4.1.2 Wind pressure resistance

The kit behaviour exposed to wind pressure is most favourable than when exposed to wind suction. Therefore, according to paragraph § 5.4.1.2 of ETAG 034, wind pressure test has been avoided and wind pressure resistance of kit can be considered as equal to wind suction resistance.

3.4.2 Mechanical test

3.4.2.1 Resistance of grooved cladding element

Resistance of grooved cladding element has been tested according to ETAG 034 part 1 § 5.4.2.3.1.

Tests results are indicated in table 3.

TABLE 3: RESISTANCE OF GROOVED CLADDING ELEMENT TEST RESULT			
FAILURE LOAD (N)			FAILURE MODE
TEST SPECIMEN	F_m	$F_{u,5}$	
FRONTEK PLUS	462.92	386.79	Deformation of clip
FRONTEK OMEGA PLUS	361.57	195.40	Deformation of clip

3.4.2.2 Resistance to vertical load

Resistance to vertical load has been tested according to ETAG 034 part 1 § 5.4.2.3.3 using:

a. FRONTEK PLUS

- Subframe Vertical distance between brackets: 500mm
Maximum distance between vertical profiles and cladding fixings according to the plate format: 1000mm
Each plate is fixed on its four corners by clamps
- Cladding elements FRONTEK – Largest format of plates 1000mm x 405mm x 19.5mm

b. FRONTEK OMEGA PLUS

- Subframe Vertical distance between brackets: 400mm
Maximum distance between vertical profiles and cladding fixings according to the plate format: 1000mm
Each plate is fixed on its four corners by clamps
- Cladding elements FRONTEK OMEGA – Largest format of plates 1000mm x 307mm x 20mm

After 1h the deflection measured on the clamp at the bottom was less than 0,1mm.

3.4.2.3 Pull-through resistance of fixings from clamps

Pull-through resistance of fixings from clips has been tested according to ETAG 034 part 1 § 5.4.2.3.4.

Tests results are indicated in table 4.

TABLE 4: PULL-THROUGH RESISTANCE OF FIXINGS FROM CLIPS TEST RESULT		
FAILURE LOAD (N)		FAILURE MODE
R_{sm}	$R_{cs,5}$	
501	338.23	Deformation of clip ⁽¹⁵⁾

3.4.2.4 Load bearing capacity of the brackets

Resistance of the brackets and their fixings under tension and shear loads was determined by calculation using the specifications defined in the annex E of ETAG 034 part 2.

⁽¹⁵⁾ It was considered the maximum limit of allowable plastic deformation

The calculation results are indicated in table 5 and 6.

TABLE 5: RESISTANCE TO VERTICAL LOAD OF BRACKETS – CALCULATION RESULT				
BRACKETS DIMENSIONS (e=3mm)	F_v (daN) $\Delta L=0.2\%$ de L	F_{1d} (daN) $\Delta L=1$ mm	F_{3d} (daN) $\Delta L=3$ mm	F_s (daN) failure
50 x 60 x 60	60	100	115	Purposeless
50 x 80 x 60	42	68	78	Purposeless
50 x 100 x 60	33	50	58	Purposeless
50 x 120 x 60	25.5	38.5	45.5	Purposeless
50 x 60 x 123	260	390	460	Purposeless
50 x 80 x 123	175	260	300	Purposeless
50 x 100 x 123	130	190	225	Purposeless
50 x 120 x 123	105	150	175	Purposeless
TABLE 6: RESISTANCE TO HORIZONTAL LOAD OF BRACKETS – CALCULATION RESULT				
BRACKETS DIMENSIONS	F_c (daN) $\Delta L=1$ mm	F_s (daN) failure		
50 x 60 x 60	170	Purposeless		
50 x 80 x 60	160	Purposeless		
50 x 100 x 60	150	Purposeless		
50 x 120 x 60	149	Purposeless		
50 x 60 x 123	310	Purposeless		
50 x 80 x 123	295	Purposeless		
50 x 100 x 123	280	Purposeless		
50 x 120 x 123	270	Purposeless		

3.4.3 Resistance to horizontal point loads

This performance has not been determined (NPD).

3.4.4 Impact resistance

Impact resistance has been tested and classified according to the method indicated in section 5.4.4 of ETAG 034 part 1.

According with the test results the use category of these kits for vertical exterior wall claddings is the Category IV that means this kit can be used in zones out of reach from ground level.

3.4.5 Resistance to seismic actions

This performance has not been determined (NPD).

3.4.6 Hygrothermal behaviour

The hygrothermal behaviour test has been carried out according to the method indicated in section 5.4.6 of ETAG 034 part 1 and during the test cycles, none of the following defects occurs:

- deterioration such as cracking or delamination of the cladding element that allows water penetration to the insulation
- detachment of the cladding element
- Irreversible deformation

This system is therefore assessed as resistant to hygrothermal cycles.

The joint in “FRONTEK PLUS” and in “FRONTEK OMEGA PLUS” kits are not watertight so the insulation layer shall be made of EPS to EN 13163, XPS to EN 13164, PUR to EN 13165, phenolic foam to EN 13166 or mineral wool to EN 13162 (WS or WL(P), depending on the national regulations.

3.5 Protection against noise (BWR5)

This performance has not been determined (NPD).

3.6 Energy economy and heat retention (BWR6)

This performance has not been determined (NPD).

3.7 Sustainable use of natural resources (BWR7)

This performance has not been determined (NPD).

3.8 Aspects of durability and serviceability

3.8.1 Pulsating load

This performance has not been determined (NPD).

3.8.2 Dimensional stability

The tabulated values of cladding and subframe are included in Annexes A and B following the standards:

- for ceramics EN 14411
- for aluminium EN 1999-1

3.8.3 Immersion in water

The FRONTEK and FRONTEK OMEGA plates have a water absorption $\leq 3\%$. According to EN 14411 (see Annex A) FRONTEK and FRONTEK OMEGA are classified in Group I, including Group Al_a ($E_b \leq 0.5\%$) and Group Al_b ($0.5\% < E_b \leq 3\%$).

3.8.4 Freeze / thaw behaviour

The FRONTEK and FRONTEK OMEGA plates do not show any defect after 100 cycles of freeze-thaw (see Annex A).

3.8.5 Chemical and biological attack

This performance has not been determined (NPD).

3.8.6 Corrosion

The material and corrosion protection of the kit components (brackets and vertical profiles) are defined in the relevant table of Annex B.

3.8.7 UV radiation

This performance has not been determined (NPD).

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

4.1 System of assessment and verification of constancy of performances

According to the decision 2003/640/EC of the European Commission ⁽¹⁶⁾ the system of assessment and verification of constancy of performances (see Annex V to Regulation (EU) N° 305/2011) given in the following table applies:

Product(s)	Intended use(s)	Level(s) or class(es)	System(s)
Claddings kit based on ceramic plates fastened to the subframe by invisible fixings	kit for external wall claddings	All / any	2+

The system 2+, referred above is described in Construction Products Regulation (EU) N°305/2011 Annex V §.1.3 as follows:

Declaration of performance of the essential characteristics of the construction product completed by the manufacturer is defined in the basis of the following items.

- a) The manufacturer shall carry out:
 - (i.) Determination of the product-type on the basis of type testing (including sampling) calculation, tabulated values of descriptive documentation of the product:
 - (ii.) Factory production control.
 - (iii.) Testing of samples taken at the manufacturing plant in accordance with a prescribed test plan.
- b) The notified production control certification body shall issue the certificate of conformity of the factory production control on the basis of:
 - (i.) Initial inspection of factory and factory production control.
 - (ii.) Continuous surveillance, assessment and evaluation of factory production control

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

The ETA is issued for “FRONTEK PLUS” “FRONTEK OMEGA PLUS” kits on the basis of agreed data/information which identifies the product that has been assessed and judged. Detailed description and conditions of the manufacturing process of the kit, and all the relevant design and installation criteria of this kit are specified in the manufacturer’s technical documentation deposited with the IETcc. The main aspects of this information are specified in the following sections. 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.

5.1 Tasks of the manufacturer

5.1.1 Determination of the product-type on the basis of type testing

For type-testing the results of the tests performed as part of the assessment for the European Technical Assessment shall be used unless there are changes in the production line or plant. In such cases the necessary type testing has to be agreed between ETA holder and the notified body.

5.1.2 Factory production control

The manufacturer has a factory production control system and 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.

⁽¹⁶⁾ Published in the Official Journal of the European Communities L226/21 of 10.09.2003. See www.new.eur-lex.europa.eu/oj/direct-access.html

The manufacturer shall only use raw materials supplied with the relevant inspection documents as laid down in the control plan ⁽¹⁷⁾. The incoming raw materials shall be subjected to controls by the manufacturer before acceptance. Check of materials shall include control of the inspection documents presented by suppliers by verifying dimension and material properties, e.g. chemical composition, mechanical properties etc. The manufactured components are checked visually, for dimensions and properties, where appropriate.

The control plan which is part of the Technical Documentation of this ETA, includes details of the extent, nature and frequency of testing and controls to be performed within the factory production control and has been agreed between the assessment holder and IETcc. The results of factory production control shall be recorded and evaluated in accordance with the provisions of the control plan. The records include at least the following information:

- Designation of the product, the basic materials and components;
- Type of control or testing and minimum frequencies of them;
- Date of manufacture of the product and testing date of the product or basic material and components;
- Results of controls and testing and, if appropriate, comparison with requirements;
- Signature of person responsible for factory production control.

The records shall be presented to the notified body involved in the continuous surveillance. On request, they shall be presented to the IETcc.

5.2 Tasks of notified bodies

5.2.1 Initial inspection of factory and of factory production control

The notified body shall ascertain that, in accordance with the control plan, the factory and the factory production control are suitable to ensure continuous and orderly manufacturing of the product according to the specifications mentioned in Annex A of this the European Technical Assessment.

5.2.2 Continuous surveillance

The notified body shall visit the factory at least once a year for regular inspection.

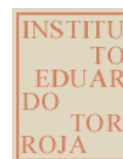
This continuous surveillance and assessment of factory production control have to be performed according to the control plan. The system of factory production control and the specified manufacturing process has to be verified that they are maintained as the control plan defined.

The results of product certification and continuous surveillance shall be made available on demand by the product certification body or factory production control body, respectively, to IETcc. In cases where the provisions of the European Technical Assessment and the control plan are no longer fulfilled the conformity certificate shall be withdrawn.



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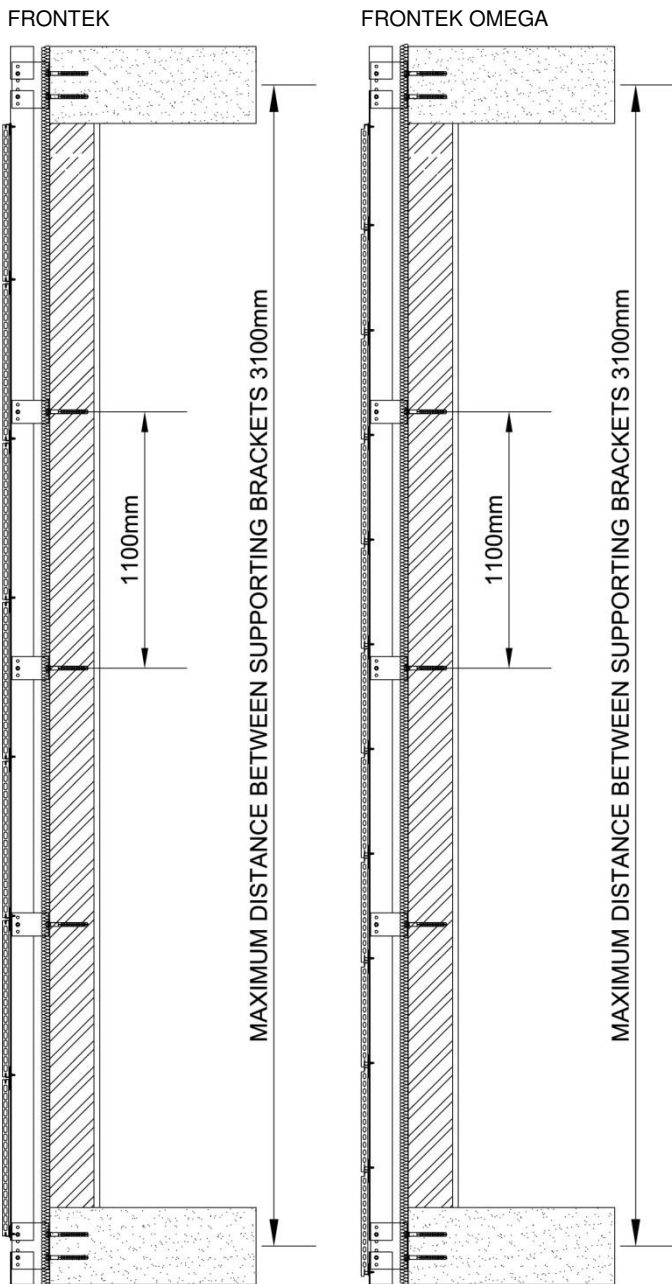
On behalf of the Instituto de Ciencias de la Construcción Eduardo Torroja
Madrid, 23rd November 2015

A handwritten signature in blue ink, appearing to read 'Marta Mª Castellote Armero', is written over a horizontal line.

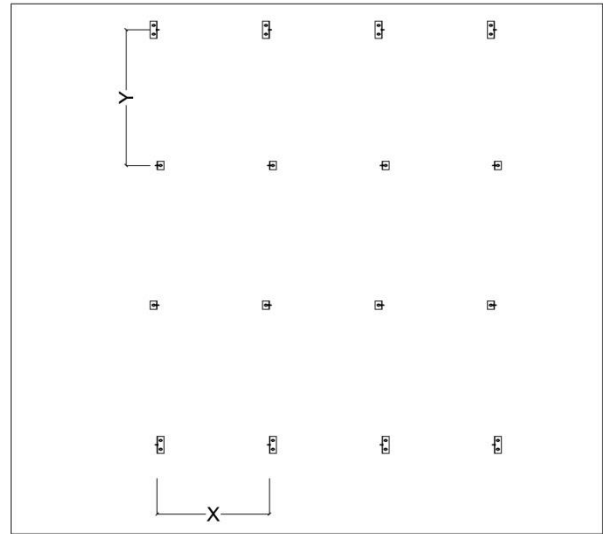
Marta Mª Castellote Armero
Director

⁽¹⁷⁾ the control plan has been deposited at IETcc and is only made available to the approval bodies involved in the ACVP procedure.

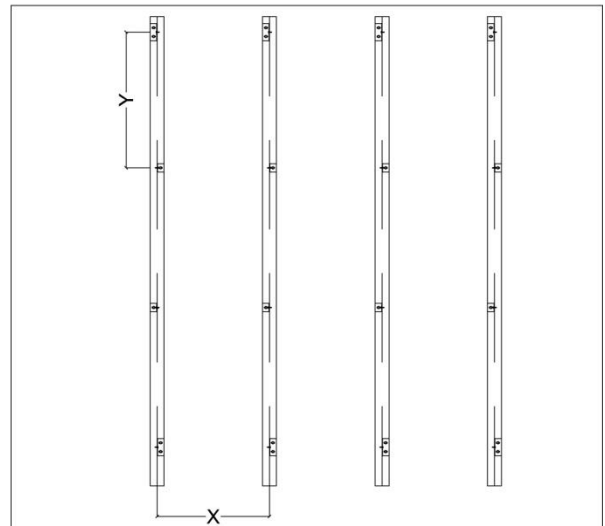
FIGURE 1: GENERAL CONFIGURATION OF THE SYSTEM



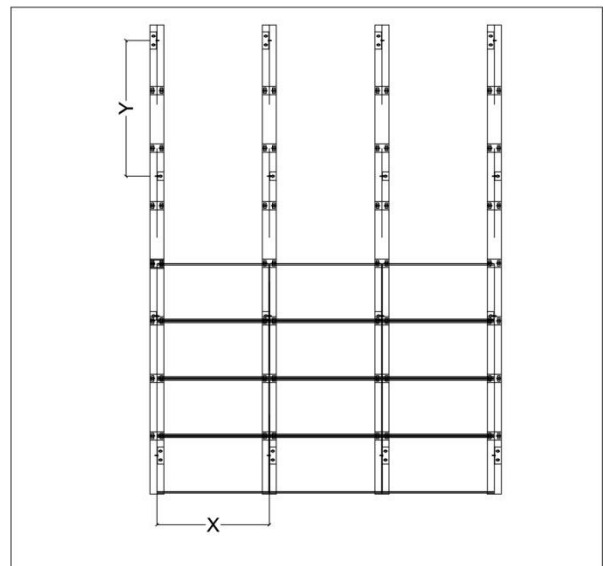
1. BRACKET INSTALLATION



2. VERTICAL PROFILES INSTALLATION



3. CLIPS AND CERAMIC PLATES INSTALLATION



X depends on the size of the plates
Y max. 1100mm

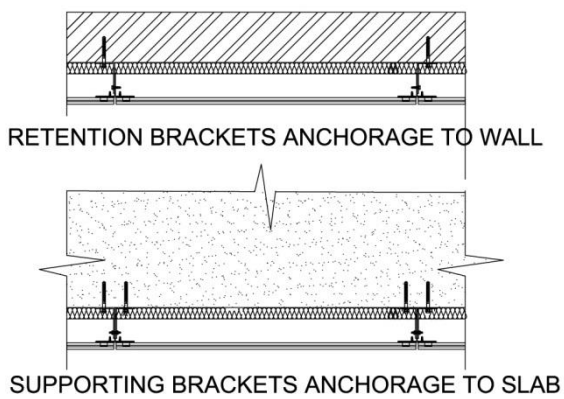


FIGURE 5.2: ALUMINIUM RETENTION BRACKETS

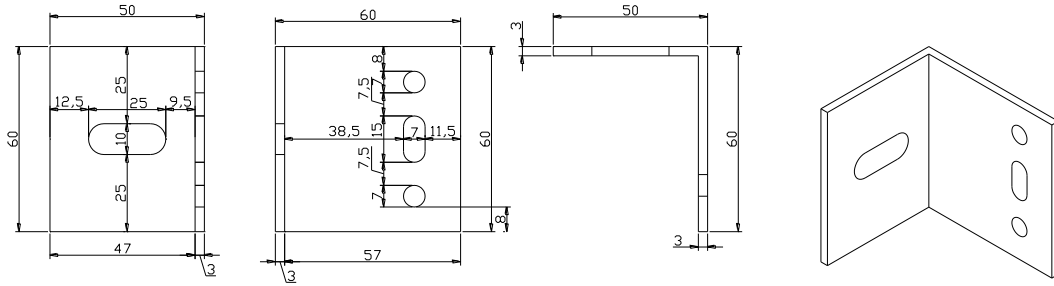


FIGURE 6.1: DETAIL OF TOP AND BASE – FRONTEK PLUS

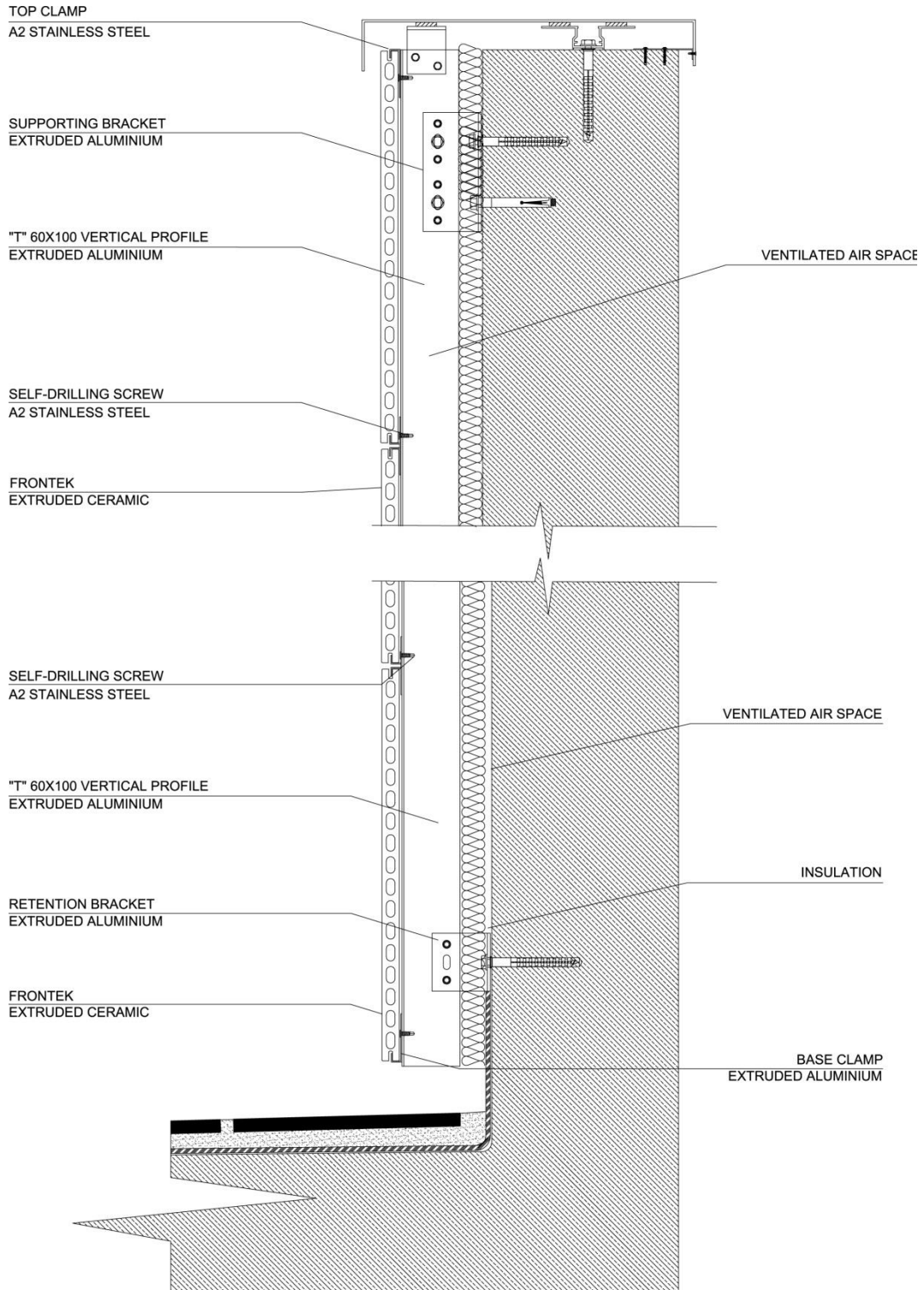


FIGURE 6.2: DETAIL OF TOP AND BASE – FRONTEK OMEGA PLUS

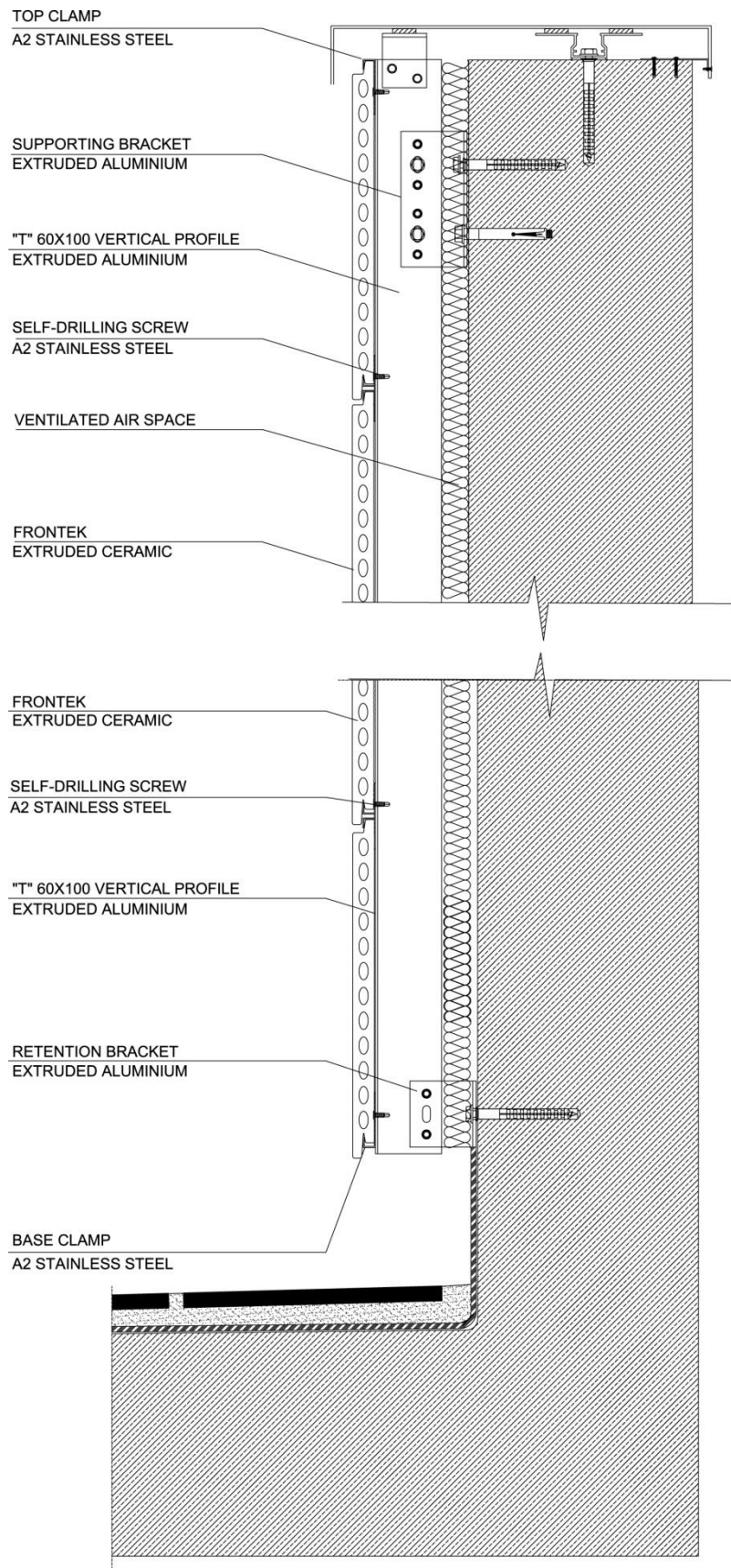


FIGURE 7: DETAILS OF EXTERNAL CORNER – FRONTEK PLUS AND FRONTEK OMEGA PLUS

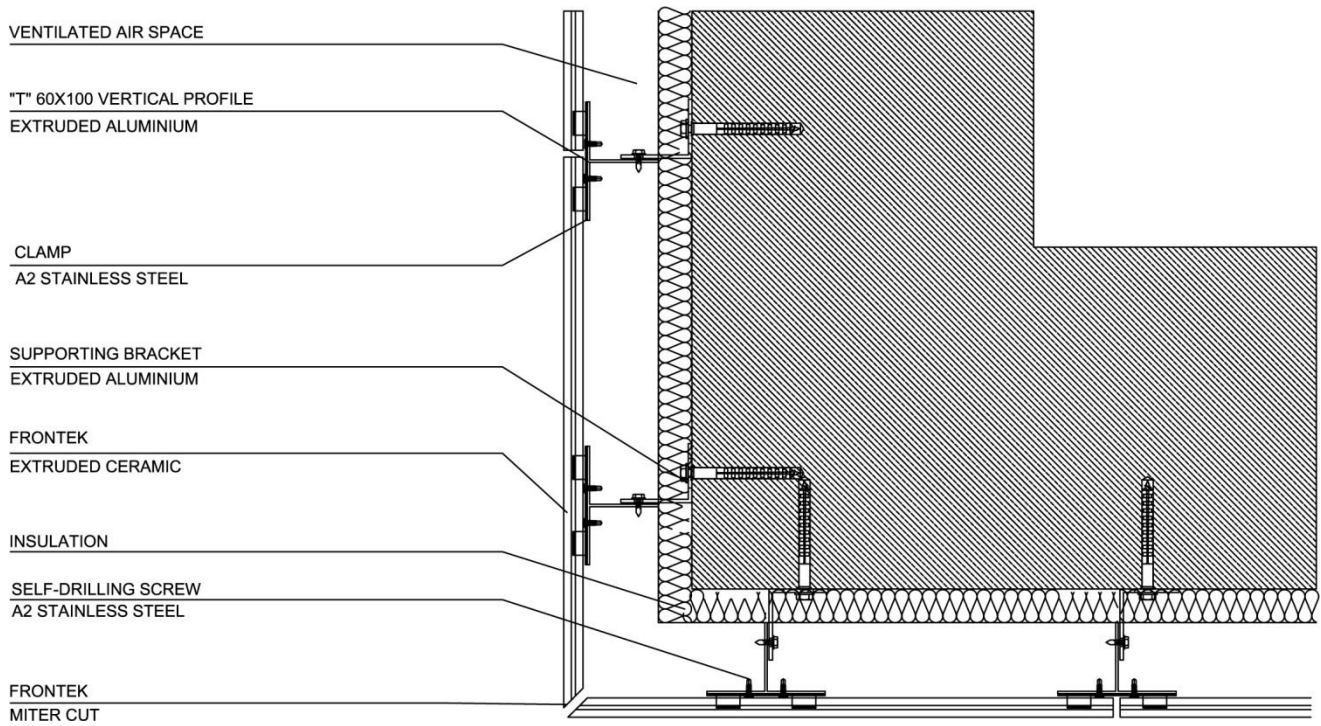


FIGURE 8: DETAILS OF INTERNAL CORNER – FRONTEK PLUS AND FRONTEK OMEGA PLUS

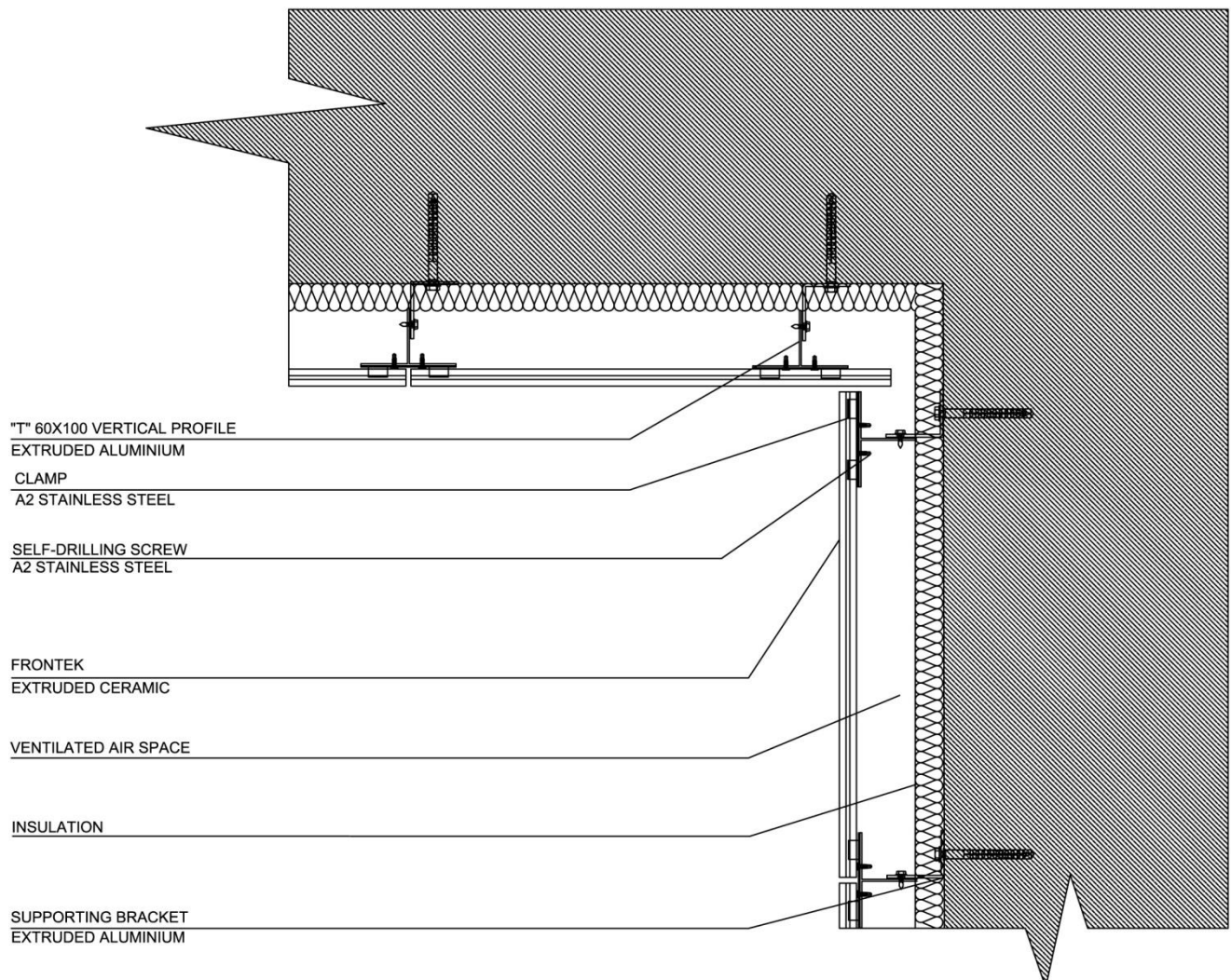


FIGURE 9: VERTICAL EXPANSION JOINT

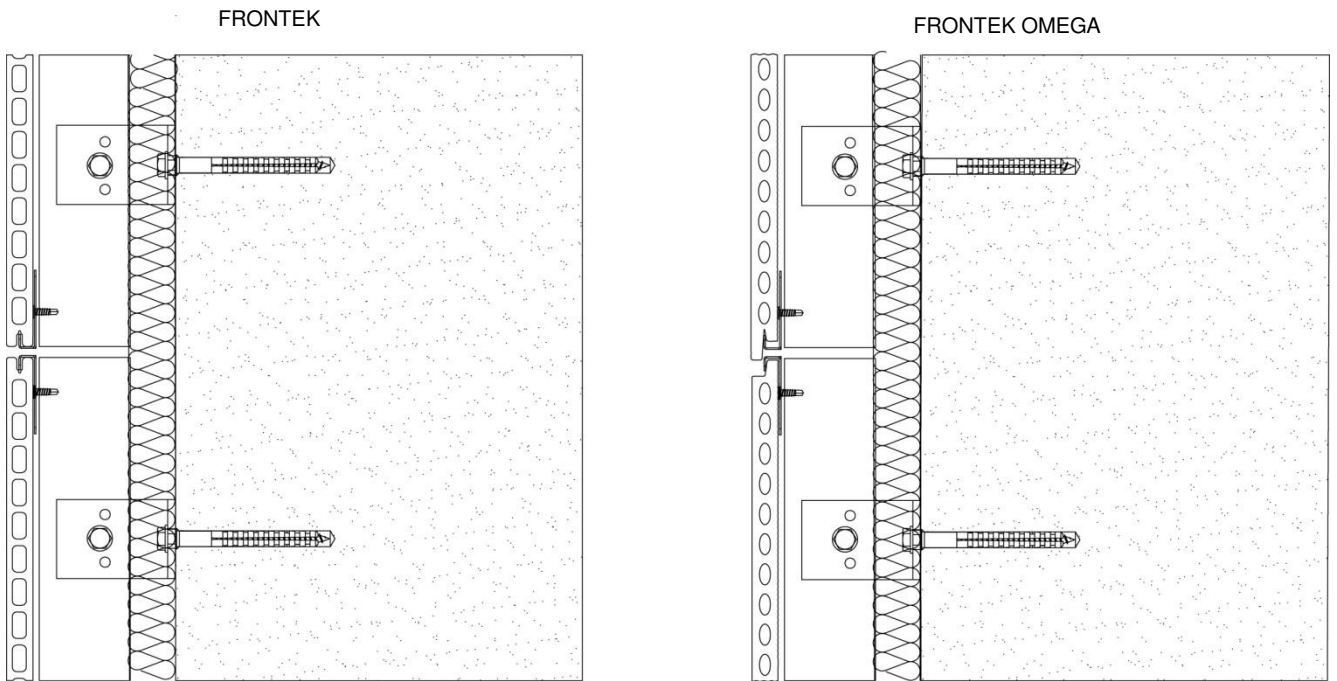
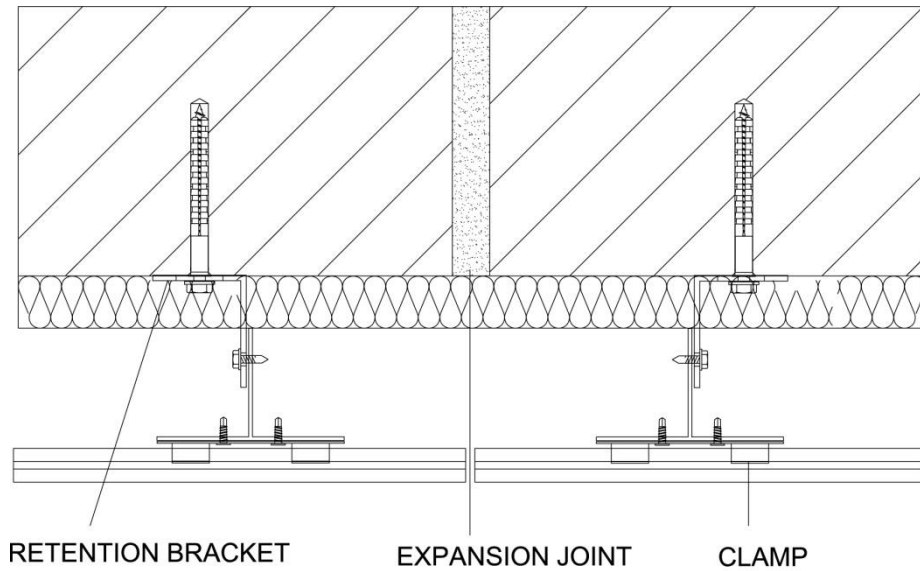


FIGURE 10: HORIZONTAL EXPANSION JOINT – FRONTEK PLUS AND FRONTEK OMEGA PLUS



Note: The details shown in figures above are approximate and must be defined for each project. These details concern the kit for ventilated external wall claddings and may not be used as justification for compliance with the CTE basic requirements.

Annex A: Cladding element specifications

Dimensional features

STANDARD DIMENSIONS ⁽¹⁸⁾					
Nominal size(mm)		Lenght (mm)	Aprox. width (mm)	Aprox. thickness (mm)	Weight (kg)
FRONTEK PLUS	405 x 600	600	405	19.5	8
	405 x 800	800	405	19.5	10.7
	405 x 900	900	405	19.5	12
	405 x 1000	1000	405	19.5	13.4
FRONTEK OMEGA PLUS	307 x 600	600	307	20	6.15
	307 x 800	800	307	20	8.20
	307 x 900	900	307	20	9.22
	307 x 1000	1000	307	20	10.25

Classification, dimensional tolerance and physical properties

CLASIFICATION		
Manufacturing method	Extruded	
Water absorption (E)	$E_b \leq 3\%$ (Group I)	$E_b \leq 0.5\%$ (Group AI _a)
		$0.5\% < E_b \leq 3\%$ (Group AI _b)
DIMENSIONAL TOLERANCE		
Lenght and Width (mm)	0.2	%
Thickness (mm)	7	%
Squareness (mm)	0.4	%
Flatness (mm)	0.2	%
PHYSICAL PROPERTIES		
Bulk density	$\pm 2,3$	g/cm ³
Water absorption	≤ 3	%
Flexural strength	≥ 25	N/mm ²
Coefficient of linear thermal expansion	$\leq 9 \times 10^{-6}$	K ⁻¹
Reaction to fire	A1	

⁽¹⁸⁾ Available smaller dimensions with the same thickness

Annex B: Subframe specifications

Aluminium Physical and mechanical properties

Symbolic and numeric designation		6063	AlMgSi
Treatment		T5	
Protection		Raw finished	
Corrosion Resistance ⁽¹⁹⁾	General	A ⁽²⁰⁾	
	Stress-corrosion cracking	A ⁽²¹⁾	
PHYSICAL PROPERTIES			
Specific weight		2,7 g/cm ³	
Coefficient of linear thermal expansion (20 a 100 °C)		23,6·10 ⁻⁶ °K	
Elastic modulus		69.500 MPa	
Poisson coefficient		0,33	
MECHANICAL PROPERTIES			
Tensile strength (R _m)		≥175 MPa	
Elastic limit (R _{p0,2})		≥ 130 MPa	
Elongation (A _{50mm})		≥ 8%	
According to EN 755-2 ⁽²²⁾ and EN 12020-1 ⁽²³⁾			

Brackets Geometrical and mechanical features

Reference	50 x 60 x 60/123 (e=3mm)	50 x 80 x 60/123 (e=3mm)	50 x 100 x 60/123 (e=3mm)	50 x 120 x 60/123 (e=3mm)
Section (mm ²)	321	381	441	501
Perimeter (mm)	220	260	300	340
x _c (mm)	37.5	39.2	40.5	41.5
I _{xc} (cm ⁴)	11.83	25.97	47.57	77.88
r _{xc} (mm)	19.2	26.1	32.8	39.4
y _c (mm)	17.48	25.8	34.5	43.5
I _{yc} (cm ⁴)	7.55	8.16	8.61	8.95
r _{yc} (mm)	15.33	14.6	13.9	13.4

Vertical profiles Geometrical and mechanical features

Reference	T 60x100
Section (mm ²)	290.48
Perimeter (mm)	357.39
Weight (kg/m)	0.783
x _c (mm)	50,00
I _{xc} (cm ⁴)	9.55
r _{xc} (mm)	18.13
y _c (mm)	47
I _{yc} (cm ⁴)	14.27
r _{yc} (mm)	22.17

⁽¹⁹⁾ Alcoa structural handbook design manual for aluminium. Aluminum Company of America. Pittsburgh : Alcoa, cop. 1960

⁽²⁰⁾ Alloy with A can be used in industrial and sea-coast atmosphere without protection.

⁽²¹⁾ A= no known instance of failure in service or in laboratory tests.

⁽²²⁾ EN 755-2 Aluminium and aluminium alloys. Extruded rod/bar, tube and profiles. Part 2: Mechanical properties.

⁽²³⁾ EN 12020-1 Aluminium and aluminium alloys. Extruded precision profiles in alloys en aw-6060 and en aw-6063. Part 1: technical conditions for inspection and delivery.

Stainless steel screw between vertical profiles and brackets

Description	hex head self-drilling screw
Standard	DIN 7504K EN ISO 15480:2000 ⁽²⁴⁾
Diameter	5.5 mm
Length	22 mm
Material	Stainless steel A2 (AISI 304)
Standard	EN ISO 3506-1: 2010 ⁽²⁵⁾
Steel resistance class	70
Tensile strength (R_m)	700 MPa
Elastic limit ($R_{p0.2}$)	450 MPa

Stainless steel screw between vertical profiles and clips

Description	self-drilling screw with countersunk head
Standard	DIN 7504P EN ISO 15482:2000 ⁽²⁶⁾
Diameter	4.2 mm
Length	13 mm
Material	Stainless steel A2
Standard	EN ISO 3506-1: 2010
Steel resistance class	50
Tensile strength (R_m)	500 MPa
Elastic limit ($R_{p0.2}$)	210 MPa

⁽²⁴⁾ EN ISO 15480:2000 Hexagon washer head drilling screws with tapping screw thread (ISO 15480:1999).

⁽²⁵⁾ EN ISO 3506-1:2010 Mechanical properties of corrosion-resistant stainless steel fasteners - Part 1: Bolts, screws and studs (ISO 3506-1:2009).

⁽²⁶⁾ EN ISO 15482:2000 Cross recessed countersunk head drilling screws with tapping screw thread (ISO 15482:1999)

Annex C: Anchorage to substrate

The fixings between the subframe and the substrate are not part of the kit, therefore have not been assessed, even so it is important to define type, position and number of the anchorage according to the substrate material and the resistance required due to the envisaged actions and when possible, CE marking according to the ETA via ETAG 001, ETAG 020 or ETAG 029 is recommended.

Annex D:

Factory production control Report is confidential and it is not included in the European Technical Assessment when that assessment is publicly available.