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European Technical Assessment

ETA 18/0633 of 03/08/2020

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General Part

Technical Assessment Body issuing the European Technical Assessment:	Instituto de Ciencias de la Construcción Eduardo Torroja (IETcc)
Trade name of the construction product	CERAMAPANEL
Product family to which the construction product belongs	Kits for external wall claddings mechanically fixed
Manufacturer	VALCAN, L.T.D. Unit 7 Robins Drive, Castlefields Ind.Est. Bridgwater Somerset TA6 4DL, United Kingdom website: www.valcan.co.uk
Manufacturing plant(s)	Plant 1
This European Technical Assessment contains	28 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	EAD 090062-00-0404. Ed. July 2018. Kits for external wall claddings mechanically fixed
This version replaces	ETA 18/0633 (version 1) of 16/07/2018

SPECIFIC PART

1. Technical description of the product

The assessed kits for ventilated external wall claddings mechanically fixed in ventilated façades "CERAMAPANEL" are classified as family A, according to the EAD 090062-00-0404: *Kit for external wall claddings mechanically fixed*, edition July 2018 (hereinafter EAD 090062-00-0404).
The kits components are defined in table 1; they are factory produced by the ETA holder or a supplier.

TABLE 1 – DEFINITION OF THE KITS COMPONENTS

Components		**Material**		**Sizes** [mm]		
Cladding element	Fibre-cement flat sheets. CE marking(1) according to Annex ZA of the EN 12467: 2012(2)	Fibre-cement flat sheet		2500	1200 1250	8 10 12
				3000	1200 1250	
				3050	1200 1250	
Cladding fixings(3)	Elements(4) used to secure the sheets to the subframe	To timber subframe	Stainless steel A2 self-drilling screw	TW-S-D12 Ø 4.8 L=38 TW-S-D12 Ø 4.8 L=44		
		To galvanized steel subframe	Stainless steel A2 self-drilling screw	SX3-D12 Ø 5.5 L=30 SX3-L12 S16 Ø 5.5 L=32		
			Stainless steel A4 rivet	SSO-D15 Ø 5 L=18 SSO-D15 Ø 5 L=22		
		To aluminium subframe	Aluminium AlMg5/ Stainless steel A2 rivet	AP 16 Ø 5 L=18 AP 16 Ø 5 L=21		
	Fixed-point sleeve	Aluminium		L= 6; D=9.4; d=5.1		
Subframe(5)	Vertical elements(6) used to fix the sheets	Wood		Between two panels	140 (2 x 70) x (≥)50	
				Intermediate support	70 x (≥)50	
		Bended galvanized steel S235 Z275		Between two panels	Ω profile 50 x 60 x 50 x 60 x 50 (t=15/10)	
				Intermediate support	L profile 50 x 60 (t=15/10)	
		Extruded aluminium AW6060 T66		Between two panels	Asymmetrical T profile 130 x 45 (t=2.3)	
				Intermediate support	L profile 45 x 45 (t=2.3)	
	Metallic elements (brackets) (7) used as load transmission between the subframe and the substrate wall.	Timber subframe Galvanized steel subframe	Bended Galvanized steel S220GD Z350	50 x 60 x 80 – 150 – 300 (t= 25/10)		
		Aluminium subframe	Extruded aluminium AW6060 T66	Supporting br.	100 x 45.3 x 80 (t= 2.5) 100 x 45.3 x 140 (t= 3.5) 100 x 45.3 x 260 (t= 4)	
				Retention br.	70 x 45.3 x 80 (t= 2.5) 70 x 45.3 x 140 (t= 3.5) 70 x 45.3 x 260 (t= 4)	
Subframe fixings	Fixings (8) between - Brackets and vertical elements	Timber subframe	Carbon steel self-drilling screw	SW-T-Ø 4.8 L=35 SW-T-H15 Ø 6.5 L=50		
		Galvanized steel subframe	Stainless steel A2 and A4 self-drilling screw	SX3-S16 Ø 6.0 L=29		
			Stainless steel A4 rivet	SSO-D Ø 4.8 L=8 SSO D15 Ø 5 L=14		
		Aluminium subframe	Stainless steel A4 self-drilling screw	SLA3/6-8-S4-SR2-Ø 4.8 L=19		
Auxiliary components	Anchorage to substrate(9)	-		--		

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

2.1 Intended use

"CERAMAPANEL" kits 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 VALCAN, L.T.D.

(1) Declaration of performance nº 001/DoP/19/04/2016 REV 1.
(2) EN 12467:2012 "Fibre-cement flat sheets. Product specification and test methods"
(3) Not manufactured by VALCAN L.T.D.
(4) See Annex B (Subframe specifications) and figures 4.1, 5.1, 5.2 and 6.1
(5) Not manufactured by VALCAN L.T.D.
(6) Technical specification, Geometric and mechanical features of vertical elements in Annex B and figures 5.3, 5.4, 6.2 and 6.3
(7) Geometric and mechanical features of brackets in Annex B and figures 4.3, 6.5 and 6.6
(8) Geometric and mechanical features of screws in Annex B and figures 4.2, 5.6 and 6.4
(9) See Annex C.

Kit for ventilated external wall claddings is 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 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, according to the EAD, are based on an assumed working life of 25 years as minimum, 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 kit

The design of the external wall cladding system for ventilated façade "CERAMAPANEL" kits should take into account:

- The substrate material to define the suitable anchorages, assuming that the substrate meets the mechanical requirements (resistance to static and dynamic actions) and ensures airtightness, watertightness and water vapour permeability.
- The mechanical characteristic values of the kit components (e.g. cladding elements, cladding fixings and subframe) in order to resist the actions (dead loads, wind loads, etc.) applying on the specific work. National safety factor must be used.
- 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 (10).
- Because joints are not watertight, materials with low water absorption must compose the first layer behind ventilated air space.
- Insulation layer, usually fixed on the external wall should be defined in accordance with a harmonized standard or a European technical assessment.
- 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 kit 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 cladding elements appearance of any damage such as cracking o 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.

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

The assessment of "CERAMAPANEL" kits according to the Basic Works Requirements (BWR) was carried out in compliance with the EAD 090062-00-0404. The characteristics of the components shall

(10) (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.

correspond to the respective values laid down in the technical documentation of this ETA, checked by IETcc.

In table 2 a summary of “CERAMAPANEL” kits performance.

TABLE 2 – SUMMARY OF “CERAMAPANEL” KITS PERFORMANCE							
Basic Works Requirement	**Nº**	**Essential characteristic**		**ETA section**	**Performance**		
BWR 2 Safety in case of fire	1	Reaction to fire		3.1	A2-s1, d0		
	2	Façade fire performance		--	Not assessed		
	3	Propensity to undergo continuous smouldering		--	Not relevant (the thermal insulation is not a kit component)		
BWR 3 Hygiene, health and the environment	4	Watertightness of joints (protection against driving rain)		3.2	Not watertight (open joints)		
	5	Water absorption		--	Not relevant (use in ventilated façades)		
	6	Water vapour permeability		--	Not relevant (use in ventilated façades)		
	7	Drainability		3.3	See § 3.3 and figures 7 to 12.		
	8	Content and/or release of dangerous substances		--	Not assessed		
BWR 4 Safety and accessibility in use	9	Wind load resistance		3.4	Timber subframe	3800 Pa	
					Galv. steel subframe	3600 Pa	
					Aluminium subframe	3600 Pa	
	10	Resistance to horizontal point loads		3.5	No permanent deformation on any component		
	11	Impact resistance		3.6	Category III		
	12	Mechanical resistance of cladding elements	Bending strength of cladding element	--	See annex A: Cladding element specifications		
	15	Mechanical resistance of connection between the cladding element and the cladding fixing	Pull-through resistance	3.7	Self-drilling screw	See table 4	
					Aluminium rivet	See table 5	
	16		Pull-through resistance under shear load	3.8	See table 6		
	24	Resistance of profile		3.9	See § 3.9		
	25	Subframe fixings	Tension/pull out resistance	--	Not assessed		
	26		Shear load resistance	--	Not assessed		
	27	Brackets resistance (vertical and horizontal)		3.10	See § 3.10		
BWR 5 Protection against noise	28	Airborne sound insulation		--	Not assessed		
BWR 6 Energy economy and heat retention	29	Thermal resistance		--	Thermal insulation is not a kit component		
Durability	30	Hygrothermal behaviour		3.11	None of the defects specified in EAD were observed		
	31	Behaviour after pulsating load		3.12	See table 9		
	32	Freeze-thaw resistance of cladding element		3.13	See table 10		
	33	Behaviour after immersion in water of cladding element		3.14	See table 11		
	34	Dimensional stability		3.15	See § 3.15		
	35	Chemical and biological resistance of the cladding elements		--	Not assessed		
	36	UV radiation resistance of the cladding elements		3.16	PIGMENTA	1500h	3/4
					SPECTRA	1500h	3/4
					HYDROPLUS	1500h	4/5
					FANCY MAT	1500h	4/5
	37	Corrosion of metal components		3.17	See § 3.17		

3.1 Reaction to fire – BWR 2

Euro class A2-s1, d0 according to standard EN 13501-1: 2007 + A1:2010(11).

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

This classification is valid as long as the insulation layer placed in the ventilated air space is made of a non-combustible material (mineral wool) or 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 NPA (No performance assessed).

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. based on 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) – BWR 3

Joints between the cladding elements in the external wall claddings for ventilated façades are open, therefore “CERAMAPANEL” kits are not watertight.

3.3 Drainability – BWR 3

On the basis of the construction details (see figures 7 to 12), 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 of water, moisture damage or leakage into the substrate.

3.4 Wind load resistance – BWR 4

Wind load resistance has been tested according to § 2.2.9 and the method specified in Annex E of EAD. The kit behaviour exposed to wind pressure is most favourable than when exposed to wind suction. Therefore, wind pressure tests have been avoided and wind pressure resistance of kit can be considered as equal to wind suction resistance.
The worst case has been tested: minimum thickness, maximum separation between cladding fixings and subframe components.

Test results for the tested specimen are indicated in table 3.

TABLE 3 – WIND SUCTION RESISTANCE TEST RESULTS

TEST SPECIMEN	MAXIMUM LOAD Q (Pa)	TYPE OF FAILURE	DISPLACEMENT UNDER MAXIMUM LOAD (mm)
CERAMAPANEL (Timber subframe– family A)	3800(12)	No failure	15.13
CERAMAPANEL (Galvanized steel subframe – family A)	3600	Sheet cracking(13)	14.89
CERAMAPANEL (Aluminium subframe– family A)	3600	Sheet breakage(14)	20.14

3.5 Resistance to horizontal point loads – BWR 4

Resistance to horizontal point loads has been tested according to § 2.2.10 and the method specified in Annex F of EAD.

After test no permanent deformation on any component of the kit tested was visually appreciated.

3.6 Impact resistance – BWR 4

Impact resistance has been assessed according to § 2.2.11 and the method specified in Annex G of EAD.

According with the test results the use category of CERAMAPANEL kits for vertical exterior wall claddings is the Category III that means this kit can be used in zones not likely to be damage by normal impacts caused by people or by thrown or kicked object (e.g. Upper façade levels in buildings not sited

(12) The test had to be stopped at 3800Pa because the equipment did not achieve stabilization. No failure occurs.
(13) Achieving the 3800 Pa, *“Panel A”* cracked.
(14) Achieving the 3800 Pa, *“Panel A”* broke.

in public location, that occasionally can be hit by a thrown object – ball, stone, etc – Cleaning gondolas may be used on the façade).

3.7 Pull-through resistance – BWR 4

Pull-through resistance has been assessed according to § 2.2.12.4 and the method specified in section I.1.1 of Annex I of EAD.

Mean and characteristic values of test are indicated in table 4 and 5.

TABLE 4 - PULL-THROUGH RESISTANCE OF CLADDING ELEMENT (SCREW)

SHEET THICKNESS (mm)	SUPPORT Ø (mm)	FIXING POSITION (Screw)	FAILURE LOAD (N)		FAILURE MODE
			F_m	$F_{u,5}$	
8	180	Centre	1859.8	1649.15	Bending failure
		Border	964.66	781.15	Bending failure
		Corner	481.84	424.72	Superficial Crack
	270	Centre	1308.5	1138.32	Bending failure
		Border	522.01	470.21	Bending failure
		Corner	253.10	218.99	Superficial Crack
12	180	Centre	4123.77	3791	Pull-through
		Border	2333.14	1602.05	Bending failure
		Corner	993.94	796.80	Superficial Crack
	270	Centre	3481	3065.76	Pull-through
		Border	1204.55	1047.70	Bending failure
		Corner	613.74	458.68	Superficial Crack

TABLE 5 - PULL-THROUGH RESISTANCE OF CLADDING ELEMENT (ALUMINIUM RIVET)

SHEET THICKNESS (mm)	SUPPORT Ø (mm)	FIXING POSITION (Aluminium rivet)	FAILURE LOAD (N)		FAILURE MODE
			F_m	$F_{u,5}$	
8	180	Centre	2061.47	1726.53	Bending failure
		Border	919.89	833.52	Bending failure
		Corner	472.48	357.44	Superficial Crack
	270	Centre	1425.35	1245.58	Bending failure
		Border	510.44	405.87	Bending failure
		Corner	273.34	241.40	Superficial Crack
12	180	Centre	4625.37	3920.27	Pull-through
		Border	2129.79	1963.14	Bending failure
		Corner	953.50	882.63	Superficial Crack Fixing deformation
	270	Centre	3557.91	3149.68	Bending failure
		Border	1016.07	662.90	Bending failure
		Corner	549.00	461.26	Superficial Crack Fixing deformation

3.8 Pull-through resistance under shear loads – BWR 4

Pull-through resistance under shear loads has been assessed according to § 2.2.12.5 and the method specified in section I.5 of Annex I of EAD.

Mean and characteristic values of test are indicated in table 6.

TABLE 6 - PULL-THROUGH RESISTANCE UNDER SHEAR LOAD

SHEET THICKNESS (mm)		FAILURE LOAD (N)		FAILURE MODE
		F_m	$F_{u,5}$	
WOOD BATTEN STAINLESS SCREW	8	1928.4	1400	Sheet breakage
	12	2051.6	826.4	Sheet breakage
ALUMINIUM PROF. ALUMINIUM RIVET	8	2423.6	2175.7	Sheet breakage
	12	2930.6	2804.5	Sheet breakage

3.9 Resistance of profiles – BWR 4

Resistance of kit profiles has been assessed according to section 2.2.10 of EAD.
The following characteristics of the profiles and the subframe profiles are given in the relevant tables of Annex B:

- Form and dimensions of the profile section.
- Inertia of the profile section.
- Minimum elastic limit of the profile materials.

3.10 Brackets resistance (horizontal and vertical load) – BWR 4

Brackets load bearing capacity and deformation under loading (horizontal and vertical load) have been assessed according to § 2.2.12.16 and the method specified in Annex L of EAD.

Mean and characteristic values of bracket resistance to horizontal load test are indicated in table 7, these values correspond to the resistance to horizontal load of 1 bracket.

TABLE 7: RESISTANCE TO HORIZONTAL LOAD OF BRACKET

BRACKETS DIMENSIONS			F_m(N) ΔL=1mm Residual distortion		F_t (N) ΔL=5 mm Displacement	
			Mean value	Char. value	Mean value	Char. value
GALVANIZED STEEL		60 x 50 x 80 (t=2.5)	3249.92	3005.23	4322.67	4184.86
		60 x 50 x 150 (t=2.5)	3244.72	2940.22	4335.21	4031.06
		60 x 50 x 300 (t=2.5)	2774.21	2549.52	3935.14	3859.05
ALUMINIUM	RETENTION B.	70 x 45 x 80 (t=2.5)	3532.78	2924.99	3973.62	3691.04
		70 x 45 x 140 (t=3.5)	3856.49	3456.94	4561.80	4459.12
		70 x 45 x 260 (t=4)	4596.03	3782.01	5512.53	5411.08
	SUPPORTING B.	100 x 45 x 80 (t=2.5)	6370.25	6080.25	7108.80	6918.01
		100 x 45 x 140 (t=3.5)	7180.80	6528.47	7607.27	7221.27
		100 x 45 x 260 (t=4)	8230.53	7438.31	9209.44	8922.73

Mean and characteristic values of bracket resistance to vertical load test are indicated in table 8, these values correspond to the resistance to vertical load of 1 bracket.

TABLE 8: RESISTANCE TO VERTICAL LOAD OF BRACKET

BRACKETS DIMENSIONS			F_r (N) ΔL=0.2% de L Residual distortion		F_{1d}(N) ΔL=1mm Displacement		F_{3d}(N) ΔL=3mm Displacement		F_s(N) ΔL=5 mm Displacement	
			Mean value	Char. value	Mean value	Char. value	Mean value	Char. value	Mean value	Char. value
GALVANIZED STEEL		60 x 50 x 80 (t=2.5)	654.40	515.14	1063.30	799.40	1798.39	1639.97	2352.82	2098.20
		60 x 50 x 150 (t=2.5)	377.43	278.10	387.89	346.89	852.29	702.41	1165.37	1043.13
		60 x 50 x 300 (t=2.5)	198.95	164.36	122.74	106.74	242.99	199.51	312.21	248.65
ALUMINIUM	SUPPORTING B.	100 x 45 x 80 (t=2.5)	946.66	621.71	1057.31	599,60	1809.54	1170.04	2455.34	1402.34
		100 x 45 x 140 (t=3.5)	624.59	528.11	454.30	392.13	1076.04	895.51	1565.87	1246.77
		100 x 45 x 260 (t=4)	404.26	330.02	175.91	147.18	460.66	378.12	689.92	537.55

3.11 Hygrothermal behaviour – Durability

The hygrothermal behaviour test has been tested according to § 2.2.15.1 and the method specified in section M.1 of Annex M of EAD 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 CERAMAPANEL 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.

3.12 Behaviour after pulsating load – Durability

Behaviour after pulsating load has been assessed according to § 2.2.15.2 and the method specified in section M.2 of Annex M of EAD.

Mean and characteristic values of test are indicated in table 9.

TABLE 9 - PULL-THROUGH RESISTANCE OF CLADDING ELEMENT AFTER PULSATING LOAD CYCLES

SHEET THICKNESS (mm)	SUPPORT Ø (mm)	FIXING POSITION (Stainless steel self-drilling screw)	FAILURE LOAD (N)		FAILURE MODE
			F_m	$F_{u.5}$	
8	270	Centre	1285.43	929.61	Bending failure

3.13 Freeze-thaw resistance – Durability

After freeze-thaw cycles according to EN 12467: 2012, pull-through resistance of the panel has been tested according to § 2.2.15.3 of EAD.

Tests results are indicated in table 10.

TABLE 10 - PULL-THROUGH RESISTANCE OF CLADDING ELEMENT AFTER FREEZE-THAW CYCLES

SHEET THICKNESS (mm)	SUPPORT Ø (mm)	FIXING POSITION (Stainless steel self- drilling screw)	FAILURE LOAD (N)		FAILURE MODE
			F_m	$F_{u.5}$	
8	270	Centre	1299.4	1267.4	Bending failure
12	270	Centre	3456.6	3161.7	Bending failure

3.14 Behaviour after immersion in water of cladding element – Durability

After immersion in water according to EN 12467: 2012, pull-through resistance of the sheet has been tested according to § 2.2.15.4 of EAD.

Tests results are indicated in table 11.

TABLE 11 - PULL-THROUGH RESISTANCE OF CLADDING ELEMENT AFTER IMMERSION IN WATER

SHEET THICKNESS (mm)	SUPPORT Ø (mm)	FIXING POSITION (Stainless steel self- drilling screw)	FAILURE LOAD (N)		FAILURE MODE
			F_m	$F_{u.5}$	
8	270	Centre	1378.57	1278.51	Bending failure
12	270	Centre	3517.42	3217.93	Pull-through

3.15 Dimensional stability – Durability

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

- for fibre-cement flat sheet EN 12467: 2012
- for aluminium EN 1999-1
- for stainless steel EN 10088-1: 2015

3.16 UV radiation resistance of the cladding elements – Durability

UV radiation resistance has been tested according to EN ISO 4892-3: 2016[15] on CERAMAPANEL samples with the following references:

- PIGMENTA
- SPECTRA
- HYDROPLUS
- FANCY MAT

Based on the test results after accelerating ageing from UV radiation the colour stability is satisfactory for the reference of colour tested.

3.17 Corrosion of metal components

Fixings and subframe components are made of:

- Aluminium alloy AW-6060 according to EN 573, EN 755 and EN 1999-1-1, and their minimum thickness is 2mm.

The durability class is B according to EN 1999-1-1:2007/A1:2009[16] (Table 3.1a and Table.C.1 in Annex C). 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.

- A2, A3 and A4 stainless steel according to EN ISO 3506-1.

The category of corrosivity is C4 (High) according to EN 1993-1-4:2006[17] (Table A.1 in Annex A) and EN ISO 9223: 2012[18] (Table C.1 in Annex C). Therefore these components may be used in indoor environments with high frequency of condensation and high pollution from production process (e.g. industrial processing plants, swimming pools) and in outdoor environments, temperate zone, with high pollution (e.g. polluted urban areas, industrial areas, coastal areas without spray of salt water) or, subtropical and tropical zone, with medium pollution.

- Galvanized steel S220GD with Z350 treatment and S235 with Z275 treatment according to EN 10346[19].

The category of corrosivity is C3 (Medium) and the durability class is H (High) according to EN ISO 14713-1: 2019[20] (Table 2). Therefore, these components may be used in outdoor environments, temperate zone, atmospheric environment with medium pollution or some effect of chloride, e.g. urban areas, coastal areas with low deposition of chlorides, subtropical and tropical zones with atmosphere with low pollution.

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 of the European Commission [21] the system of assessment and verification of constancy of performances (see Annex V to Regulation (EU) Nº 305/2011) given in the following table applies:

Product(s)	Intended use(s)	Level(s) or class(es)	System(s)
Kits for external wall claddings mechanically fixed CERAMAPANEL	Ventilated external wall claddings	-	2+

(15) EN ISO 4892-3: 2016 “Plastics — Methods of exposure to laboratory light sources — Part 3: Fluorescent UV lamps”.
(16) EN 1999-1-1:2007+A1:2009 “Eurocode 9. Design of aluminium structures - Part 1-1: General structural rules”.
(17) EN 1993-1-4:2006 “Eurocode 3 Design of steel structures - Part 1-4: General rules - Supplementary rules for stainless steels”.
(18) EN ISO 9223:2012 “Corrosion of metals and alloys - Corrosivity of atmospheres - Classification, determination and estimation”.
(19) EN 10346: 2015 “Continuously hot-dip coated steel flat products for cold forming - Technical delivery conditions”.
(20) EN ISO 14713-1: 2017 “Zinc coatings - Guidelines and recommendations for the protection against corrosion of iron and steel in structures - Part 1: General principles of design and corrosion resistance”.
(21) 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 provided for in the applicable EAD

Technical details necessary for the implementation of the AVCP system are laid down in the quality plan deposited at the Instituto de Ciencias de la Construcción Eduardo Torroja.

Instituto de Ciencias de la Construcción Eduardo Torroja
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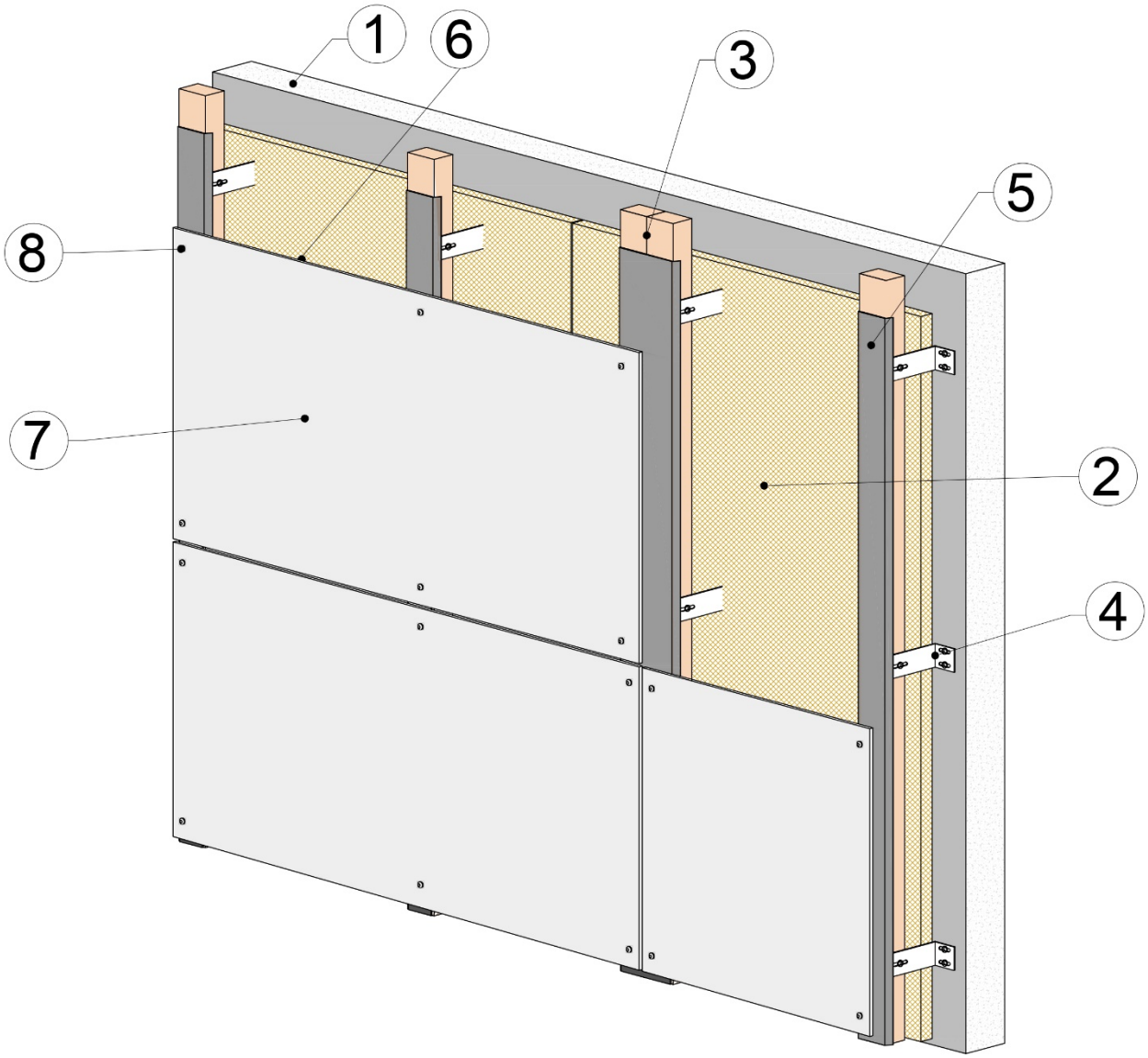
On behalf of the Instituto de Ciencias de la Construcción Eduardo Torroja
Madrid, 03rd August 2020

Firmado por CASTILLO
ANGEL - DNI 52507605P
08/08/2020 con un cer
emitido por AC Admini

Director
IETcc-CSIC

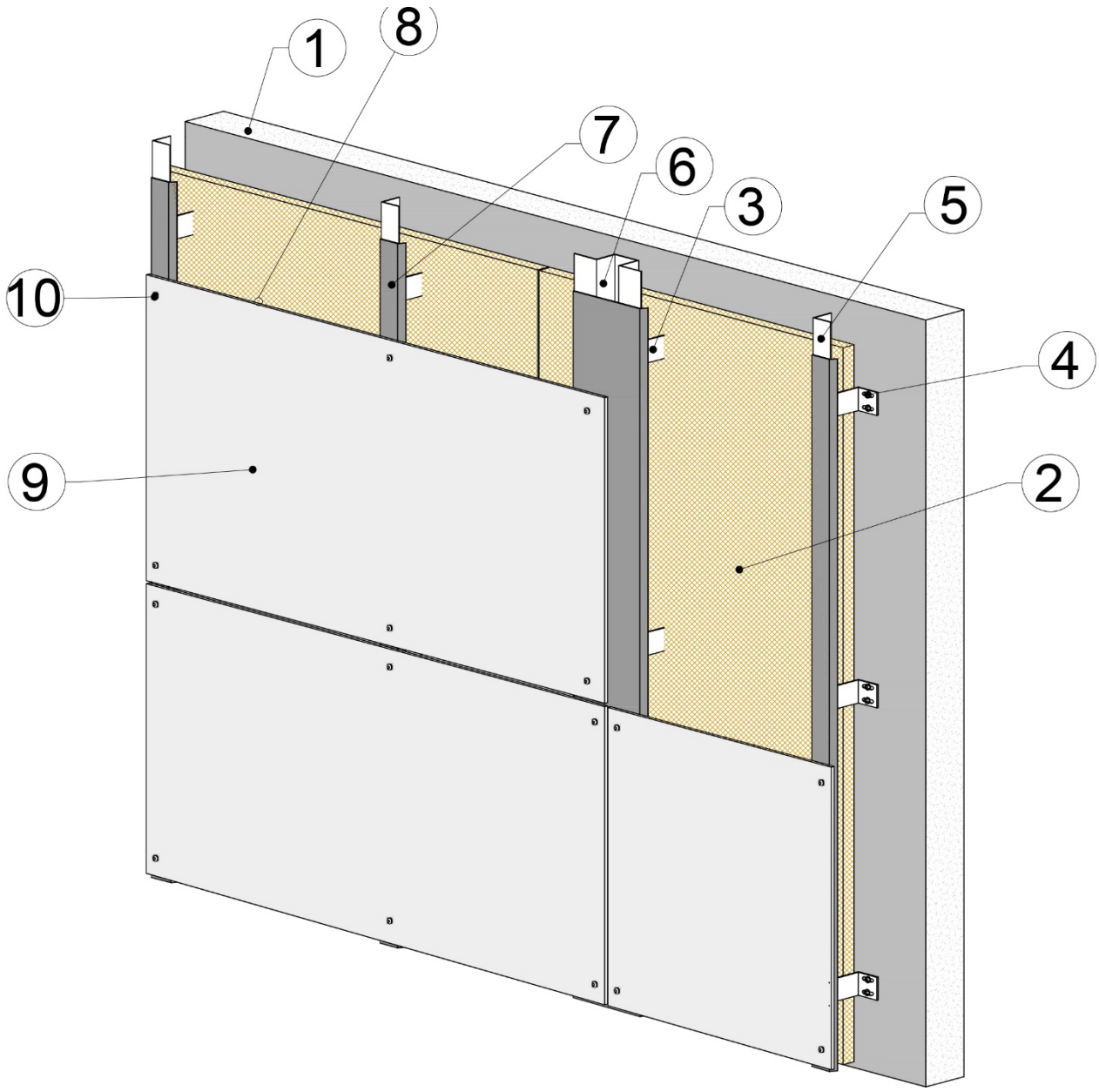
Note: The details shown in figures on this page and on the following pages are approximate and must be defined for each project depending on the site of the building.
These details concern the kit for ventilated external wall claddings and may not be used as justification for compliance with the National requirements.

FIGURE 1-A: CERAMAPANEL– GENERAL CONFIGURATION TIMBER SUBFRAME



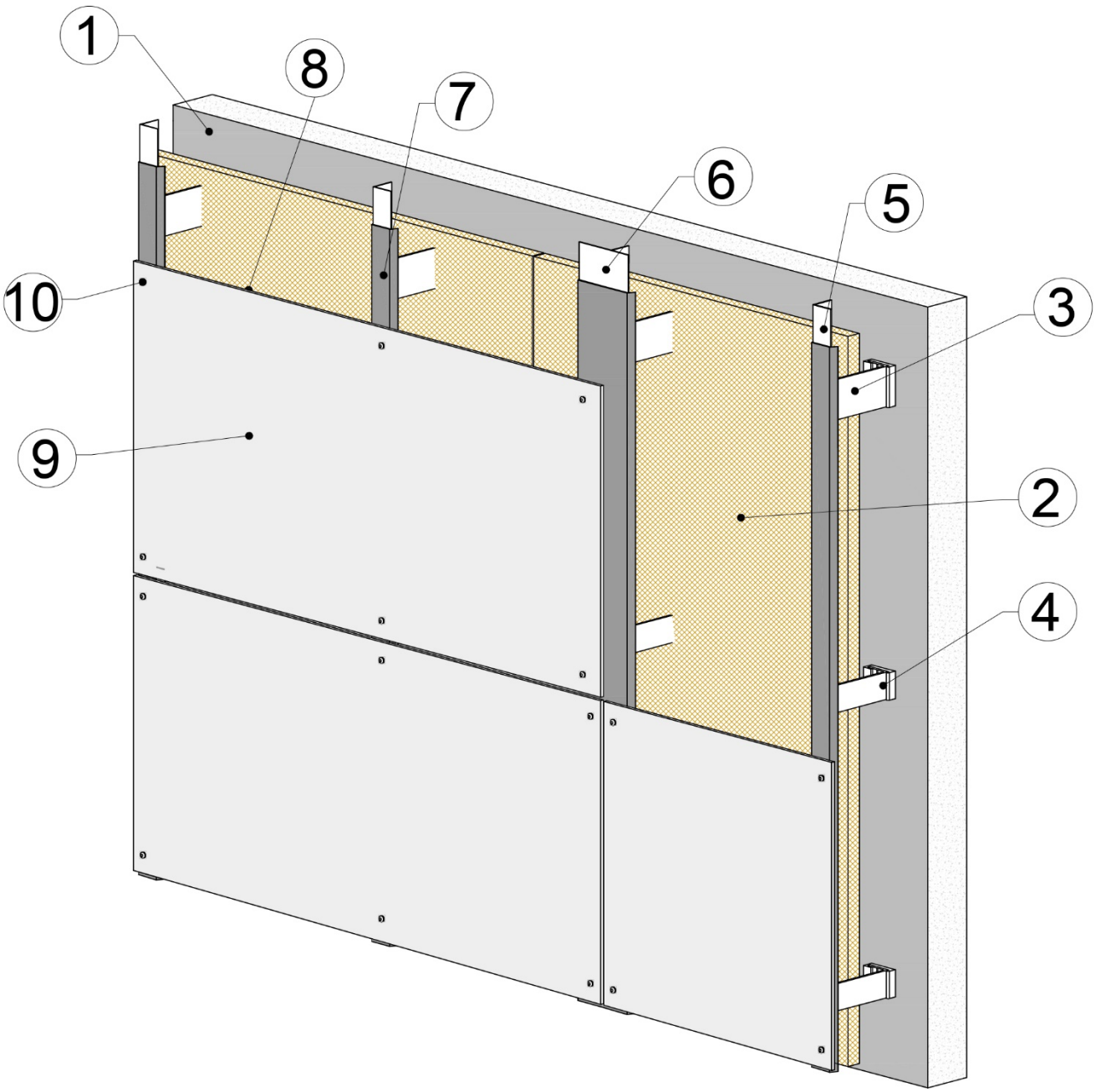
1. Load-bearing structure
2. Thermal insulation
3. Wooden sub frame – Vertical battens
4. Fixing between subframe and load-bearing structure
5. EPDM ribbon
6. Ventilation cavity
7. Fibre-cement cladding sheets
8. Fixing between cladding sheet and wood batten

FIGURE 1-B: CERAMAPANEL – GENERAL CONFIGURATION GALVANIZED STEEL SUBFRAME



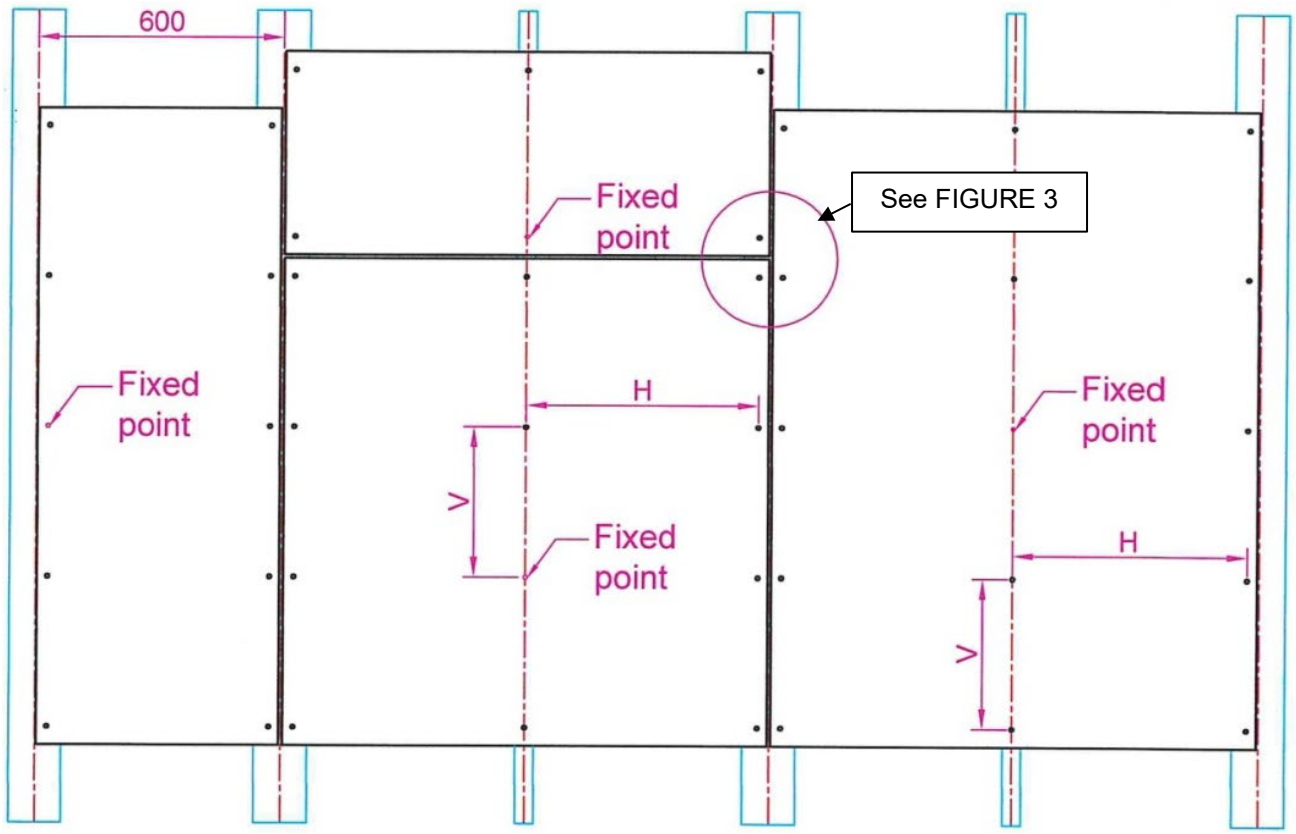
1. Load-bearing structure
2. Thermal insulation
3. Galvanized steel brackets
4. Fixing between subframe and load-bearing structure
5. L vertical profiles
6. Ω vertical profiles
7. EPDM ribbon
8. Ventilation cavity
9. Fibre-cement cladding sheets
10. Fixing between cladding sheet and steel profile

FIGURE 1-C: CERAMAPANEL – GENERAL CONFIGURATION ALUMINIUM SUBFRAME



1. Load-bearing structure
2. Thermal insulation
3. Supporting bracket (fixed point)
4. Retention bracket (gliding point)
5. GFT L profile
6. GFT T profile with asymmetric wings
7. EPDM ribbon
8. Ventilation cavity
9. Fibre-cement cladding sheets
10. Rivet between cladding sheet and aluminium profile

FIGURE 2.1: FIXED POINT ON FIBRE-CEMENT FLAT SHEETS



H maximum horizontal distance between fixings H≤ 600 mm
V maximum vertical distance between fixings V≤ 600 mm

FIGURE 2.2: FIXED POINT SLEEVE

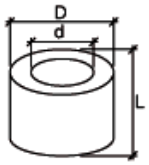
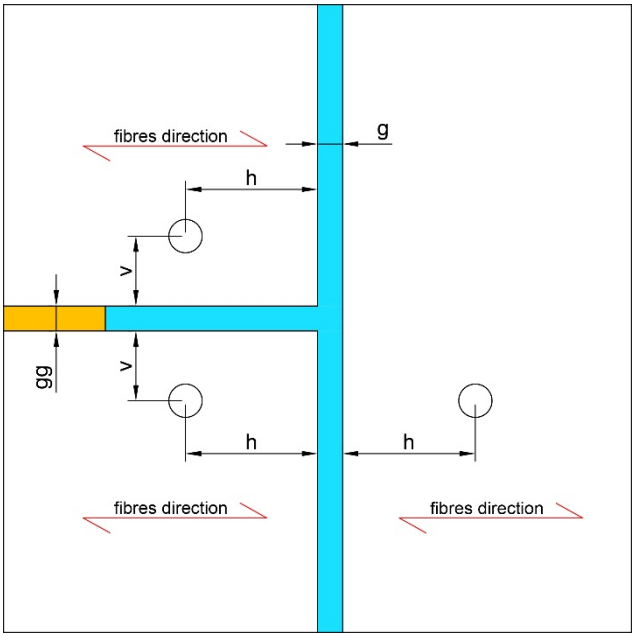


FIGURE 3: JOINTS AND HOLES DISTANCE FROM SHEET EDGES



h fixing distance to sheet edges measured following fibres direction: **h**≥45 mm
v fixing distance to sheet edges measured across fibres direction: **v**≥25 mm
g vertical sheet joint. **gg** horizontal sheet joint; **g**=**gg**= minimum width 8 mm

FIGURE 3.a: HOLES DISTANCE FROM SHEET AND BATTEN

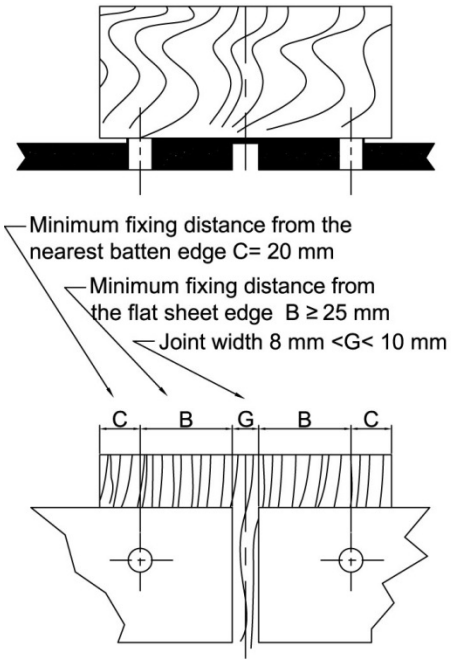
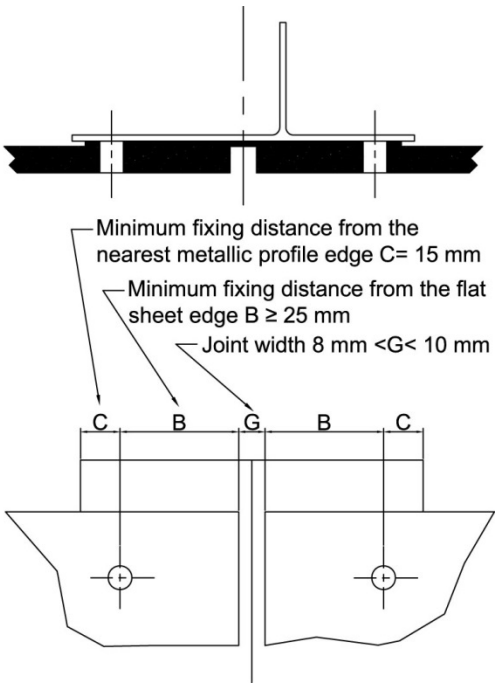


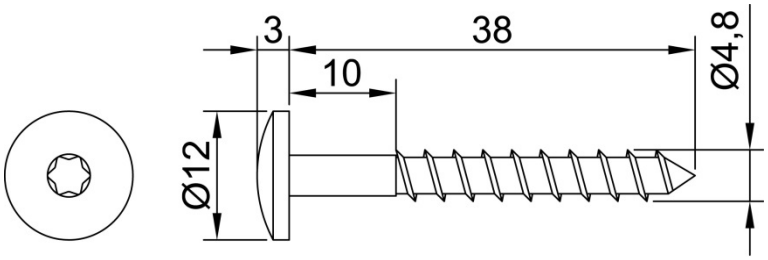
FIGURE 3.b: HOLES DISTANCE FROM SHEET AND METALLIC PROFILE



SYSTEM COMPONENTS

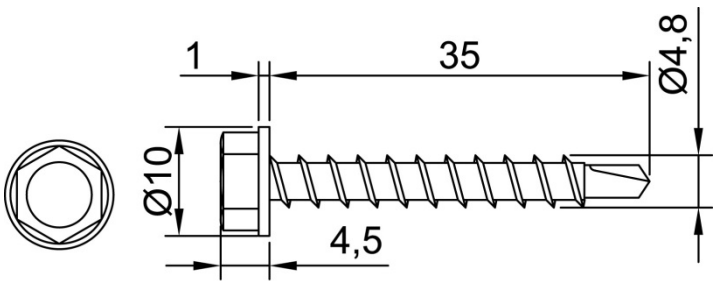
FIGURE 4: TIMBER SUBFRAME

4.1: CLADDING FIXING TO TIMBER SUBFRAME - STAINLESS STEEL SCREW



TW-S-D12 Ø 4.8 L=38

4.2: FIXING BETWEEN BRACKET AND BATTEN – STAINLESS STEEL SCREW



SW-T Ø 4.8 L=35

4.3: GALVANIZED STEEL BRACKETS

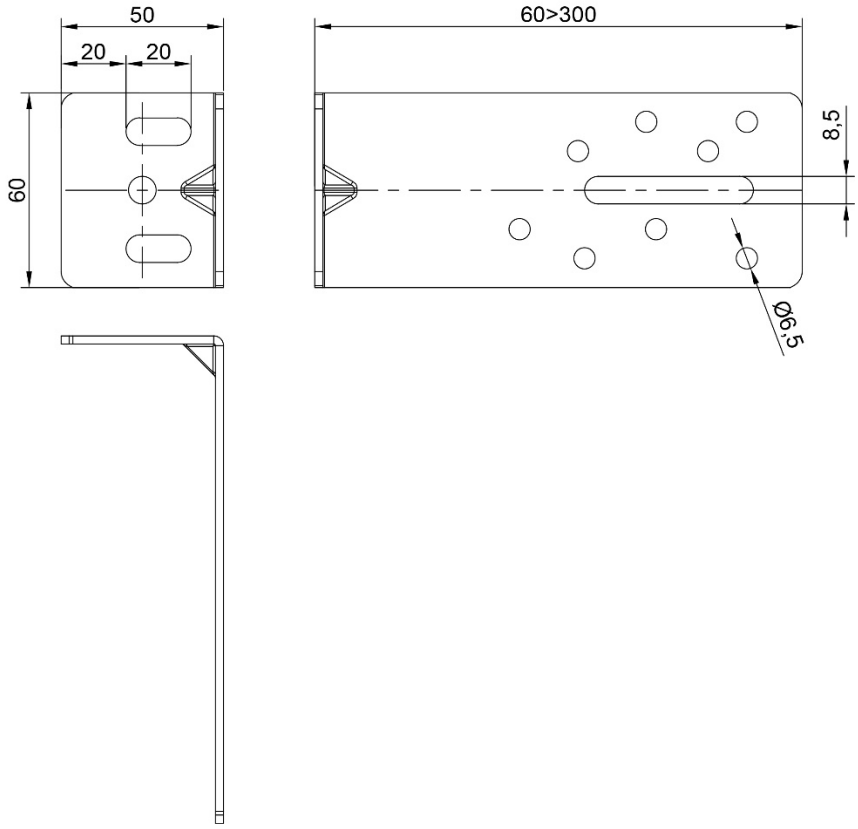
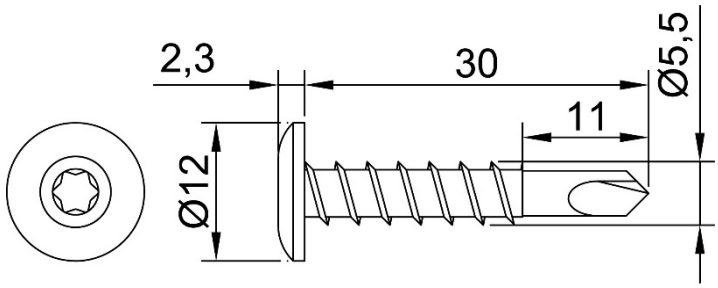


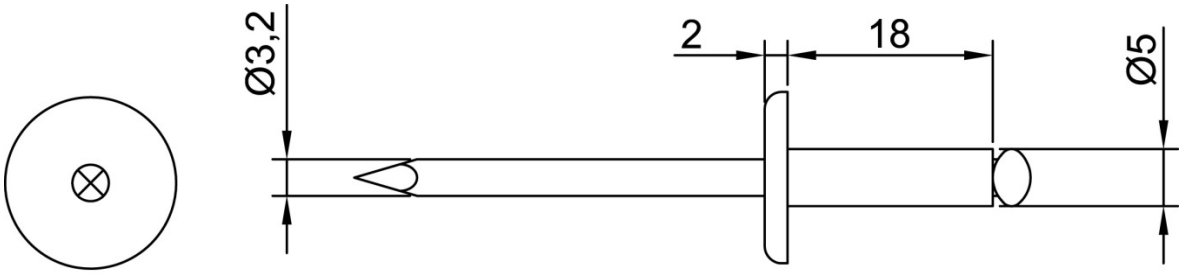
FIGURE 5: GALVANIZED STEEL SUBFRAME

5.1: CLADDING FIXING TO GALVANIZED STEEL SUBFRAME – STAINLESS STEEL SCREW



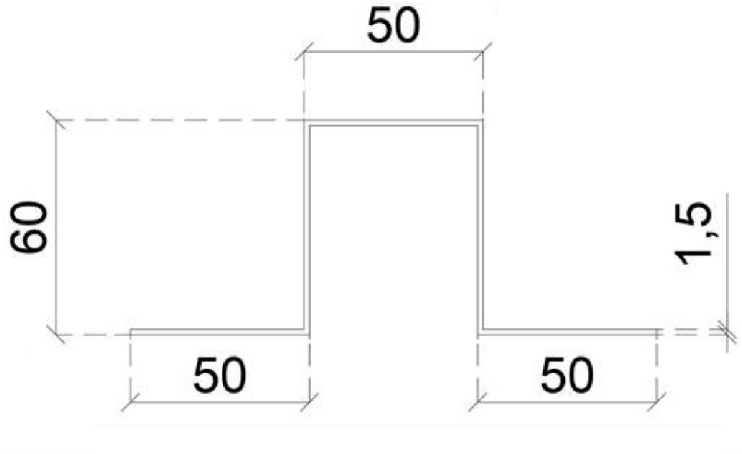
SX3-D12 Ø 5,5 L=30

5.2: CLADDING FIXING TO GALVANIZED STEEL SUBFRAME – STAINLESS STEEL RIVET

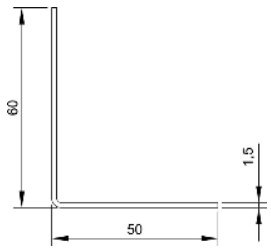


SSO-D15 Ø 5 L=18

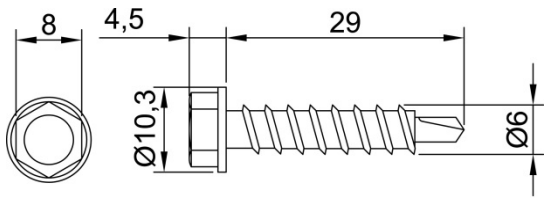
5.3: GALVANIZED STEEL Ω PROFILE



5.4: GALVANIZED STEEL L PROFILE



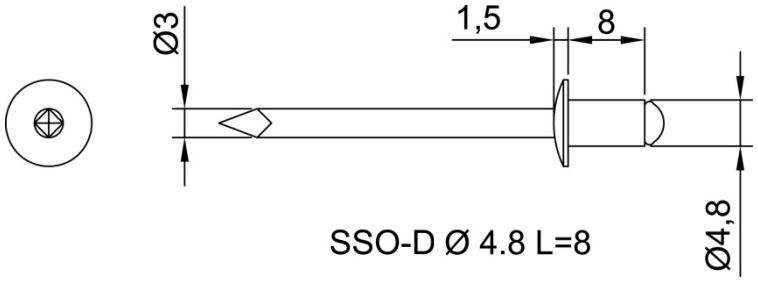
5.5: FIXING BETWEEN BRACKET AND VERTICAL PROFILE – STAINLESS STEEL SCREW



SX3-S16 Ø 6.0 L=29

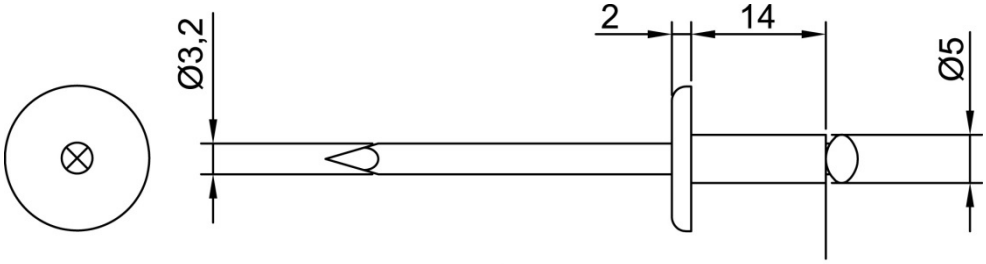
5.6: FIXING BETWEEN BRACKET AND VERTICAL PROFILE– STAINLESS STEEL RIVET

OPTION 1 – For grip range from 4 mm to 6 mm



SSO-D Ø 4.8 L=8

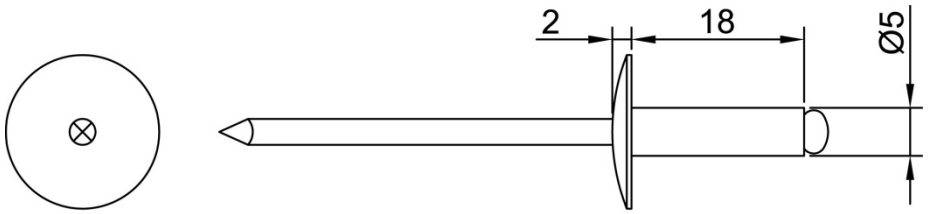
OPTION 2 – For grip range greater than 6 mm



SSO-D15 Ø 5 L=14

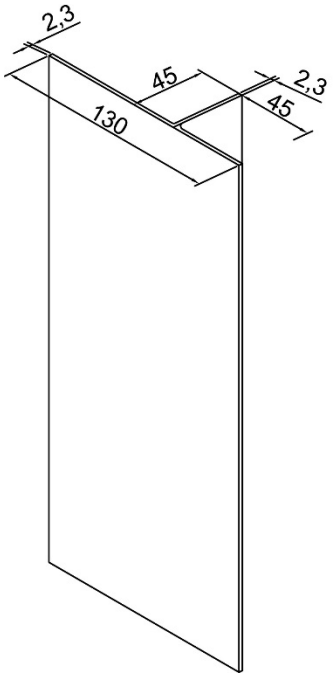
FIGURE 6: ALUMINIUM SUBFRAME

6.1: CLADDING FIXING TO ALUMINIUM SUBFRAME – ALUMINIUM RIVET

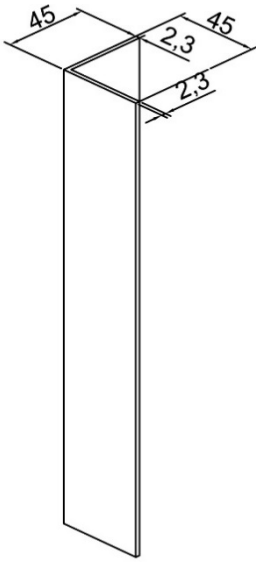


AP 16 Ø 5 L=18

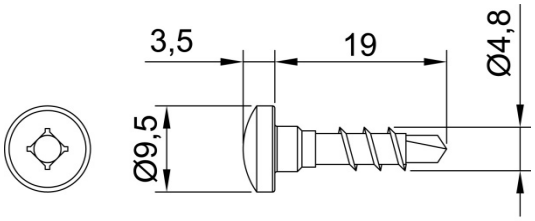
6.2: ALUMINIUM T PROFILE



6.3: ALUMINIUM L PROFILE



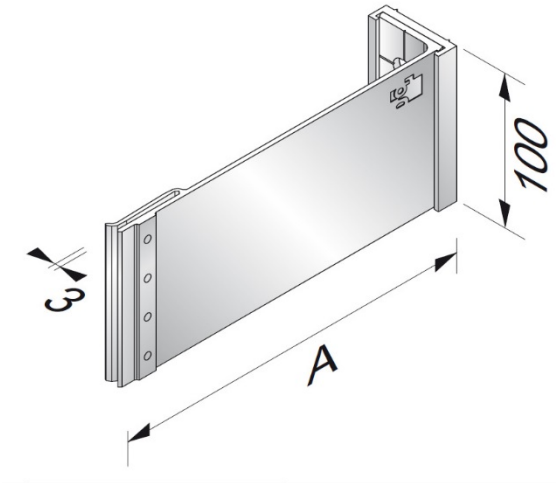
6.4: FIXING BETWEEN BRACKET AND VERTICAL PROFILE – STAINLESS STEEL SCREW



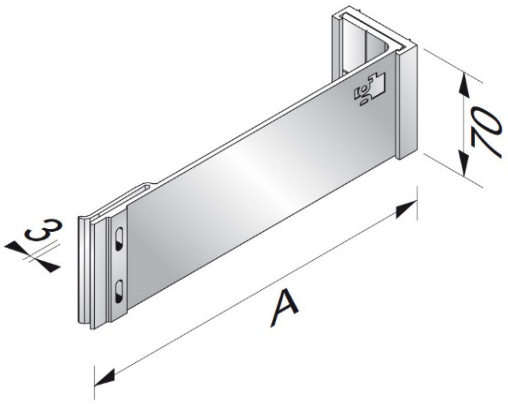
SLA3/6-8-S4-SR2 ø 4.8 L=19

6.5: ALUMINIUM BRACKETS

6.5a: SUPPORTING BRACKET

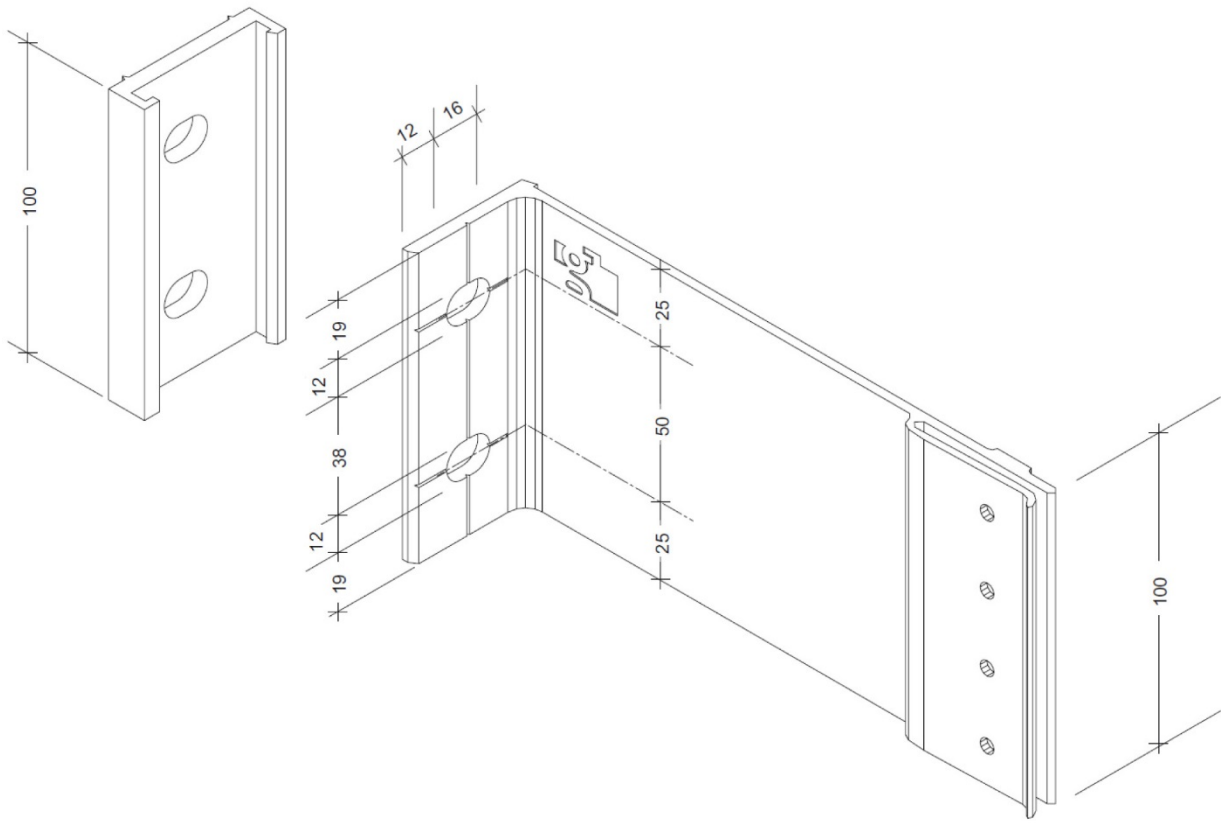


6.5b: RETENTION BRACKET



6.6: ALUMINIUM BRACKETS DETAILS

6.6a: SUPPORTING BRACKETS DETAIL
(FIXED POINT)



6.6b: RETENTION BRACKETS DETAIL
(GLIDING POINT)

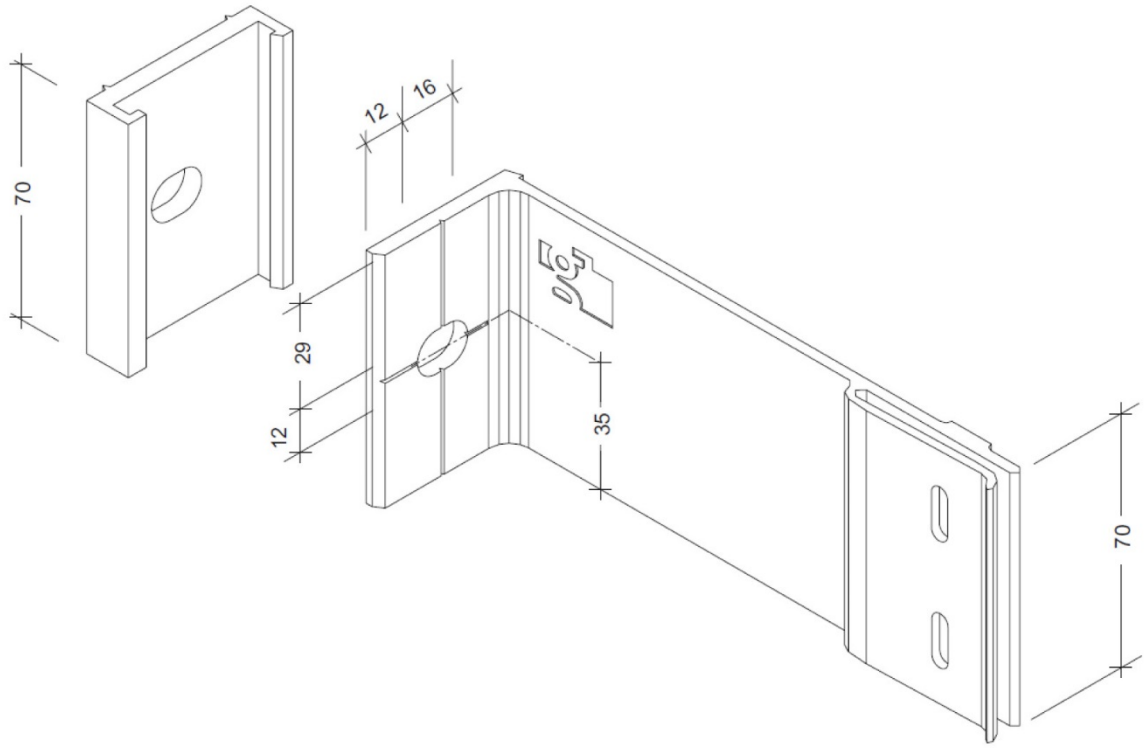
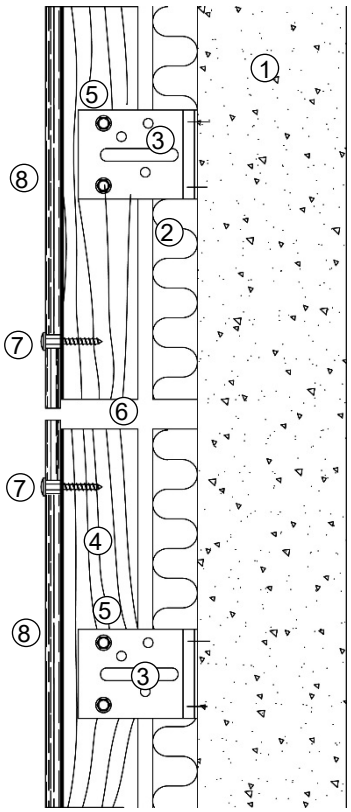


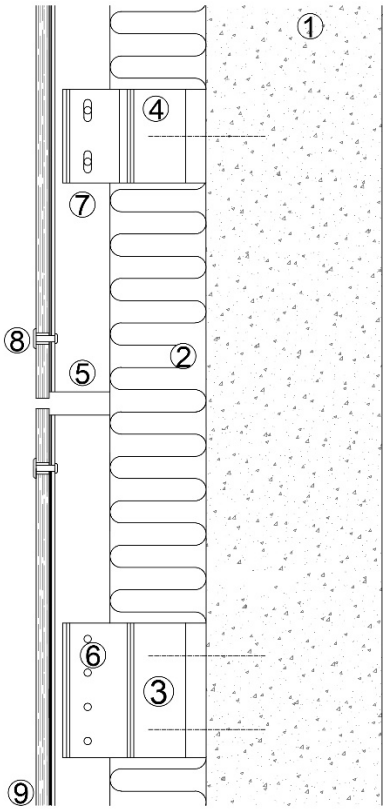
FIGURE 7. VERTICAL SECTION

FIGURE 7.a: TIMBER SUBFRAME



1. Load-bearing structure
2. Thermal insulation
3. Galvanized steel bracket
4. Batten
5. Screw between brackets and batten
6. Ventilation cavity
7. Screw between cladding sheet and batten
8. Fiber-cement cladding sheets

FIGURE 7.b: ALUMINIUM SUBFRAME



1. Load-bearing structure
2. Thermal insulation
3. GFT AVANTI bracket for fixed points
4. GFT AVANTI bracket for gliding points
5. GFT AVANTI T profile with asymmetric wings
6. GFT AVANTI screw
7. Ventilation cavity
8. Rivet between cladding sheet and aluminium profile
9. Fiber-cement cladding sheets

FIGURE 8. HORIZONTAL SECTION

FIGURE 8.a: TIMBER SUBFRAME

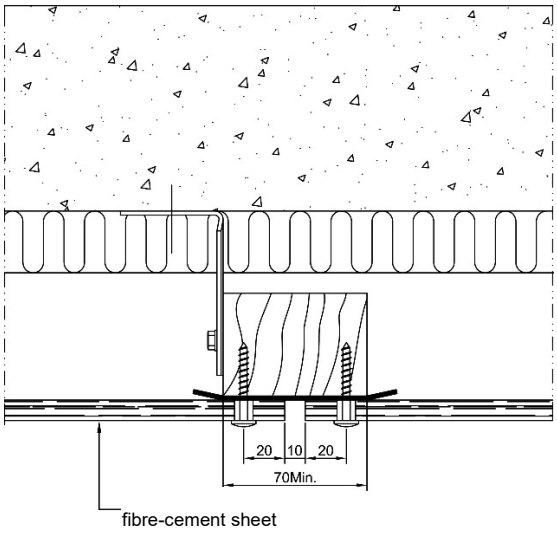


FIGURE 8.b: ALUMINIUM SUBFRAME

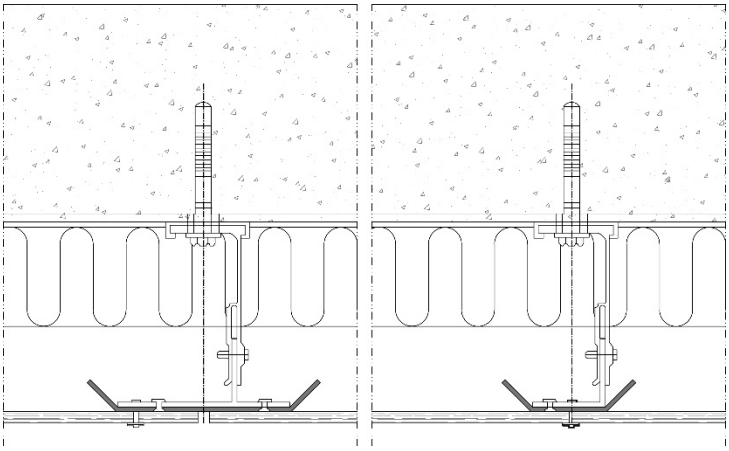


FIGURE 9: DETAIL OF CROWN AND BASE

FIGURE 9.a: TIMBER SUBFRAME

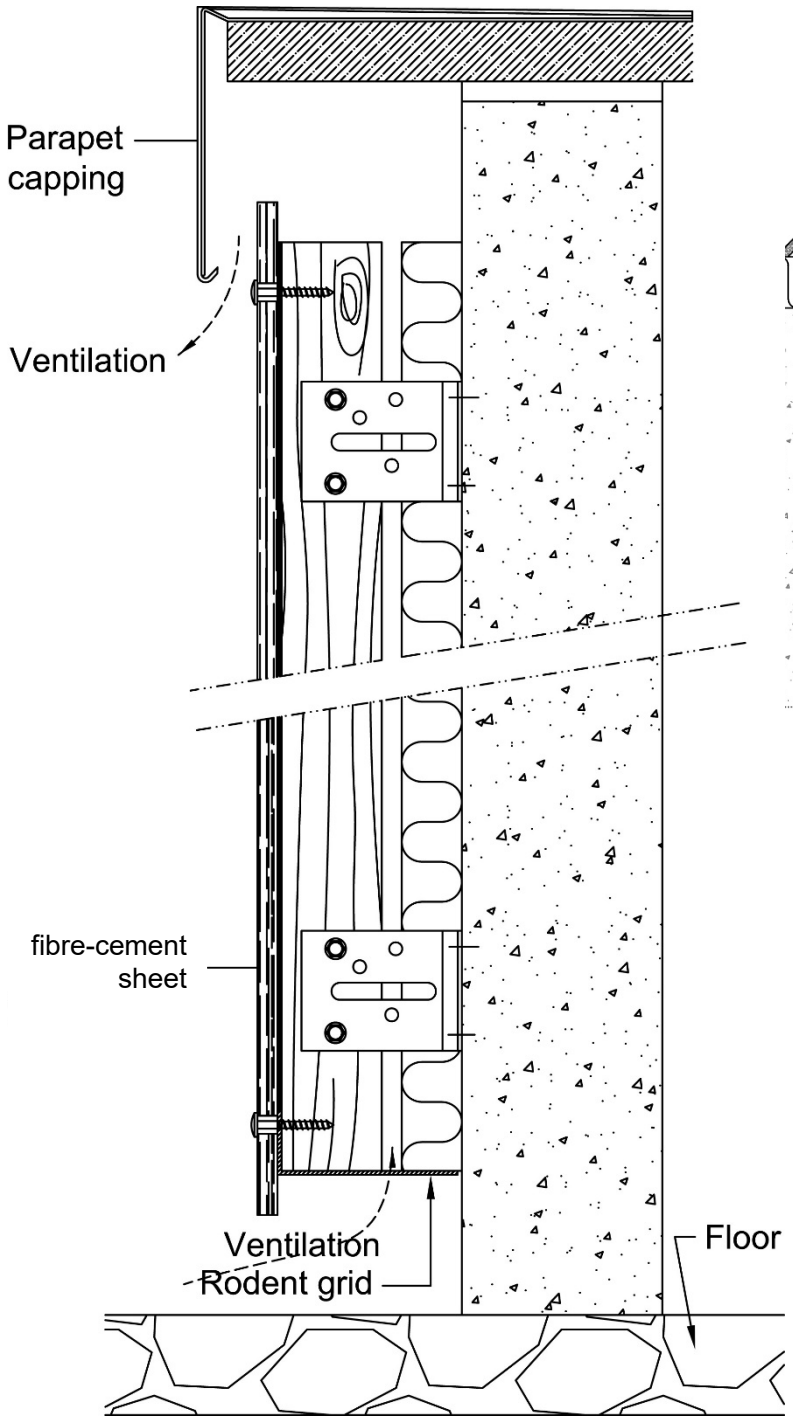


FIGURE 9.b: ALUMINIUM SUBFRAME

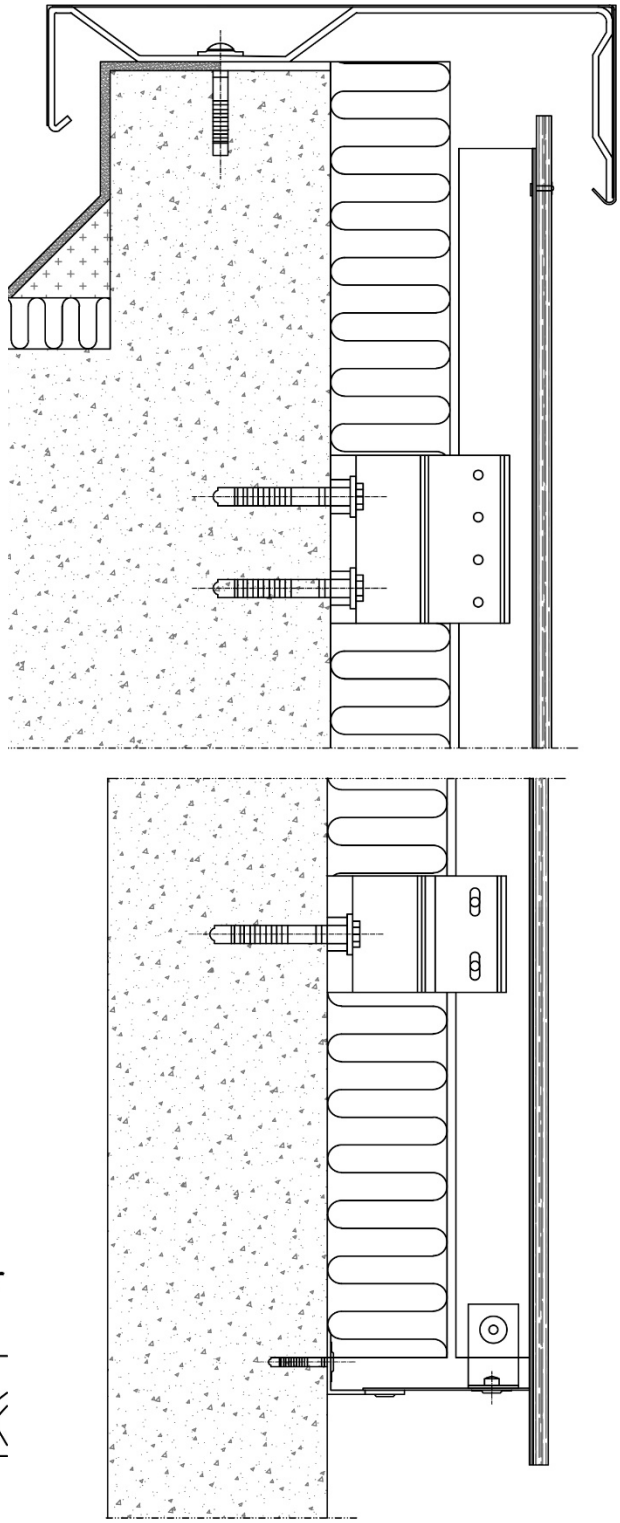


FIGURE 10. EXTERNAL CORNER

FIGURE 10.a: TIMBER SUBFRAME

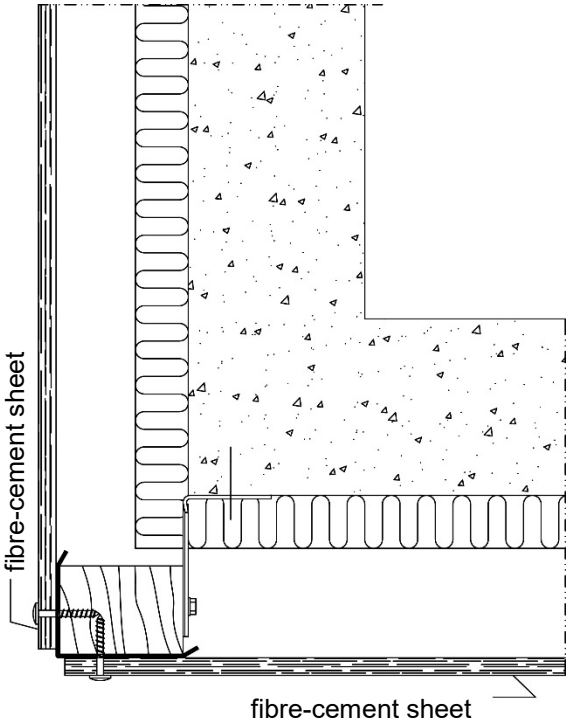


FIGURE 10.b: ALUMINIUM SUBFRAME

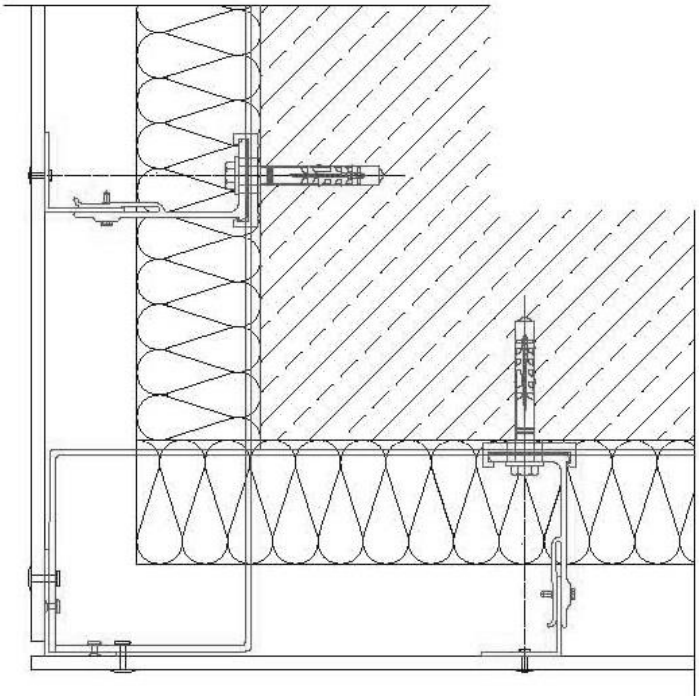


FIGURE11. INTERNAL CORNER

FIGURE 11.a: TIMBER SUBFRAME

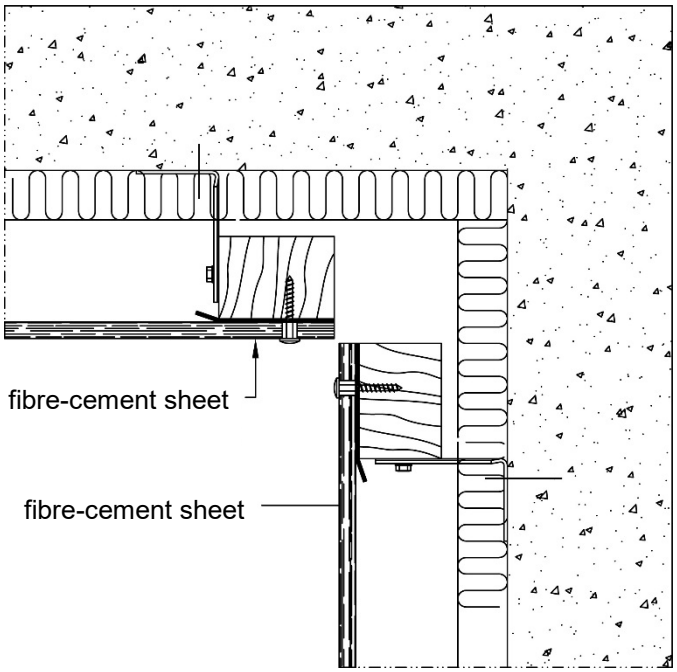


FIGURE 11.b: ALUMINIUM SUBFRAME

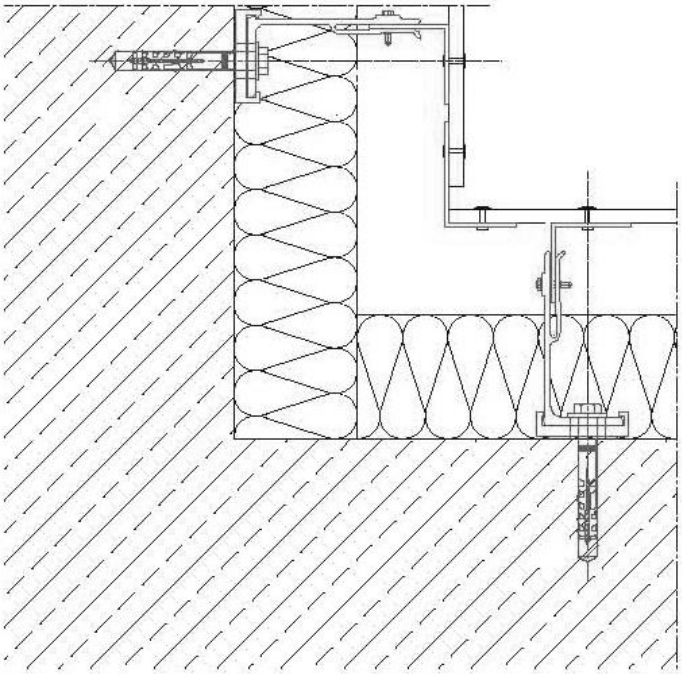


FIGURE12. VENTILATION CAVITY PARTITION

FIGURE 12.a: TIMBER SUBFRAME

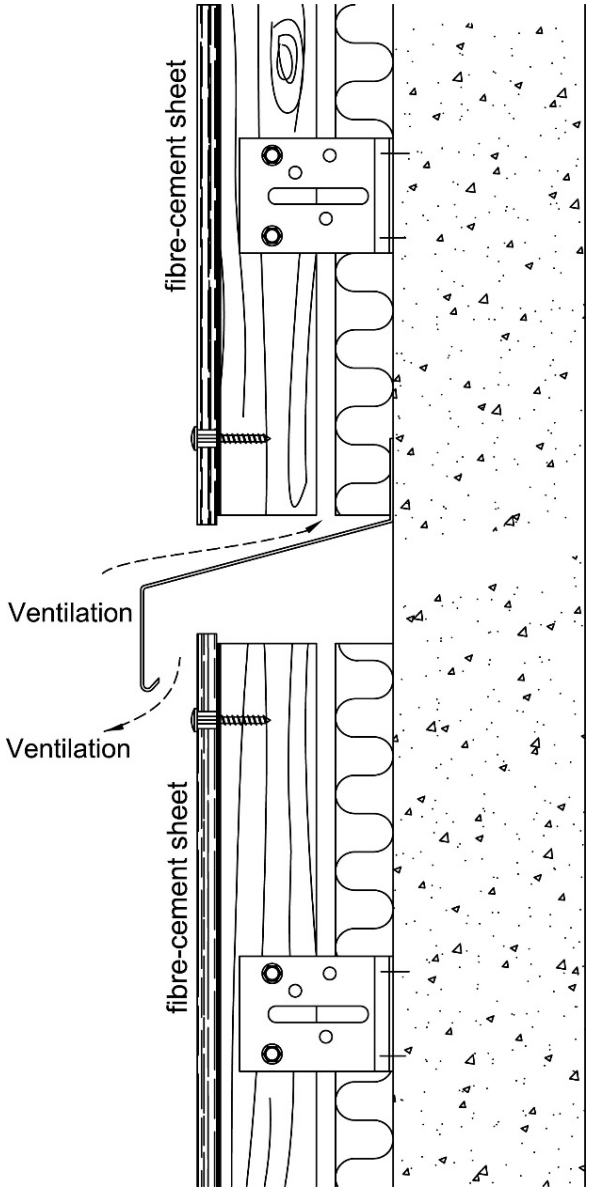
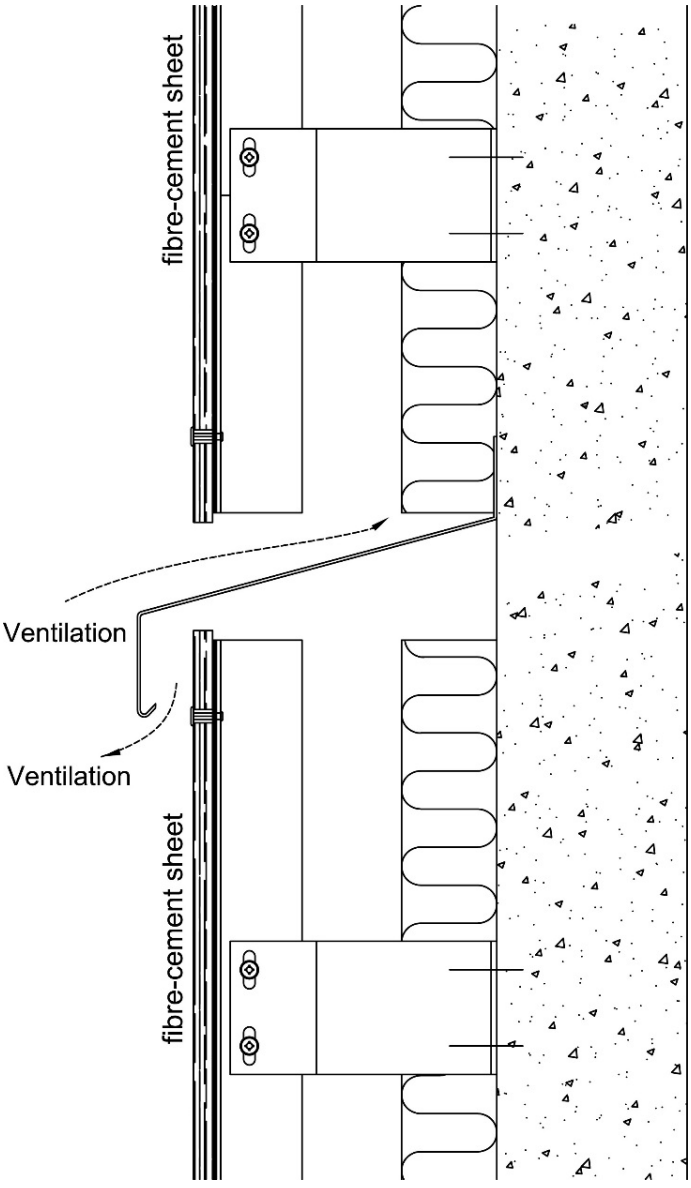


FIGURE 12.b: ALUMINIUM SUBFRAME



Annex A: Cladding element specifications

STANDARD DIMENSIONS[22] AND GEOMETRY[23]		
Characteristics	Nominal value	Tolerance (Level 1. classifications according to EN 12467:2012)
Length	2500 – 3000 - 3050	±2 mm
Width	1200 - 1250	±1 mm
Thickness for smooth sheets	8 – 10 - 12	±0.2 mm
Squareness of edges		2 mm/m
Straightness of edges		0.1 %
Nominal weight (Kg/m^2)		14.4 (8 mm) 18 (10 mm) 21.6 (12 mm)

PHYSICAL PROPERTIES		
Density		1600 ± 50 Kg/m^3
MECHANICAL PROPERTIES		
E modulus of elasticity (dry)	longitudinal	14 GPa
	transversal	12 GPa
E modulus of elasticity (wet)	longitudinal	11 GPa
	transversal	9 GPa
Bending strength (wet) – untreated sheet		≥ 18 MPa
Bending strength (wet) – hydrophobic treated sheet and acrylic coated (treated sheets)		≥ 24 MPa
Bending strength (dry)	longitudinal	32 MPa
	transversal	22 MPa
Compressive strength		40 MPa
Resilience (Charpy test) – According to EN 179-1:2010	longitudinal	4.3 kJ/m^2
	transversal	3.1 kJ/m^2
HYGROMETRICAL PROPERTIES		
Natural humidity		10 ÷ 15 %
Max water absorption*– untreated sheets		22 ± 3 %
Max water absorption* – hydrophobic treated sheets (treated sheets)		9 ± 3 %
Max water absorption* – acrylic coated sheets (treated sheets)		3 ± 2 %
Moisture movement – Relative humidity change from 30% to 90%	longitudinal	0.7 mm/m
	transversal	0.8 mm/m
THERMAL AND WATER VAPOUR PROPERTIES		
Vapour resistance factor. μ – According to EN 12572:2016		49±8
Thermal conductivity – According to EN 12664:2002		0.42 W/mK
Thermal expansion coefficient - According to EN 10545-8:2014	longitudinal	1.71*10^{-6}/ºC
	transversal	0.58*10^{-6}/ºC
OTHER CHARACTERISTICS		
Superior calorific power (untreated sheets)		1-1.1 MJ/kg
Fire rating class – According to EN 13501-1		A2 s1 d0
Durability classification – According to EN 12467:2012		category A
Strength classification – untreated sheets – According to EN 12467:2012		class 4
Strength classification – treated sheets – According to EN 12467:2012		class 5
CE marked product according to EN 12467: 2012		

(22) Available smaller dimensions with the same thickness
(23) Properties according to EN 12467:2012

Annex B: Subframe specifications

Wood requirements

Resistance class	≥ C 18[24]
Durability	Class 3[25]
Processing	Autoclave level 5
Damp control	≤ 18%

Galvanized steel physical and mechanical properties

Type of steel	S235 (profiles)	S220GD (brackets)
Treatment	Z 275 (profiles)	Z350 (brackets)
PHYSICAL PROPERTIES		
Density	7850 g/cm^3	7850 g/cm^3
Coefficient of linear thermal expansion	1.2 x 10^{-5} ºC^{-1}	1.2 x 10^{-5} ºC^{-1}
Poisson coefficient	0.39	0.3
MECHANICAL PROPERTIES		
Tensile strength (R_m)	360-510 MPa	300 MPa
Elastic limit (R_{eH})	235 MPa	220 MPa
Elongation (A_{80mm})	20 mm	20 mm
According to EN 10025-5: 2007[26] and EN 10346:2015[27]		

Aluminium physical and mechanical properties

Symbolic designation	EN AW-Al MgSi
Numeric designation	AW 6060
Treatment	T66
PHYSICAL PROPERTIES	
Density	2.7 kg/dm^3
Coefficient of linear thermal expansion (20º-100ºC)	23.2 x 10^{-6} ºC
Elastic modulus	69 000 N/mm^2
MECHANICAL PROPERTIES	
Tensile strength (R_m)	≥215 N/mm2
Elastic limit ($R_{p0.2}$)	≥160 N/mm^2
Elongation (A)	8 %
Webster hardness	14
Brinell hardness	75
According to EN 755-2: 2016[28] and EN 12020-1: 2008[29]	

(24) EN 338: 2016 Structural timber - Strength classes
(25) EN 335: 2013 Durability of wood and wood-based products. Use classes: definition, application to solid wood and wood-based products
(26) EN 10025-5:2007.Hot rolled products of structural steels - Part 5: Technical delivery conditions for structural steels with improved atmospheric corrosion resistance
(27) EN 10346:2015. Continuously hot-dip coated steel flat products for cold forming - Technical delivery conditions.
(28) EN 755-2: 2016 Aluminium and aluminium alloys. Extruded rod/bar, tube and profiles. Part 2: Mechanical properties.
(29) EN 12020-1: 2008 Aluminium and aluminium alloys. Extruded precision profiles in alloys EN AW-6060 and EN AW-6063. Part 1: technical conditions for inspection and delivery.

TIMBER SUBFRAME ELEMENTS

Stainless steel screw between cladding elements and vertical batten

Designation	TW-S-D12	
Diameter	4.8 mm	
Length	38 mm	44 mm
Material	Stainless steel A2 (1.4567)	
Standard	EN ISO 3506-4:2009[30]	
Tensile breaking load	7100 N	
Shear breaking load	5400 N	

Vertical batten geometrical features

Reference	**AT LOCATION OF JOINT**	**INTERMEDIATE SUPPORT**
Minimum width –W (mm)	2 x ≥ 70	≥ 70
Thickness – T (mm)	≥ 50	≥ 50
E=T/W	0.5 < E < 2	

Galvanized steel brackets geometrical properties

Reference	**50 x 60 x 80**	**50 x 60 x 150**	**50 x 60 x 300**
Thickness (mm)	25/10	25/10	25/10
Material	D220GD + Z350		

Stainless steel screw between brackets and vertical batten

Designation	SW-T-4.8 x 35	SW3-T-H15 – 6.5 x 50
Standard	ETA-10/0198 Fastening screws for metal members and sheeting	
	Annex 57	Annex 59
Diameter	4.8 mm	6.5 mm
Length	35 mm	50 mm
Material	Carbon steel 18B3	

[30] EN ISO 3506-4: 2009 Mechanical properties of corrosion-resistant stainless steel fasteners - Part 4: Tapping screws (ISO 3506-4:2009)

GALVANIZED STEEL SUBFRAME ELEMENTS

Stainless steel screw between cladding elements and vertical profile

Designation	SX3-D12 5.5 x 30	SX3-L12 5.5 x 32
Diameter	5.5 mm	
Length	30 mm	32 mm
Material	Austenitic stainless steel A2 (1.4301)	
Standard	EN ISO 3506-4:2009	
Tensile breaking load	10351 N	
Shear breaking load	8966 N	

Stainless steel rivet between cladding elements and vertical profile

Designation	SSO-D15 5 x 18	SSO-D15 5 x 22
Diameter	5.0 mm	
Length	18 mm	22 mm
Material	Austenitic stainless steel A4 (1.4578)	
Tensile breaking load	≥ 6500 N	
Shear breaking load	≥ 5300 N	

Vertical profiles geometrical features

Reference	**Ω 50x60x50x60x50**	**L 50x60**
Thickness (mm)	15/10	15/10
Material	Bended galvanized steel S235 + Z275	

Galvanized steel brackets geometrical properties

Reference	**50 x 60 x 80**	**50 x 60 x 150**	**50 x 60 x 300**
Thickness (mm)	25/10	25/10	25/10
Material	D220GD + Z350		

Stainless steel screw between bracket and vertical profile

Designation	SX3-S16 6.0 x 29
Diameter	6.0 mm
Length	29 mm
Material	Austenitic stainless steel A2 (1.4301 or 1.4567)
Standard	ETA-10/0198 Fastening screws for metal members and sheeting - Annex 8
Tensile breaking load	11282 N
Shear breaking load	8293 N

Stainless steel rivet between bracket and vertical profile

Designation	SSO-D 4.8 x 8mm	SSO-D15 5 x 14mm
Diameter	4.8 mm	5
Length	10 mm	14 mm
Material	Austenitic stainless steel A4 (1.4578)	
Tensile breaking load	≥ 5000 N	≥ 6500 N
Shear breaking load	≥ 4000 N	≥ 5300 N

ALUMINIUM SUBFRAME ELEMENTS

Aluminium rivet between cladding elements and vertical profile

Designation	AP16 5 x 18 (mandrel A2)	AP16 5 x 21 (mandrel A2)
Diameter	5.0 mm	
Length	18 mm	21 mm
Material		
- **Sleeve**	Aluminium AlMg5	
- **Mandrel**	Stainless steel A2 (1.4541)	
Tensile breaking load	3720 N	
Shear breaking load	2414 N	

Vertical profiles geometrical and mechanical features

Reference	T 130 x 45 x 2.3	L 45 x 45 x 2.3
Thickness (mm)	2.3	2.3
Section (mm^2)	3.99	2.02
$\mathbf{I_x}$ (cm^4)	5.25	4.05
$\mathbf{W_x}$ (cm^3)	1.37	1.23
$\mathbf{I_y}$ (cm^4)	44.77	4.05
$\mathbf{W_y}$ (cm^3)	6.42	1.23

Stainless steel screw between bracket and vertical profile

Designation	SLA3/6-8-S4-SR2
Diameter	4.8 mm
Length	19 mm
Material	Austenitic stainless steel A4 (1.4401)
Standard	EN ISO 3506-4:2009
Tensile breaking load	7 850 N
Shear breaking load	5 235 N

Brackets geometrical and mechanical features

Reference	**Supporting brackets**			**Retention brackets**		
	100x45.3x80	**100x45.3x140**	**100x45.3x260**	**70x45.3x80**	**70x45.3x140**	**70x45.3x260**
Thickness (mm)	2.5	3.5	4	2.5	3.5	4
Section (cm^2)	4.94	8.02	13.50	4.94	8.02	13.50
$\mathbf{x_c}$ (mm)	9.4	6.9	5	9.4	6.9	5
$\mathbf{Ix_c}$ (cm^4)	36.50	186.92	1016.32	36.50	186.92	1016.32
$\mathbf{y_c}$ (mm)	49.5	76.2	134.6	49.5	76.2	134.6
$\mathbf{Iy_c}$ (cm^4)	6.91	7.90	8.72	6.91	7.90	8.72

Annex C: Auxiliary components

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 anchorages according to the substrate material and the resistance required due to the envisaged actions. When it is possible, CE marking according to the EAD 330232-00-0601, 330499-00-0601, 330747-00-0601, 330076-00-0604, etc. is recommended.

Annex D: Confidential information

Quality control of components of kits manufactured by suppliers or ETA holder.

This information is confidential and it is not included in the European Technical Assessment when that assessment is publicly available.