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Designated according to Article 29 of Regulation (EU) No 305/2011

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European Technical Assessment

ETA 19/0750 of 14.06.2022

General part

Technical Assessment Body issuing the ETA: ITeC ITeC has been designated according to Article 29 of Regulation (EU) No 305/2011 and is member of EOTA (European Organisation for Technical Assessment)	
Trade name of the construction product	**WindWall Terracota TW18 – FTS 502B**
Product family to which the construction product belongs	Kits for external wall claddings
Manufacturer	**LOUVELIA FACADE SOLUTIONS, S.L.** Av. Alcalde Caballero 16 ES-50014 Zaragoza Spain
Manufacturing plant(s)	Virgen del Buen Acuerdo, 2 Pol. Ind. Alcalde Caballero ES-50014 Zaragoza Spain
This European Technical Assessment contains	21 pages including 3 annexes which form an integral part of this assessment.
This European Technical Assessment is issued in accordance with Regulation (EU) 305/2011, on the basis of	EAD 090062-00-0404 *Kits for external wall claddings mechanically fixed.*
This ETA replaces	ETA 19/0750 issued on 13.02.2020

General comments

Translations of this European Technical Assessment in other languages shall fully correspond to the original issued document and should be identified as such.

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Specific parts of the European Technical Assessment

1 Technical description of the product

This ETA refers to WindWall Terracota TW18 – FTS 502B kit[1] for external wall cladding in ventilated façades.

WindWall Terracota TW18 – FTS 502B kit components are given in table 1.1.

Detailed information and data of all the components are given in the annexes of this ETA.

Fixings between brackets and substrate are not part of the kit assessed in this ETA.

Table 1.1: Kits components.

N.	Generic component		WindWall Terracota TW18 – FTS 502B kits (family C)	Technical description in Annex 1
1	Cladding element (*)		WindWall Terracota TW18	A1.1
2	Cladding fixing	Fixing device	Stainless steel clips FTS-502B	A1.2
		Screw	Stainless steel screws	A1.3
3	Subframe	Vertical profile	Aluminium alloy profiles	
		Bracket	Aluminium alloy brackets	
		Subframe fixings	Between clips and vertical profiles	
		Ancillary components	EPDM joint profile	

(*) Extruded ceramic tiles according to EN 14411.

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

WindWall Terracota TW18 – FTS 502B kit is intended to be used as external wall claddings in ventilated façades (rainscreens). The walls are made of masonry (clay, concrete or stone), concrete (cast on site or as prefabricated panels), timber or metal frame in new or existing buildings (retrofit).

The characteristics of the walls shall be verified prior to use of WindWall Terracota TW18 – FTS 502B kit, especially regarding conditions for reaction to fire classification and for mechanical fixing of WindWall Terracota TW18 – FTS 502B kit.

The provisions made in this European Technical Assessment are based on an assumed working life of at least 25 years for WindWall Terracota TW18 – FTS 502B kit. 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 products in relation to the expected economically reasonable working life of the works.

WindWall Terracota TW18 – FTS 502B kit is made of non-load bearing construction components. They do not contribute directly to the stability of the wall on which they are installed, but they can contribute to its durability by providing enhanced protection from the effect of weathering.

WindWall Terracota TW18 – FTS 502B kit is not intended to ensure the airtightness of the building envelope.

Detailed information and data regarding design, installation, maintenance and repair criteria are given in Annexes 2 and 3.

[1] "Kit" means a construction product placed on the market by a single manufacturer as a set of at least two separate components that need to be put together to be incorporated in the construction works (Art. 2 nº 2 CPR).

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

The assessment of WindWall Terracota TW18 – FTS 502B kit for the intended use was performed following the EAD 090062-00-0404 *Kits for external wall claddings mechanically fixed*.

Table 3.1: Summary of the WindWall Terracota TW18 – FTS 502B kit performance (see also detailed performance in relevant sections).

Product:	WindWall Terracota TW18 – FTS 502B kit	**Intended use:**	External wall claddings in ventilated façades (rainscreens).

Basic Works Requirement	**ETA section**	**Essential characteristic**		**Performance**
BWR 2 Safety in case of fire	3.1	Reaction to fire		B-s1,d0
	---	Façade fire performance		Not assessed
	---	Propensity to undergo continuous smouldering		Not relevant (the thermal insulation is not a kit component)
BWR 3 Hygiene, health and the environment	3.2	Watertightness of joints (protection against driving rain)		Not watertight (open joints)
	---	Water absorption		Not relevant
	---	Water vapour permeability		Not relevant
	3.3	Drainability		See figures in Annex 2
	---	Content and/or release of dangerous substances		Not assessed
BWR 4 Safety and accessibility in use	3.4	Wind load resistance		3600 Pa
	---	Resistance to horizontal point loads		Not relevant
	3.5	Impact resistance		Category IV (see table 3.3)
	3.6	Bending strength of cladding element		> 17,5 MPa
	3.7	Resistance of grooved cladding element		≥ 990 N
	3.8	Resistance to vertical load		< 0,1 mm after 1 h
	---	Pull-through resistance of fixings from profile		Not relevant
	3.9	Resistance of metal clip		> 190 N
	3.10	Resistance of profiles		See 3.10
	3.11	Pull-out resistance of subframe fixings		≥ 0,92 kN
	3.12	Shear load resistance of subframe fixings		≥ 4,9 kN
	3.13	Bracket resistance (horizontal and vertical load)		See tables 3.9 & 3.10
BWR 5 Protection against noise	---	Airborne sound insulation		Not relevant
BWR 6 Energy economy and heat retention	---	Thermal resistance of the kit		Not relevant
	---	Thermal resistance of thermal insulation product		Not relevant
Durability aspects	---	Hygrothermal behaviour		Not relevant
	---	Behaviour after pulsating load		Not assessed
	3.14	Freeze-thaw resistance		No defects
	---	Behaviour after immersion in water		Not relevant
	3.15	Dimensional stability of the cladding elements	by temperature	Not assessed
			by humidity	≤ 0,1 mm/m
	---	Chemical and biological resistance of the cladding elements		Not relevant

Table 3.1: Summary of the WindWall Terracota TW18 – FTS 502B kit performance (see also detailed performance in relevant sections).

Product:	WindWall Terracota TW18 – FTS 502B kit	**Intended use:**	External wall claddings in ventilated façades (rainscreens).

Basic Works Requirement	**ETA section**	**Essential characteristic**	**Performance**
	---	UV radiation resistance of the cladding elements	Not relevant
	3.16	Corrosion of metal components	See § 3.15

Complementary information:

Requirements with respect to the mechanical resistance and stability of non-load bearing parts of the works are not included in the Basic Works Requirement *Mechanical resistance and stability* (BWR 1) but are treated under the Basic Works Requirement *Safety and accessibility in use* (BWR 4).

The fire resistance requirement is applicable to the wall (made of masonry, concrete, timber or metal frame) and not to the WindWall Terracota TW18 – FTS 502B kit itself.

3.1 Reaction to fire

Reaction to fire of WindWall Terracota TW18 – FTS 502B kit according to Commission Delegated Regulation (EU) 2016/364 and EN 13501-1 is class B-s1,d0. It is based on the relevant tests according to EN 13501-1 including EPDM joint profiles.

These classes are valid provided that the insulation layer placed behind the cladding elements is made of non-combustible materials (e.g. mineral wool) or that the layer behind the cladding elements is a mineral substrate like masonry or concrete (class A1 or A2-s1, d0). For other end use conditions (for example: with insulation layer made of EPS, XPS, PUR or PF), the reaction to fire of the external wall claddings for ventilated façades will be the reaction to fire of the insulation material.

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

3.2 Watertightness of joints (protection against driving rain)

Joints between the cladding elements in the external wall claddings for ventilated façades are open, therefore the WindWall Terracota TW18 – FTS 502B kit is not watertight.

3.3 Drainability

On the basis of the construction details (see Annex 2), the available technical knowledge, experience and the installation criteria, it is considered that the water which penetrates into the air space or the condensation water can be drained out from the cladding without accumulation or moisture damage or leakage into the substrate.

3.4 Wind load resistance

Wind load resistance has been determined taking into account the wind resistance tests and the mechanical resistance of components (see sections 3.6 to 3.12).

The worst case has been tested: maximum width of cladding element (400 mm) and the maximum separation between clips or vertical profiles (1200 mm).

Test results are given in table 3.2.

For other assembled systems, wind load resistance obtained by calculation on the basis of the mechanical resistance of the kit components should not be higher than the maximum load obtained in the tests.

Table 3.2: Test results and calculated values for tested specimen.

Test	System	Maximum load Q (Pa)	Displacement under maximum load (mm) [deflection after 1 min recovery]
Suction (1)	Clips	3600 (2)	2,30 (3) [17,70 mm]

(1) Tests specimen: five cladding elements 1200 mm x 400 mm and ten cladding elements 600 mm x 400 mm with four clips for each panel, four vertical profiles at distances 1200 mm and 600 mm, 6 EPDM profiles, 12 brackets 60x60x60x3 mm (span 750 mm), and subframe fixings.

(2) Maximum load reached without kit failure (at test equipment limit).

(3) Maximum displacement measured on the center of the central 1200 mm x 400 mm cladding element.

3.5 Impact resistance

Impact resistance has been tested on the assembled systems given in table 3.3. For other assembled systems, the impact resistance has not been assessed.

Table 3.3: Impact resistance.

Cladding element			Cladding fixing for cladding element	Impact resistance passed	Degree of exposure in use (*)
Trade name	Length, L (mm)	Width, H (mm)			
WindWall Terracota TW18	≥ 600	≤ 400	≥ 4 Clips	Hard body (0,5 kg) 3 impacts of 1 J Soft body (3,0 kg) 3 impacts of 10 J	Category IV

(*) Category I: This category means that the degree of exposure in use should be a zone readily accessible to the public at ground level 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.

3.6 Bending strength of the cladding element

Bending strength of the cladding element has been tested according to EN 10545-4. The supports of the test specimens have been positioned parallel and perpendicular to the extrusion of the cladding element. Mean values and characteristic values of the breaking load, breaking strength and bending strength are given in table 3.4.

Table 3.4: Bending strength of the cladding element.

Trade name	Load direction	Breaking load (N)		Breaking strength (N)		Bending strength (MPa)	
		F_m	F_c	F_m	F_c	F_m	F_c
WindWall Terracota TW18-200 (*)	Suction	2802	2666	4597	4375	21,0	19,6
	Pressure	2579	2441	4283	4053	19,6	18,5
WindWall Terracota TW18-400 (*)	Suction	1251	1063	4522	3841	20,6	17,4
	Pressure	1283	1092	4637	3946	21,1	17,9

Where: F_m = mean values; F_c = characteristic values giving 75% confidence that 95% of results will be higher than this value.

(*) Test specimens width = 100 mm.

3.7 Resistance of grooved cladding elements

Mean and characteristic values of the grooved cladding elements are given in table 3.5.

The worst cases have been tested.

Table 3.5: Resistance of grooved cladding elements**.**

Cladding element		Resistance (N)			
		Under suction action		Under pressure action	
		F_m	F_c	F_m	F_c
WindWall Terracota TW18-200 (*)	Top groove	1533	1074	---	---
	Lower groove	1644	966	1389	993
WindWall Terracota TW18-400 (*)	Top groove	1756	1305	---	---
	Lower groove	1893	1692	1349	1163

Where: F_m = mean values; F_c = characteristic values giving 75% confidence that 95% of results will be higher than this value.

(*) Test specimens width = 100 mm.

3.8 Resistance to vertical load

The maximum deflection of the cladding fixings has been **0,09 mm after 1 hour**. A vertical load with value 704 N has been applied. The worst case has been tested: tile with maximum weight, clips with minimum vertical load resistance and distance between clips 1460 mm.

3.9 Resistance of metal clip

Resistance of metal clips has been tested. Mean and characteristic values are given in table 3.6.

Table 3.6: Resistance of metal clip.

Test specimen		Resistance (N) at 1 mm of permanent deflection		Ultimate resistance (N)		Failure
		F_m	F_c	F_m	F_c	
Horizontal load	Clip 15 mm	312	199	786	635	Clip deflection
Vertical load	Clip 15 mm	246	183	548	383	
Where: F_m = mean values; F_c = characteristic values giving 75% confidence that 95% of results will be higher than this value.						

3.10 Resistance of profiles

The following characteristics of the vertical profiles are given in Annex 1:

- Form and dimensions of the profiles sections.
- Inertia of the profiles sections.
- Minimum elastic limit of the profiles material.

3.11 Tension / Pull-out resistance of subframe fixings

Pull-out resistance of the subframe fixing on profile minimum thickness 1,8 mm has been tested. Mean and characteristic values are given in table 3.7.

Table 3.7: Pull out resistance.

Test specimen	Ultimate resistance (N)	
	F_m	F_c
Profile: Thickness 1,8 mm, AW-6063 aluminium alloy. Self-drilling screw: Ø4,8 mm, A2 stainless steel.	1938	929
Profile: Thickness 1,8 mm, AW-6063 aluminium alloy. Self-drilling screw: Ø5,5 mm, A2 stainless steel.	2155	1784
Where: F_m = mean values; F_c = characteristic values giving 75% confidence that 95% of results will be higher than this value.		

3.12 Shear load resistance of subframe fixings

Shear load resistance of the subframe fixings on profile minimum thickness 1,8 mm has been tested. Mean and characteristic values are given in table 3.8.

Table 3.8: Shear load resistance.

Test specimen	Ultimate resistance (N)	
	Fm	Fc
Profile: Thickness 1,8 mm, AW-6063 aluminium alloy. Self-drilling screw: Ø4,8 mm, A2 stainless steel.	5234	4956
Profile: Thickness 1,8 mm, AW-6063 aluminium alloy. Self-drilling screw: Ø5,5 mm, A2 stainless steel. (*)		
Where: F_m = mean values; F_c = characteristic values giving 75% confidence that 95% of results will be higher than this value.		
(*) Shear strength not tested. Minimum shear strength value from tested screw.		

3.13 Bracket resistance

Bracket resistance to horizontal load has been tested (see table 3.9). Bracket resistance to vertical load has been tested (see table 3.10).

Table 3.9: Bracket resistance to horizontal load.

Bracket H x L x B x t (mm)	Resistance (N) at 1 mm of permanent deflection		Ultimate resistance (N)	
	Fm	Fc	Fm	Fc
60 x 60 x 60 x 3 (*)	1380	472	3440	3050
60 x 80 x 60 x 3	1367	896	3417	3162
60 x 100 x 60 x 3				
60 x 120 x 60 x 3				
60 x 140 x 60 x 3 (*)				
60 x 160 x 60 x 3	2340	1480	4213	4016
60 x 180 x 60 x 3 (*)				
60 x 200 x 60 x 4	3838	2695	7343	6881
60 x 220 x 60 x 4 (*)				
120 x 60 x 60 x 3 (*)	1800	1371	5050	2683
120 x 80 x 60 x 3	2300	1766	4200	3810
120 x 100 x 60 x 3 (*)				
120 x 120 x 60 x 3				
120 x 140 x 60 x 3 (*)	2767	2068	5233	4482
120 x 160 x 60 x 3	1440	1148	2382	2251
120 x 180 x 60 x 3 (*)				
120 x 200 x 60 x 4	1888	1074	3565	3385
120 x 220 x 60 x 4 (*)				
180 x 60 x 60 x 3 (*)	1933	1405	4967	4457
180 x 80 x 60 x 3	2100	1239	4233	3724
180 x 100 x 60 x 3 (*)				
180 x 120 x 60 x 3				
180 x 140 x 60 x 3 (*)	2367	1857	4467	4016
180 x 160 x 60 x 3	1723	1492	2980	2843
180 x 180 x 60 x 3 (*)				
180 x 200 x 60 x 4	2629	2042	4708	4222
180 x 220 x 60 x 4 (*)				

(*) Tested bracket which gives value to the other stronger brackets.

Where:

H = height; L = length; B = base; t = thickness

F_m = mean values; F_c = characteristic values giving 75% confidence that 95% of results will be higher than this value.

Table 3.10: Bracket resistance to vertical load.

Bracket H x L x B x t (mm)	Resistance (N) at 1 mm of displacement		Resistance (N) at 3 mm of displacement		Resistance at ΔL = 0,2%·L mm of permanent deflection (N)		Ultimate resistance (N)	
	Fm	Fc	Fm	Fc	Fm	Fc	Fm	Fc
60 x 60 x 60 x 3 (*)	933	739	2150	1813	1256	987	4138	3746
60 x 80 x 60 x 3	367	269	933	739	844	719	3188	3029
60 x 100 x 60 x 3 (*)								
60 x 120 x 60 x 3	267	169	550	382	817	705	1839	1667
60 x 140 x 60 x 3 (*)								
60 x 160 x 60 x 3	(**)	(**)	(**)	(**)	(**)	(**)	(**)	(**)
60 x 180 x 60 x 3 (*)								
60 x 200 x 60 x 4	(**)	(**)	(**)	(**)	(**)	(**)	(**)	(**)
60 x 220 x 60 x 4 (*)								
120 x 60 x 60 x 3 (*)	1500	1163	5900	5563	2457	1701	13557	12754
120 x 80 x 60 x 3	1033	519	2767	2572	1871	1359	9414	8708
120 x 100 x 60 x 3 (*)								
120 x 120 x 60 x 3	500	500	1567	1372	1529	1370	5229	4796
120 x 140 x 60 x 3 (*)								
120 x 160 x 60 x 3	159	112	448	378	341	190	848	757
120 x 180 x 60 x 3 (*)								
120 x 200 x 60 x 4	220	180	575	517	524	266	1165	1096
120 x 220 x 60 x 4 (*)								
180 x 60 x 60 x 3 (*)	1567	788	6867	6478	4667	3965	17900	17008
180 x 80 x 60 x 3	900	563	3367	2978	3250	2574	10713	10142
180 x 100 x 60 x 3 (*)								
180 x 120 x 60 x 3	567	372	2333	1632	2033	1750	5511	5027
180 x 140 x 60 x 3 (*)								
180 x 160 x 60 x 3	453	365	1016	969	793	660	1714	1613
180 x 180 x 60 x 3 (*)								
180 x 200 x 60 x 4	507	357	1184	1085	912	722	1994	1836
180 x 220 x 60 x 4 (*)								

(*) Tested bracket which gives value to the other stronger brackets.

(**) Bracket not considered for this use.

Where:

L = length; H = height; B = base; t = thickness

F_m = mean values; F_c = characteristic values giving 75% confidence that 95% of results will be higher than this value.

3.14 Freeze-thaw resistance

Freeze-thaw resistance has been tested according to EN ISO 10545-12 with no defects.

3.15 Dimensional stability of the cladding elements

Moisture expansion of the cladding elements has been tested according to EN ISO 10545-10. The maximum moisture expansion of WindWall Terracota TW18 is 0,1 mm/m.

Linear thermal expansion of WindWall Terracota TW18 cladding elements has not been assessed.

3.16 Corrosion of metal components

The cladding fixings (clips) are made of stainless steel 1.4016 according to EN 10088 and the subframe fixings are made of A2 stainless steel according to EN ISO 3506-1. Therefore, these components may be used in dry internal conditions or exposure in permanent damp internal conditions and also in external atmospheric exposure with high category of corrosivity of the atmosphere (included industrial and marine environment, C4 as defined in ISO 9223), provided that no particular aggressive conditions exist. Such particular aggressive conditions are e.g. permanent or alternating immersion in seawater or the splash zone of seawater, chloride atmosphere of indoor swimming pools or atmosphere with extreme chemical pollution (e.g. in desulphurization plants or road tunnels where de-icing materials are used).

The vertical profiles are made of aluminum alloy AW-6063 according to EN 573, EN 1999 and EN 755. The durability is class B and the minimum thickness is 1,8 mm. Therefore, these components may be used in the following external atmospheric exposure: rural environment, moderate industrial/urban environment, but excluding industrial marine environment. These components may be used in other external atmospheric conditions exposure if the components are protected as indicated in EN 1999-1-1.

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

According to the decision 2003/640/EC, as amended of the European Commission[2], the systems of AVCP (see EC delegated regulation (EU) No 568/2014 amending Annex V to Regulation (EU) 305/2011) given in the following table apply.

Table 4.1: Applicable AVPC system.

Product	Intended use	Level or class	System
Exterior wall claddings	External finishes of walls	Any	2+
	For uses subject to regulations on reaction to fire	B-s1,d0 (*)	3

(*) Class B,s1-d0 for WindWall Terracota TW18 – FTS 502B kit which contains the EPDM joint.

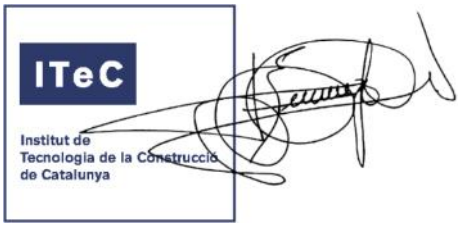
[2] 2003/640/EC – Commission Decision of date 4 September 2003, published in the Official Journal of the European Union (OJEU) L226/21 of 10/09/2003.

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

All the necessary technical details for the implementation of the AVCP system are laid down in the *Control Plan* deposited with the ITeC[3], with which the factory production control shall be in accordance.

Issued in Barcelona on 14 June 2022

by the Catalonia Institute of Construction Technology.



Ferran Bermejo Nualart

Technical Director, ITeC

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

ANNEX 1: WindWall Terracota TW18 – FTS 502B kit

WindWall Terracota TW18 – FTS 502B kit is a product for external wall claddings composed of:

- Cladding elements: extruded ceramic tile WindWall Terracota TW18 (see table A1.1) according to the harmonized standard EN 14411.
- Cladding fixings: stainless steel clip (see table A1.2);
- Subframe components:
  - vertical profiles (see table A1.3);
  - EPDM joint profiles (see table A1.4);
  - brackets (see table A1.5);
  - subframe fixings (see table A1.6).

A1.1 Cladding element

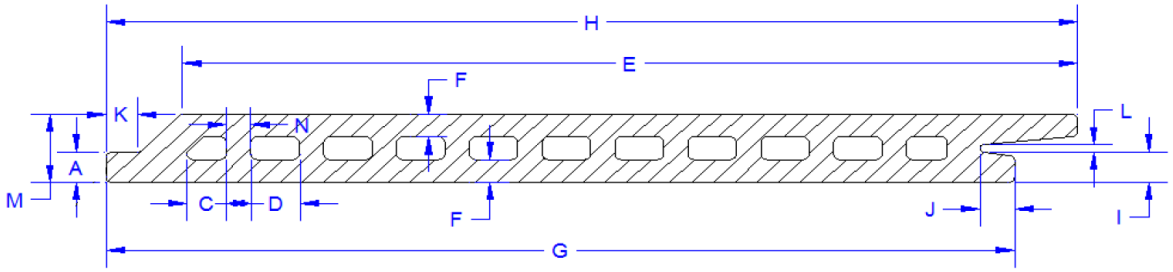


Figure A1.1: WindWall Terracota TW18 cladding element.

Table A1.1: WindWall Terracota TW18 cladding element.

Characteristic		Value					Reference
Trade name		WindWall Terracota TW18 tile					---
Form		Figure A1.1					---
Nominal length (mm)		(600 to 1200) ± 2					EN ISO 10545-2
Nominal width (mm)		200 ± 3	250 ± 3	300 ± 3	350 ± 3	400 ± 3	
Thickness (mm), M		18,0 ± 1,5					
Other dimensions (mm) (see figure A1.1)	A	8,0 ± 1,0					
	C	10,5 ± 1,0					
	D	12,8 ± 1,0					
	E	189 ± 3	239 ± 3	289 ± 3	339 ± 3	389 ± 3	
	F	6,0 ± 1,0					
	G	192 ± 3	242 ± 3	292 ± 3	342 ± 3	392 ± 3	
	H	208 ± 3	258 ± 3	308 ± 3	358 ± 3	408 ± 3	
	I	8,0 ± 0,5					
	J	8,5 ± 1,0					
	K	7,8 ± 1,0					
	L	2,0 ± 0,5					
	N	6,0 ± 1,0					
Rectangularity		± 3 mm					
Straightness of sides		± 3 mm					
Central curvature		± 3 mm					
Lateral curvature							
Warping							

Table A1.1: WindWall Terracota TW18 cladding element.

Characteristic	Value	Reference
Trade name	**WindWall Terracota TW18 tile**	---
Surface appearance	> 95% undamaged tiles	
Water absorption (% weight)	6% ≤ Eb ≤ 10%	EN ISO 10545-3
Apparent relative density (kg/m^3)	2300 ± 200	
Bulk density (kg/m^3)	2300 ± 200	
Apparent porosity (%)	0,4 ± 1	
Weight per unit (kg)	(variable) ± 10% ; m_{max} ≤ 18,0	---
Weight per square metre (kg/m^2)	30,0 ± 10%	---
Breaking strength (N)	> 3000	EN ISO 10545-4
Modulus of rupture (MPa)	> 20	
Resistance to thermal shock	Pass	EN ISO 10545-9
Frost resistance	No defects	EN ISO 10545-12
Reaction to fire	A1	Decision 96/603/EC with modifications

A1.2 Cladding fixings

Table A1.2: FTS-502B clips.

Characteristic	Value	Reference
Trade name	**FTS-502B-Clip 15 mm**	---
Form	Figures A1.2.1	---
Material	Stainless steel 1.4301 (X5CrNi18-10)	EN 10088-2
Resistance to corrosion	Pass	
Specific weight (kg/m^3)	7900	
Elastic limit (MPa)	≥ 230	
Tensile strength (MPa)	540 to 750	
Elongation (%)	≥ 45	
Modulus of elasticity at 20 ºC (kN/mm^2)	200	
Poisson coefficient	0,3	
Coefficient of thermal expansion between 50 °C and 100 ºC (µm/(m·ºC))	16,0	

A1.3 Subframe

Table A1.3: FTS-502B vertical profiles geometric and material properties.

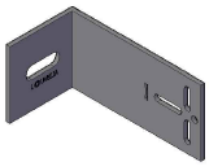
Geometric properties							
Type of profile		**Form and dimensions**		**Weight per linear metre (g/m)**	**Cross section (mm^2)**	**Inertia of profile section (cm^4)**	
						I_{xx}	**I_{yy}**
FTS-502B-PV-Y profile	85x60x2	Figure A 1.3a	dy = 16,1	0,97	358	13,65	13,81
FTS-502B-PV-Y profile-start-end	50x60x2	Figure A1.3b	dy = 20,2	0,72	264	11,89	2,94

Material properties			
Characteristic	**Value**		**Reference**
Material	EN AW-6063		EN 755 EN 1999-1
Treatment	T6	T66	
Durability class	B		
Specific weight (kg/m^3)	2700		
Elastic limit (MPa)	170	200	
Elongation (%)	6		
Tensile strength (MPa)	215	245	
Modulus of elasticity (MPa)	70000		
Poisson coefficient	0,3		
Coefficient of thermal expansion between 50 °C and 100 ºC (µm/(m·ºC))	23,0		

Table A1.4: FTS-502B EPDM profile.

Characteristic	**Value**		**Reference**
Trade name	**Double profile**	**Simple profile**	---
Material	EPDM		
Form	Figure A1.4a	Figure A1.4b	
Cross section (mm^2)	159,11	92,03	
Weight per linear metre (g/m)	199	116	
Density (kg/m^3)	1,25 ± 0,05		ISO 2781
Hardness, 3 sec (ShA)	70 ± 5		ISO 7619-1
Tensile strength (MPa)	> 7		ISO 37
Elongation at break (%)	> 250 (*)		
(*) Due to ageing, elongation at break can reach a value of 150%.			

Table A1.5: FTS-502B brackets geometric and material properties. L = length; B = base; t = thickness.

Geometric properties				
Type of bracket			**Form and dimensions**	**Mass per unit (kg)**
Height 60 	60 x L x 60 x 3,0	L = 60	Figure A1.5a	0,051
		L = 80		0,060
		L = 100		0,070
		L = 120		0,080
		L = 140		0,090
		L = 160		0,100
		L = 180		0,109
	60 x L x 60 x 4,0	L = 200		0,158
		L = 220		0,171
Height 120 	120 x L x 60 x 3,0	L = 60	Figure A1.5b	0,099
		L = 80		0,119
		L = 100		0,138
		L = 120		0,158
		L = 140		0,177
		L = 160		0,197
		L = 180		0,216
	120 x L x 60 x 4,0	L = 200		0,313
		L = 220		0,339
Height 180 	180 x L x 60 x 3,0	L = 60	Figure A1.5c	0,154
		L = 80		0,183
		L = 100		0,212
		L = 120		0,241
		L = 140		0,270
		L = 160		0,300
		L = 180		0,328
	180 x L x 60 x 4,0	L = 200		0,475
		L = 220		0,514

Material properties		
Characteristic	**Value**	**Reference**
Material	EN AW-6063	EN 755 EN 1999-1
Treatment	T5	
Durability class	B	
Specific weight (kg/m^3)	2700	
Elastic limit (MPa)	130	
Elongation (%)	6	
Tensile strength (MPa)	175	
Modulus of elasticity (MPa)	70000	
Poisson coefficient	0,3	
Coefficient of thermal expansion between 50 °C and 100 ºC (µm/(m·ºC))	23,0	

Table A1.6: FTS-502B subframe fixings.

Fixing elements	**Geometry**		**Material**		**Reference**
Position	**Type**	**Description**	**Type**	**Class**	---
Between the cladding fixing (clip) and the vertical profiles	Self-drilling screws	ST 4,8 x L ST 5,5 x L	Stainless steel	A2-70	EN ISO 3506-4 EN ISO 15480 EN ISO 10666
Between the vertical profile and the brackets	Self-drilling screws	ST 5,5 x L			

FTS-502B-Clip 15 mm

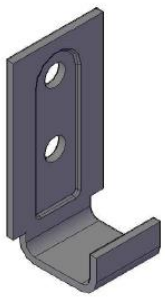


Figure A1.2.1a: General view.

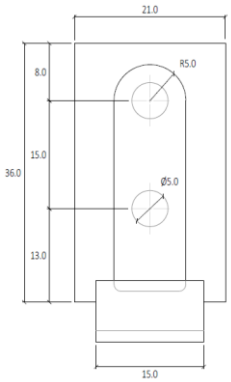


Figure A1.2.1b: Front view.

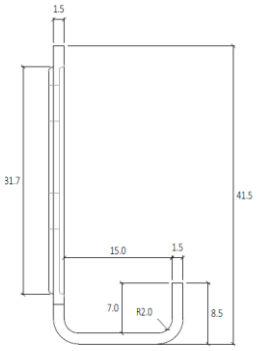


Figure A1.2.1c: Side view.

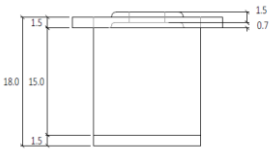


Figure A1.2.1d: Top view.

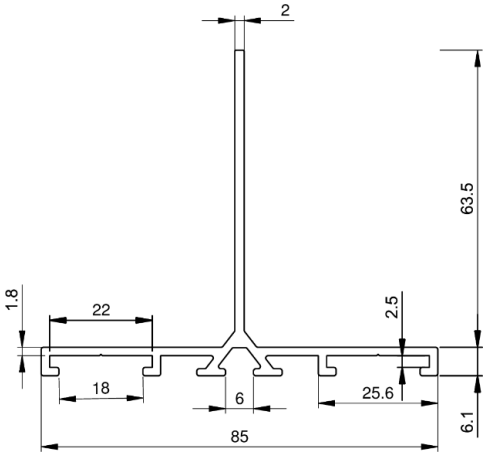


Figure A1.3a: FTS-502B-PV-Y profile.

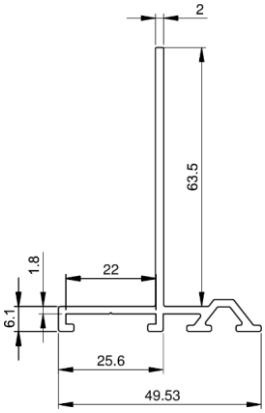


Figure A1.3b: FTS-502B-PV-Y start-end profile.

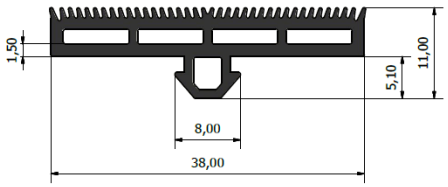


Figure A1.4a: FTS-502B double EPDM profile.

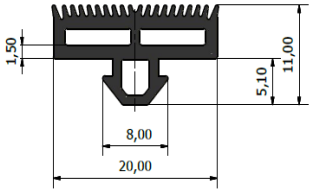


Figure A1.4b: FTS-502B simple EPDM profile.

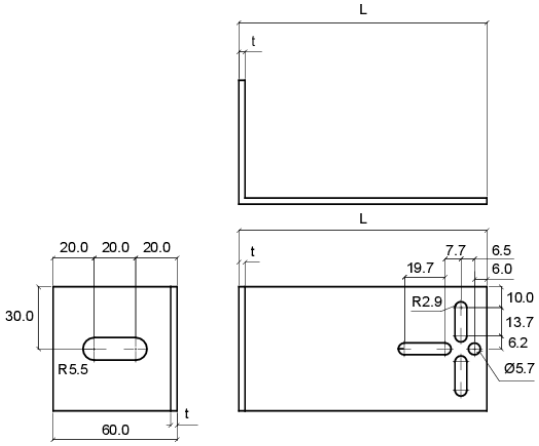


Figure A1.5a: FTS-502B bracket Height 60.

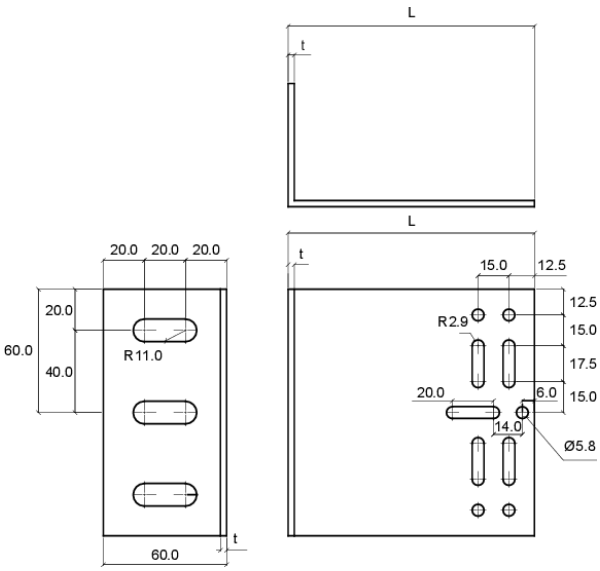


Figure A1.5b: FTS-502B bracket Height 120.

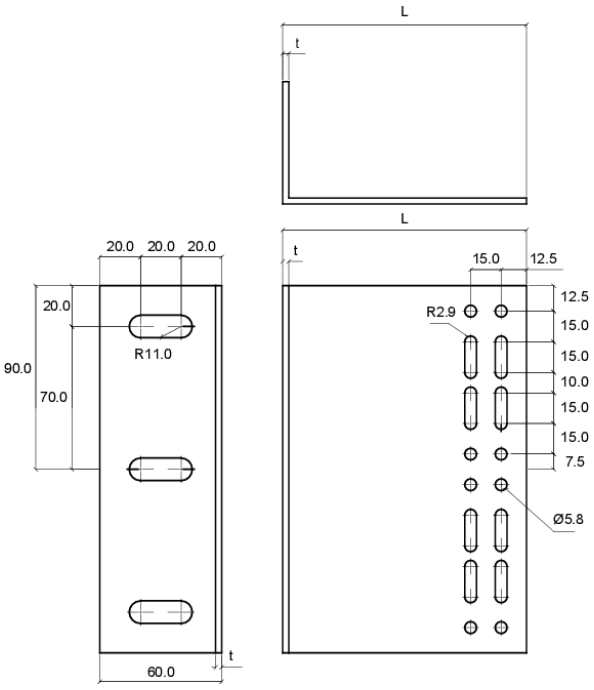


Figure A1.5c: FTS-502B bracket Height 180.

ANNEX 2: Construction details

Legend:

1. Cladding element.
2. Ventilated air space.
3. Thermal insulation.
4. Load-bearing wall.
5. Simple clip.
6. Vertical profile.
7. Slide point bracket.
8. Fix point bracket.
9. Thermal bridge break piece.
10. Anchor.
11. Profile-bracket self-drilling screw.
12. Special bracket.
13. Clip bracket tab.
14. EPDM doble profile.
15. Roof edge support piece.
16. Sill piece.
17. Jamb metal piece.
18. EPDM simple profile.
19. Clip-profile self-drilling screw.
20. Base edge support piece.
21. Roof edge finishing piece.
22. Waterproofing sheet.
23. Special vertical corner profile.
24. Rivet.
25. Base edge finishing perforated piece.
26. Special L piece.
27. Start-end vertical profile.
28. Special jamb profile.

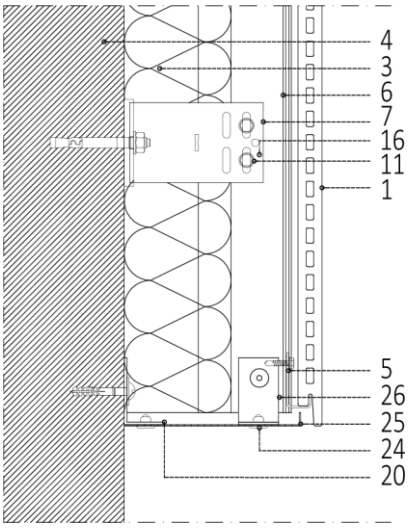


Figure A2.1: Base edge.

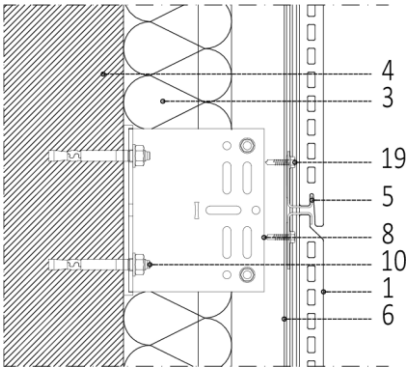


Figure A2.2a: Upper vertical section.

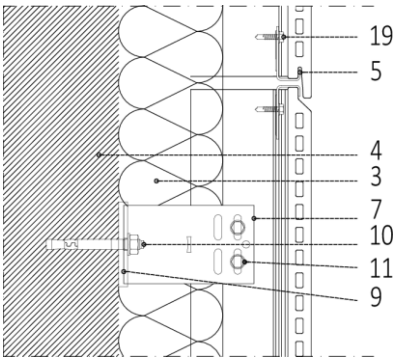


Figure A2.2b: Lower vertical section.

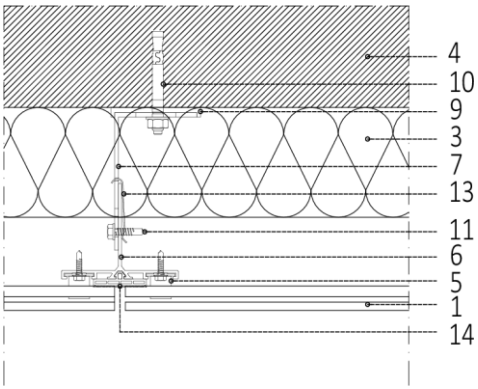


Figure A2.3: Horizontal section.

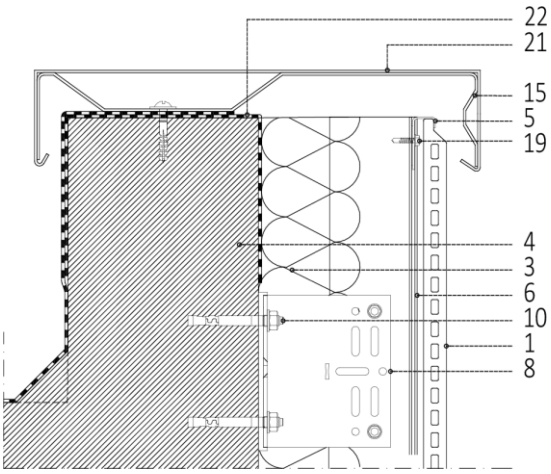


Figure A2.4: Roof edge.

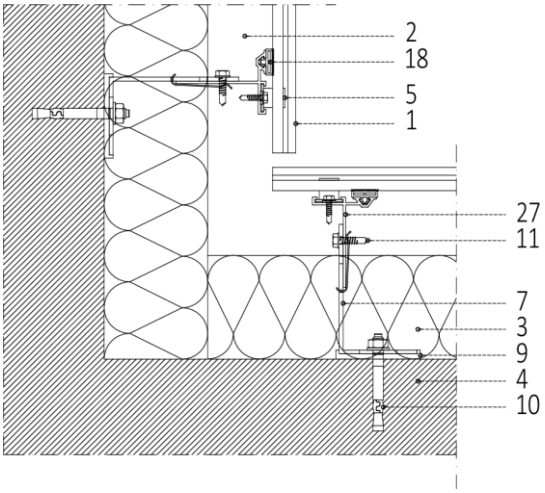


Figure A2.5: Internal corner.

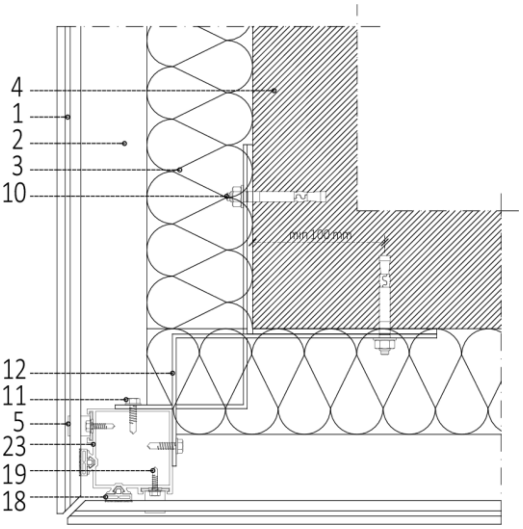


Figure A2.6: External corner.

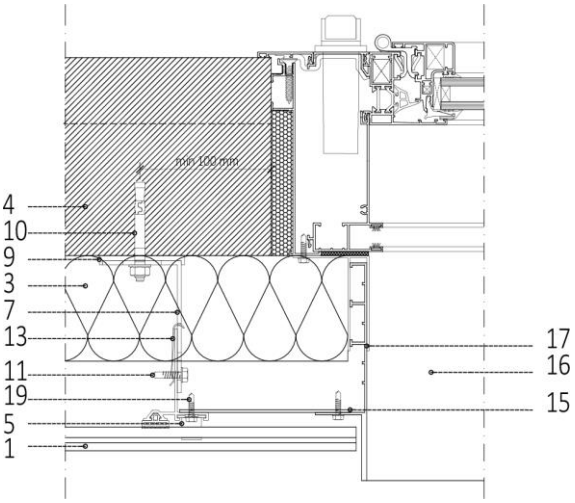


Figure A2.7: Jamb with metal piece.

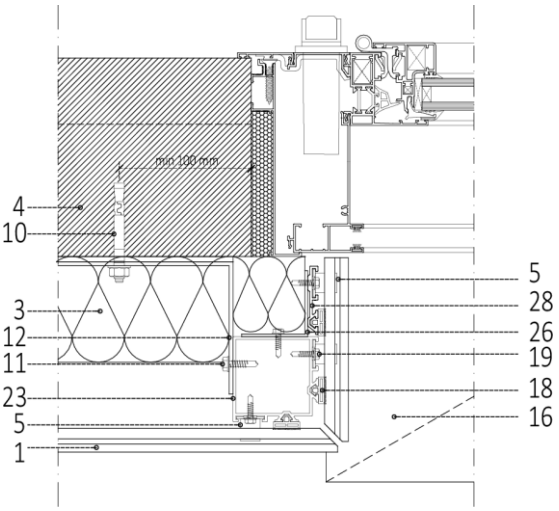


Figure A2.8: Jamb with ceramic piece.

ANNEX 3: Design, installation, maintenance and repair criteria

A3.1 Design

The design of the external wall claddings for ventilated façades using WindWall Terracota TW18 – FTS 502B kit should consider:

- It is assumed that the substrate wall meets the necessary requirements regarding the mechanical strength (resistance to static and dynamic loads) and the airtightness, as well as the relevant resistance regarding watertightness and water vapour.
- The verification of the designed system by means of calculation, taking into account the mechanical characteristic values of the kit components in order to resist the actions (dead loads, wind loads, etc.) applying on the specific works. National safety factors and other national provisions must be followed.
- The selection and verification of the brackets which support the subframe vertical profiles considering compatible materials (e.g. aluminium alloy) and the mechanical resistance (vertical and horizontal resistance) according to the envisaged actions obtained from the mechanical calculation of the designed system.
- The selection and verification of the anchors between the brackets and the external walls (substrate), taking into account the substrate material and the minimum resistance required (pull-out and shear resistance) according to the envisaged actions obtained from the mechanical calculation of the designed system.
- The accommodation of the designed system movements to the substrate or structural movements.
- The execution of singular parts of the façade; some examples of construction details are indicated in Annex 2.
- The corrosion protection of the designed system metallic components taking into account the category of corrosivity of the atmosphere of works (e.g. acc. ISO 9223) .
- The drainability of the ventilated air space between the cladding elements and the insulation layer or the external wall accordingly.
- An insulation layer is usually fixed on the external wall and should be defined in accordance with a harmonized standard or an European technical assessment and taking into account the section 3.1 of this ETA.
- Because the joints are not watertight, the first layer behind ventilated air space (e.g. insulation layer) should be composed by materials with low water absorption.

A3.2 Installation

Installation of the external wall claddings for ventilated façades using WindWall Terracota TW18 – FTS 502B kit should be carried out:

- According to the specifications of the manufacturer and using the components specified in this ETA.
- In accordance with the design and drawings prepared for the specific works. The manufacturer should ensure that the information on these provisions is given to those concerned.
- By appropriately qualified staff and under the supervision of the technical responsible of the specific works.

A3.3 Maintenance and repair

Maintenance of the external wall claddings for ventilated façades using WindWall Terracota TW18 – FTS 502B kit includes inspections on site, taking into account the following aspects:

- Regarding the cladding elements: the appearance of any damage such as cracking, detachment, delamination, and mould presence due to permanent moisture or permanent irreversible deformation.
- Regarding metallic components: the presence of corrosion or presence of water accumulation.

When necessary, any repair to localized damaged areas must be carried out with the same components and following the repair instructions given by the manufacturer.