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

EOTA
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European Technical Assessment

ETA 24/1138
of 23/12/2024

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	StoVentec FibreCement
Product family to which the construction product belongs	Kit for external wall claddings mechanically fixed
Manufacturer	Sto SE & Co. KGaA Ehrenbachstr. 1, D-79780 Stühlingen Germany (Weizen) Germany website: www.sto.com
Manufacturing plant(s)	Sto SE & Co. KGaA Ehrenbachstr. 1, D-79780 Stühlingen Germany (Weizen) Germany
This European Technical Assessment contains	42 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 090062-01-0404. Ed. October 2021. Kits for external wall claddings mechanically fixed.

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SPECIFIC PART

1. Technical description of the product

The assessed kits[1] for ventilated external wall claddings mechanically fixed in ventilated façades StoVentec FibreCement are classified as family A, according to the EAD 090062-01-0404: *Kit for external wall claddings mechanically fixed*, edition October 2021 (hereinafter EAD).
The kit components are defined in tables 1.1 to 1.3; they are factory produced by the ETA holder or suppliers.

TABLE 1.1 – DEFINITION OF THE KIT COMPONENTS – Type A

Generic components		**StoVentec FibreCement aluminium subframe** (Family A)						**Technical description in**
Cladding elements		StoFibreCement Pure, Pure UV, Pure GX, Coat, CoatGX, Print 8 / 10 / 12mm						Annex A
Cladding fixings Elements used to secure the cladding plates to the subframe	Fixings[2]	Rivet	Self-drilling screw					Annex B
		Aluminium AlMg5 / Stainless steel A2	Stainless steel A2			Stainless steel A4		
		StoVentro Rivet 210 Head Diam.=16 l=18 (8) and l=21 (10-12)	EJOT JT3 -LT-3-5.5 KD16 l=30 (8-10-12)	EJOT JT4 -LT-3-5.5 KD16 l=25 (8-10-12)	EJOT JT3 -LT-3-5.5 KD16 l=32/8 (8)	EJOT JT4 -LT-3-5.5 KD16 l=28/8 (8)	SFS SDA4-D15-CS10 D15-5.8 l=29 (8) l=33 (10) l=38 (12)	SFS SX4-D15-CS10 D15-5.8 l=29 (8) l=33 (10) l=38 (12)
	Fixed/ Sliding point sleeve	Aluminium	Polyamid		Polyamid		Stainless steel A2	
		StoVentro Sleeve FP 001[3]	EJOT Zentrierhülse F/ Zentrierhülse S[4]		EJOT Fixing point (FP) / Sliding point (SP)[5]		SFS FP-S-10,0x6-6,0/ SFS GP-S-10,0x6-6,0[6]	
Subframe Intermediate assembly used as load transmission between Cladding elements and the substrate	Vertical profiles[7]	Extruded aluminium						
		T/L profile th. 2.3 mm	Sto-Aluminium T/L profile th.2.7 mm / 2.0 mm (smooth) / Sto-Aluminium T profile 2.3 mm					
	Brackets[8]	Extruded aluminium Supp: 100x45.3x 80/140/260 Ret: 70x45.3x 80/140/260	Extruded Aluminium: Sto Ventro Bracket L200 FP (th.3.2 - 4.2) and GP (th.3.2 - 4.2) Stainless Steel: Sto Ventro Bracket L100 FP (th.2) and GP (th.2) and Sto Ventro Bracket L150 FP (th.2) and GP (th.2) Galvanized Steel: Sto Ventro Bracket L300 FP (th.2) and GP (th.2) and Sto Ventro Bracket L350 FP (th.2) and GP (th.2) (FP=fixing point – supporting br.; GP=gliding point – retention br.)					
	Screws Brackets to Vertical profile	Self-drilling screw A4 Stainl. steel	Self-drilling screw A2 and A4 Stainless steel					
		SFS SLA3/6-7-S4-SR2 4.8 l=19	Sto-Façade Self-drilling screw 5,5x19mm with overtwist lock (clamping range for components combinations 3.1-5.0mm) StoVentro Screw108 (clamping range for components combinations 3.8 -8.0mm)					
Auxiliary components	Anchorage to substrate	Not assessed, anchorages have to be defined according to the substrate material and the resistance requires due to the envisages actions						Annex C

1 "Kit" means a construction product placed on the market by a single manufacturer as set of at least two separate components that need to be put together to be incorporated in the construction work (Art. 2 n.º 2 CPR n.º 305/2011)
2 The correct cladding element thickness for each fixing is indicated in parentheses.
3 Geom. and mechanical features in Annnex B. Pre-drilling holes 9.5 ≤ diam. ≤ 11 mm require fitting outer/inner diameter.
4 Requires a pre-drilling hole of 11 mm. Alternatively, StoVentro Sleeve FP 001 with the fitting outer/inner diameter.
5 Requires a pre-drilling hole of 11 mm. Alternatively, StoVentro Sleeve FP 001 with the fitting outer/inner diameter.
6 Requires a pre-drilling hole of 10 mm. Alternatively, StoVentro Sleeve FP 001 with the fitting outer/inner diameter
7 See figure 5.2.
8 See figure 5.3.

TABLE 1.2 – DEFINITION OF THE KIT COMPONENTS – Type B				
Generic components		**StoVentec FibreCement timber subframe** (Family A)		**Technical description in**
Cladding elements		StoFibreCement Pure, Pure UV, Pure GX, Coat, CoatGX, Print 8 / 10 / 12mm		Annex A
Cladding fixings Elements used to secure the cladding plates to the subframe	Fixings[9]	Self-drilling screw		Annex B
		Stainless steel A2		
		StoVentro Screw 270 Head diam.=12 and 16 l=18 (8) and l=21 (10-12)	EJOT JT4 LT-2/6 KD16 l=50 (8-10-12)	
	Fixed/ Sliding point sleeve	Aluminium	Polyamid	
		StoVentro Sleeve FP 001[10]	EJOT Zentrierhülse F/ Zentrierhülse S[11]	
Subframe Intermediate assembly used as load transmission between Cladding elements and the substrate	Vert. elements	Wooden batten		
	Brackets[12]	Galvanized steel 50x60x80/150/300 th. 2.5mm Extruded Aluminium Sto Ventro Bracket L200 FP (th.3.2 - 4.2) and GP (th.3.2 - 4.2) Stainless Steel Sto Ventro Bracket L100 FP (th.2) and GP (th.2) Galvanized Steel Sto Ventro Bracket L300 FP (th.2) and GP (th.2)		
	Screws Brackets to Vertical batten	Self-drilling screws SFS SW-T ø4.8 l=35 SW-T-H15-ø6,5 l=50		
Auxiliary components	Anchorage to substrate	Not assessed, anchorages have to be defined according to the substrate material and the resistance requires due to the envisages actions		Annex C

TABLE 1.3 – DEFINITION OF THE KIT COMPONENTS – Type C							
Generic components		**StoVentec FibreCement galvanized steel subframe** (Family A)					**Technical description in**
Cladding elements		StoFibreCement Pure, Pure UV, Pure GX, Coat, CoatGX, Print 8 / 10 / 12mm					Annex A
Cladding fixings Elements used to secure the cladding plates to the subframe	Fixings[13]	Rivet	Self-drilling screw				Annex B
		Stainless steel A4	Stainless steel A2		Stainless steel A4		
		StoVentro Rivet 240 Head diam.=15 l=18 (8) and l=22 (10-12)	EJOT JT3 -LT-3-5.5 KD16 l=30 (8-10-12)	EJOT JT3 -LT-3-5.5 KD16 l=32/8 (8)	SFS SX3 D12-5.5 l=30 (8) l=32 (10-12)	SFS SX4-D15-CS10 D15-5.8 l=29 (8) l=33 (10) l=38 (12)	
	Fixed/ Sliding point sleeve	Aluminium	Polyamid	Polyamid	Aluminium	Stainless steel A2	
		StoVentro Sleeve FP 001[14]	EJOT Zentrierhülse F/ Zentrierhülse S[15]	EJOT Fixing point (FP)/ Sliding point (SP)[16]	StoVentro Sleeve FP 001[17]	SFS FP-S-10,0x6-6,0/ SFS GP-S-10,0x6-6,0[18]	
Subframe Intermediate assembly used as load transmission between Cladding elements and the substrate	Vert. profiles[19]	Galvanized steel Ω profile th.1.5 mm					
	Brackets[20]	Galvanized steel 50x60x80/150/300th. 2.5mm Galvanized steel StoVentro Bracket L300 FP (th.2) and GP (th.2) StoVentro Bracket L350 FP (th.2) and GP (th.2)					
	Screws Brackets to Vertical profile	Rivet A4 Stainless steel Self-drilling screw A2/A4 Stainless steel			SFS SSO-D15 l=14 SFS SSO-D 4,8x8mm SFS SX3-S16 l=29 (6 x 29mm) SX5/12-S16 5,5x31mm		
Auxiliary components	Anchorage to substrate	Not assessed, anchorages have to be defined according to the substrate material and the resistance requires due to the envisages actions					Annex C

9 The correct cladding element thickness for each fixing is indicated in parentheses.
10 Geom. and mechanical features in Annex B. Pre-drilling holes 9.5 ≤ diam. ≤ 11 mm require fitting outer/inner diameter.
11 Requires a pre-drilling hole of 11 mm. Alternatively, StoVentro Sleeve FP 001 with the fitting outer/inner diameter.
12 See figure 6.3.
13 The correct cladding element thickness for each fixing is indicated in parentheses.
14 Geom. and mechanical features in Annex B. Pre-drilling holes 9.5 ≤ diam. ≤ 11 mm require fitting outer/inner diameter.
15 Requires a pre-drilling hole of 11 mm. Alternatively, StoVentro Sleeve FP 001 with the fitting outer/inner diameter.
16 Requires a pre-drilling hole of 11 mm. Alternatively, StoVentro Sleeve FP 001 with the fitting outer/inner diameter.
17 With the fitting outer/inner diameter.
18 Requires a pre-drilling hole of 10 mm. Alternatively, StoVentro Sleeve FP 001 with the fitting outer/inner diameter.
19 Geometric and mechanical features in Annex B and figure 7.2.
20 Geometric and mechanical features in Annex B and figure 5.3.

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

2.1 Intended use

StoVentec FibreCement kits are intended to be used for ventilated external wall claddings which can be fixed to the external wall of new or existing buildings. An insulation layer is usually fixed on the substrate.
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 STO SE & Co. KGaA.
The 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 Approval 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 the kit

The design of the external wall cladding system for ventilated façade using the StoVentec FibreCement 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) and the cladding or external wall elements 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 [21].
- 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 the 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.

[21] 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.

2.5 Use, maintenance and repair of the works

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

- Regarding the tiles: 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 StoVentec FibreCement kits for fastening cladding and external wall elements according to the Basic Work Requirements (BWR) was carried out in compliance with the EAD 090062-01-0404. The characteristics of the components shall correspond to the respective values laid down in the technical documentation of this ETA, checked by IETcc.
In table 3.1 a summary of StoVentec FibreCement kits performance.

TABLE 3.1 – SUMMARY OF StoVentec FibreCement 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 (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 figures 8.1 to 8.5.		
	8	Content and/or release of dangerous substances		--	Not assessed		
BWR 4 Safety and accessibility in use	9	Wind load resistance		3.4	See § 3.4		
	10	Resistance to horizontal point loads		3.5	Not assessed		
	11	Impact resistance		3.6	Category III		
	12	Mechanical resistance	Bending strength of cladding element	--	See annex A: Cladding element specifications		
			Pull-through resistance between the cladding element and the cladding fixing	3.7.1	See tables 3.7.1.1 to 3.7.1.5		
			Pull-through resistance under shear loads	3.7.2	See table 3.7.2.1		
			Resistance of profiles	3.7.3	See § 3.7.3		
			Bracket mechanical resistance (horizontal and vertical load)	3.7.4	See tables 3.7.4.1 and 3.7.4.2		
	13	Resistance to seismic loads.		--	Not assessed		
BWR 5 Protection against noise	14	Airborne sound insulation		--	Not assessed		
BWR 6 Energy economy and heat retention	15	Thermal resistance		--	Thermal insulation is not a kit component		
Durability	16.1	Hygrothermal behaviour		3.8.1	See § 3.8.1		
	16.2	Behaviour after pulsating load		--	Not assessed		
	33	Freeze-thaw resistance of cladding element		--	Not assessed		
	34	Behaviour after immersion in water of clad. el.		--	Not assessed		
	35	Dimensional stability		3.8.2	See § 3.8.2		
	36	Chemical and biological resistance of clad. el.		--	Not assessed		
	37	UV radiation resistance of the cladding elements		3.8.3	Coat GX	1500h	3/4
					Coat	1500h	3/4
					Pure UV	1500h	4/5
					Print	1500h	4/5
	38	Corrosion of metal components		3.8.4	See § 3.8.4		

3.1 Reaction to fire– BWR 2

Euro class A2-s1, d0 according to standard EN 13501-1: 2007 + A1:2010[22].

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 StoVentec FibreCement kits are not watertight.

3.3 Drainability – BWR 3

On the basis of the construction details (see figures 8.1 to 8.5), 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 – BWR 4

Wind load resistance has been assessed for each type of kit (see tables 1.1 to 1.3) with the weakest mechanically configuration (worst case) according to the resistance values of the main components and main connexions given in clauses 3.7). Table 3.4.1 indicates the maximum wind load resistance, Q, in [kN/m^2] for each type of kit

TABLE 3.4.1: MAXIMUM WIND LOAD RESISTANCE

TYPE OF KIT	CONFIGURATION	MAXIMUM WIND LOAD RESISTANCE Q [kN/m^2]
StoVentec FibreCement Type A, B and C	Any configuration with Distance between brackets H≤ 650 and V≤ 800 H distance between vertical profiles/battens ≤ 650 Cladding elements StoFibreCement L≤2390 H≤1250 th≥8mm, Predrilled holes =9.5/11mm (15 cladding fixings) H/V distance between cladding fixings ≤ 600mm Cladding fixings Head Diameter≥ 15mm Cladding fixings Head Diameter= 12mm needs Predrilled holes = 9.5 mm	2
StoVentec FibreCement Type A, B and C	Any configuration with Distance between brackets H≤ 600 and V≤ 1000 H distance between vertical profiles/battens ≤ 550 Cladding elements StoFibreCement L≤1190 H≤1250 th≥8mm, Predrilled holes =9.5mm (9 cladding fixings) H/V distance between cladding fixings ≤ 600mm Cladding fixings Head Diameter≥ 12mm	2.4

Besides, wind load resistance has been tested, according to § 2.2.9 and the method specified in Annex E of EAD, for different cases depending on the type of kit considered. 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 cases have been tested: minimum thickness, maximum width and maximum separation between cladding fixings and subframe components. Test results are given in table 3.4.2. 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 given in table 3.4.1.

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

TABLE 3.4.2: WIND SUCTION TEST RESULT			
TEST SPECIMEN[23]	**MAXIMUM LOAD Q (Pa)**	**DISPLACEMENT UNDER MAXIMUM LOAD [DEFLECTION AFTER 1 MIN RECOVERY] (mm)**	**TYPE OF FAILURE**
a. StoVentec FibreCement aluminium subframe – 1	**(T1)** 2600 **(T2)** 2000 **(T3)** 2000	14.85 (2.4) 10.90 (2.0) 13.70 (3.2)	Longitudinal crack in horizontal central fixing line
b. StoVentec FibreCement aluminium subframe – 2	3400	18.99 (2.5)	Breakage of panel
c. StoVentec FibreCement timber subframe – 3	3600[24]	15.13 (1.3)	None
d. StoVentec FibreCement galvanized steel subframe – 4	2000	9.47 (2.1)	Longitudinal crack in horizontal central fixing line
e. StoVentec FibreCement galvanized steel subframe – 5	3600	13.76 (1.78)	Breakage of panel
a. Aluminium subframe 1 – Cladding elements StoFibreCement L=2390 H=1250 th=8mm, Predrilled holes =11mm (15 cladding fixings), maximum distance between cladding fixings and vertical profiles 600mm, vertical distance between brackets 800mm, cladding fixing (T1) StoVentro Rivet 210 Head Diameter=16mm, (T2) SFS SDA4-D15-CS10 Screw Head Diameter=15mm, (T3) EJOT JT4-LT-3-5.5x28/8 Screw Head Diameter= 16mm			
b. Aluminium subframe 2 – Cladding elements StoFibreCement L= 1250 H=1190 th=8mm, Predrilled holes =9.5mm (9 cladding fixings), distance between cladding fixings 500/600mm, distance between vertical profiles 550mm, vertical distance between brackets 1000mm, cladding fixing StoVentro Rivet 210 Head Diameter=16mm			
c. Timber subframe 3 – Cladding elements StoFibreCement L= 1250 H=1190 th=8mm, Predrilled holes =9.5mm (9 cladding fixings), distance between cladding fixings 500/600mm, distance between vertical profiles 500mm, vertical distance between brackets 1000mm, cladding fixings StoVentro Screw 270 Head Diameter=12mm			
d. Galvanized steel subframe 4 – Cladding elements StoFibreCement L=2390 H=1250 th=8mm, Predrilled holes =11mm (15 cladding fixings), maximum distance between cladding fixings and vertical profiles 600mm, vertical distance between brackets 800mm, cladding fixings SFS SX4-D15-CS10 Screw Head Diameter=15mm			
e. Galvanized steel subframe 5 – Cladding elements StoFibreCement L= 1250 H=1190 th=8mm, Predrilled holes =9.5mm (9 cladding fixings), distance between cladding fixings 500/600mm, distance between vertical profiles 500mm, vertical distance between brackets 1000mm, cladding fixings StoVentro Screw 240 Head Diameter=15mm			

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 degree of exposure according to use category [25] defined in table G.3.1 (clause G.3, Annex G of EAD) of StoVentec FibreCement kits for vertical exterior wall claddings is the Category III.

3.7 Mechanical resistance – BWR 4

3.7.1 Pull-through resistance between the cladding element and the cladding fixing

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.

23 Characteristics of component are indicated in Annex A and B.
24 The test had to be stopped at 3800Pa because the equipment did not achieve stabilization. No failure occurs.
25 The definition of use categories is given in table G.3.1, Annex G of EAD. These categories correspond to the degrees of exposure in use.

Table G.3.1 – Impact use categories	
Category	Use
I	A zone readily exposed to impacts but not subject to abnormally rough use (e.g., **ground level** or **façade base** accessible to the public, such as squares, parking, schoolyards, parks, etc.). For instance, cleaning gondolas may be used on the façade.
II-a	A zone liable to impacts from thrown or kicked objects but not subject to abnormally rough use, where the height of the kit will limit the size of the impact (e.g., at **upper façade levels** that occasionally can be hit by a thrown object); or at lower levels (e.g., **ground level or façade base**) where access to the façade is primarily to those with some incentive to exercise care. For instance, cleaning gondolas may be used on the façade.
II-b	A zone liable to impacts from thrown or kicked objects but not subject to abnormally rough use, either where the height of the kit will limit the size of the impact (e.g., at **upper façade levels** that occasionally can be hit by a thrown object); or at lower levels (e.g**., ground level or façade base**) where the area surroundings the kit will limit the size of the impact or access to the façade is controlled and under surveillance). For instance, cleaning gondolas may be used on the façade.
III	A zone not likely to be damaged by normal impacts caused by people or by thrown or kicked objects, either where the height of the kit will limit the size of the impact (e.g., **high façade levels** in buildings - not including the subsequent above ground level or façade base). For instance, cleaning gondolas shall not be used on the façade.
IV	A zone out of reach from ground level in which the risk to be hit by a thrown object is very low because the height of the kit will limit the size of the impact (e.g., **high façade levels** in buildings (not including the subsequent above ground level or façade base). For instance, cleaning gondolas shall not be used on the façade.

Mean and characteristic values of test are indicated in tables 3.7.1.1 to 3.7.1.5.

TABLE 3.7.1.1 - PULL-THROUGH RESISTANCE (StoVentro Rivet 210– Head Diameter=16mm – Aluminium Subframe)

PANEL THICKNESS (mm)	SUPPORT Ø (mm)	FIXING POSITION	F_u FAILURE LOAD (N)		FAILURE MODE
			$F_{u,m}$	$F_{u,C}$	
8	50	Centre	4325	4050	Pull-through
		Border	3416	3090	
		Corner	3246	2796	
	600	Centre	688	648	Superficial Crack
		Border	284	249	
		Corner	270	184	Breakage
12	50	Centre	7967	7514	Pull-through
		Border	6664	5924	
		Corner	6053	5415	
	600	Centre	1930	1814	Superficial Crack
		Border	927	839	
		Corner	686	581	Breakage

TABLE 3.7.1.2 - PULL-THROUGH RESISTANCE (SFS SX4-D15-CS10 Screw – Head Diameter= 15mm – Aluminium Subframe)

PANEL THICKNESS (mm)	SUPPORT Ø (mm)	FIXING POSITION	F_u FAILURE LOAD (N)		FAILURE MODE
			$F_{u,m}$	$F_{u,C}$	
8	50	Centre	4208	3656	Pull-through
		Border	3211	2790	
		Corner	3065	2560	
	600	Centre	698	661	Superficial Crack
		Border	304	277	
		Corner	274	253	Breakage
12	50	Centre	7845	6986	Pull-through
		Border	6558	5531	
		Corner	6676	4864	
	600	Centre	1879	1540	Superficial Crack
		Border	874	796	
		Corner	662	563	Breakage

TABLE 3.7.1.3 - PULL-THROUGH RESISTANCE (EJOT JT4-LT-3-5.5 Screw – Head Diameter= 16mm – Aluminium Subframe)

PANEL THICKNESS (mm)	SUPPORT Ø (mm)	FIXING POSITION	F_u FAILURE LOAD (N)		FAILURE MODE
			$F_{u,m}$	$F_{u,C}$	
8	50	Centre	4164.24	3725.35	Pull-through
		Border	3552	3252	
		Corner	3257	2888	
	600	Centre	715	663	Superficial Crack
		Corner	258	202	Breakage
12	50	Centre	8410	7636	Pull-through
		Border	7173	6083	
		Corner	6891	6169	
	600	Centre	1868	1723	Superficial Crack
		Corner	706	628	Breakage

TABLE 3.7.1.4 - PULL-THROUGH RESISTANCE (StoVentro Screw 270 – Head Diameter= 12mm – Timber Subframe)					
PANEL THICKNESS (mm)	SUPPORT Ø (mm)	FIXING POSITION	F_u FAILURE LOAD (N)		FAILURE MODE
			$F_{u,m}$	$F_{u,C}$	
8	50	Centre	3736	2892	Pull-through
		Border	3185	2600	
		Corner	3000	2684	
	600	Centre	677	611	Superficial Crack
		Border	320	276	
		Corner	280	233	Breakage
12	50	Centre	6316	5423	Pull-through
		Border	5351	4159	
		Corner	5404	4012	
	600	Centre	1842	1768	Superficial Crack
		Border	878	744	
		Corner	684	544	Breakage

TABLE 3.7.1.5 - PULL-THROUGH RESISTANCE (StoVentro Rivet 240 – Head Diameter =15mm – Galvanized steel subframe)					
PANEL THICKNESS (mm)	SUPPORT Ø (mm)	FIXING POSITION	F_u FAILURE LOAD (N)		FAILURE MODE
			$F_{u,m}$	$F_{u,C}$	
8	50	Centre	4212	3517	Pull-through
		Border	3448	3164	
		Corner	3292	2886	
	600	Centre	676	649	Superficial Crack
		Corner	272	209	Breakage
12	50	Centre	8434	7876	Pull-through
		Border	7016	5900	
		Corner	6518	5645	
	600	Centre	1914	1596	Superficial Crack
		Corner	640	543	Breakage

3.7.2 Pull-through resistance under shear loads

Pull-through resistance under shear loads has been assessed according to § 2.2.12.6 and the method specified in section I.2 of Annex I of EAD.

Mean and characteristic values of test are indicated in table 3.7.2.1.

TABLE 3.7.2.1 - PULL-THROUGH RESISTANCE UNDER SHEAR LOAD				
SHEET THICKNESS (mm)		FAILURE LOAD (N)		FAILURE MODE
		$F_{u,m}$	$F_{u,C}$	
StoVentec FibreCement timber subframe	8	1928.4	1400	Breakage
	12	2051.6	826.4	Breakage
StoVentec FibreCement aluminium subframe	8	2423.6	2175.7	Breakage
	12	2930.6	2804.5	Breakage

3.7.3 Mechanical resistance of profiles

Resistance of kit profiles has been assessed according to section 2.2.12.14 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.

3.7.4 Bracket mechanical resistance (horizontal and vertical load)

Brackets load bearing capacity and deformation under loading (horizontal and vertical load) have been assessed according to § 2.2.12.17 and the method specified in Annex L of EAD.

Mean and characteristic values of bracket resistance to horizontal load test are indicated in table 3.7.4.1, these values correspond to the resistance to horizontal load of 1 bracket.

TABLE 3.7.4.1: RESISTANCE TO HORIZONTAL LOAD OF A BRACKET

BRACKETS DIMENSIONS (mm)			F_1(N) ΔL=1mm Residual distortion		F_u(N) Significant permanent distortion (≥1.5 mm)	
			$F_{1,m}$ Mean value	$F_{1,C}$ Characteristic value	$F_{u,m}$ Mean value	$F_{u,C}$ Characteristic value
EXTRUDED ALUMINIUM	RETENTION BRACKET	70 x 45 x 80 (th=2.5)	3533	2925	3974	3691
		70 x 45 x 140 (th=3.5)	3856	3457	4562	4459
		70 x 45 x 260 (th=4)	4596	3782	5513	5411
	SUPPORTING BRACKET	100 x 45 x 80 (th=2.5)	6370	6080	7109	6918
		100 x 45 x 140 (th=3.5)	7181	6528	7607	7221
		100 x 45 x 260 (th=4)	8231	7439	9210	8923
	StoVentro Bracket L200 GP	95.5x50x 40 (th=3/3.2)	4062	3014	6216	5667
		95.5x50x 320 (th=4/4.2)	5456	3995	8001	6918
	StoVentro Bracket L200 FP	135x50x 40 (th=3/3.2)	9530	8670	11118	10104
		135x50x 320 (th=4/4.2)	8821	3898	11786	11038
STAINLESS STEEL	StoVentro Bracket L150 GP	75x50x80 (th=2)	3169	2781	6246	5645
		75x50x600 (th=2)	3490	2870	5518	5097
	StoVentro Bracket L150 FP	130x50x80 (th=2)	5688	4944	9287	8927
		130x50x600 (th=2)	5756	5030	8886	8437
GALVANIZED STEEL	StoVentro Bracket L350 GP	75x50x80 (th=2)	3288	2912	5251	4658
		75x50x600 (th=2)	3483	3224	5351	5118
	StoVentro Bracket L350 FP	130x50x80 (th=2)	5876	5121	8852	8662
		130x50x600 (th=2)	5088	4650	8212	7809
	60 x 50 x 80 (th=2.5)		3250	3005	4323	4185
	60 x 50 x 150 (th=2.5)		3245	2940	4335	4031
	60 x 50 x 300 (th=2.5)		2774	2550	3935	3859

Mean and characteristic values of bracket resistance to vertical load test are indicated in table 3.7.4.2, these values correspond to the resistance to vertical load of 1 bracket.

TABLE 3.7.4.2: RESISTANCE TO VERTICAL LOAD OF A BRACKET

BRACKETS DIMENSIONS (mm)			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) Significant permanent distortion (≥2 mm)	
			F_r M. v.	F_r Ch v.	F_{1d} M. v.	F_{1d} Ch. v.	F_{3d} M. v.	F_{3d} Ch. v.	F_s M. v.	F_s Ch v.
EXTRUDED ALLUMINIUM	SUPPORTING BRACKET	100 x 45 x 80 (th=2.5)	947	622	1057	600	1810	1170	2455	1402
		100x45x140 (th=3.5)	625	528	454	392	1076	896	1566	1247
		100x45x260 (th=4)	404	330	176	147	460	378	690	538
	StoVentro Bracket L200 FP	135x50x 40 (th=3/3.2)	3110	1486	5258	4685	9654	8790	Not assigned	
		135x50x 320 (th=4/4.2)	1497	1243	423	345	1138	974	2357	2158
STAINLESS STEEL	StoVentro Bracket L150 FP	130x50x80 (th=2)	2318	2040	2738	2447	4828	4640	13187	12733
		130x50x600 (th=2)	298	275	61	53	157	141	348	347
GALVANIZED STEEL	StoVentro Bracket L350 FP	130x50x80 (th=2)	2197	1887	2550	1986	4746	3160	12560	9582
		130x50x600 (th=2)	246	215	50	39	124	115	315	293
	60 x 50 x 80 (th=2.5)		654	515	1063	799	1798	1640	2353	2098
	60 x 50 x 150 (th=2.5)		377	278	388	347	852	702	1165	1043
	60 x 50 x 300 (th=2.5)		199	164	122	107	243	200	312	249

3.8 Aspects of durability

3.8.1 Hygrothermal behaviour

The hygrothermal behaviour test has been tested according to § 2.2.16.1 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 StoVentec FibreCement 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.

3.8.2 Dimensional stability

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+A2:2018
- for aluminium EN 1999-1
- for stainless steel EN 10088-1: 2015

3.8.3 UV radiation resistance of the cladding elements

UV radiation resistance has been tested according to EN ISO 4892-3: 2016[26] on StoFibreCement samples with the following references:

- Coat GX
- Coat
- Pure UV
- Print

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

3.8.4 Corrosion of metal components

Fixings and subframe components are made of:

- Aluminium alloy AW-6060/6063 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[27] (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[28] (Table A.1 in Annex A) and EN ISO 9223[29] (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, S235 with Z275 treatment and S550 GD with ZM430 treatment according to EN 10346[30].

The category of corrosivity is C3 (Medium) up to C4 (High) and the durability class is H (High) according to EN ISO 14713-1[31] (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

4.1 System of attestation of conformity

According to the decision 2003/640/EC of the European Commission [32] the system of assessment and verification of constancy of performance (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 based on Fibre-cement panels fastened to the subframe by visible fixings	External finishes of walls	Any	2+

26 EN ISO 4892-3: 2016 “Plastics — Methods of exposure to laboratory light sources — Part 3: Fluorescent UV lamps”.
27 EN 1999-1-1:2007+A1 “Eurocode 9. Design of aluminium structures - Part 1-1: General structural rules”.
28 EN 1993-1-4 “Eurocode 3 Design of steel structures - Part 1-4: General rules - Supplementary rules for stainless steels”.
29 EN ISO 9223 “Corrosion of metals and alloys - Corrosivity of atmospheres - Classification, determination and estimation”.
30 EN 10346 “Continuously hot-dip coated steel flat products for cold forming - Technical delivery conditions”.
31 EN ISO 14713-1 “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”.
32 Official Journal of the European Communities 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 control plan deposited at the Instituto de Ciencias de la Construcción Eduardo Torroja.

Issued in Madrid, 23 December 2024

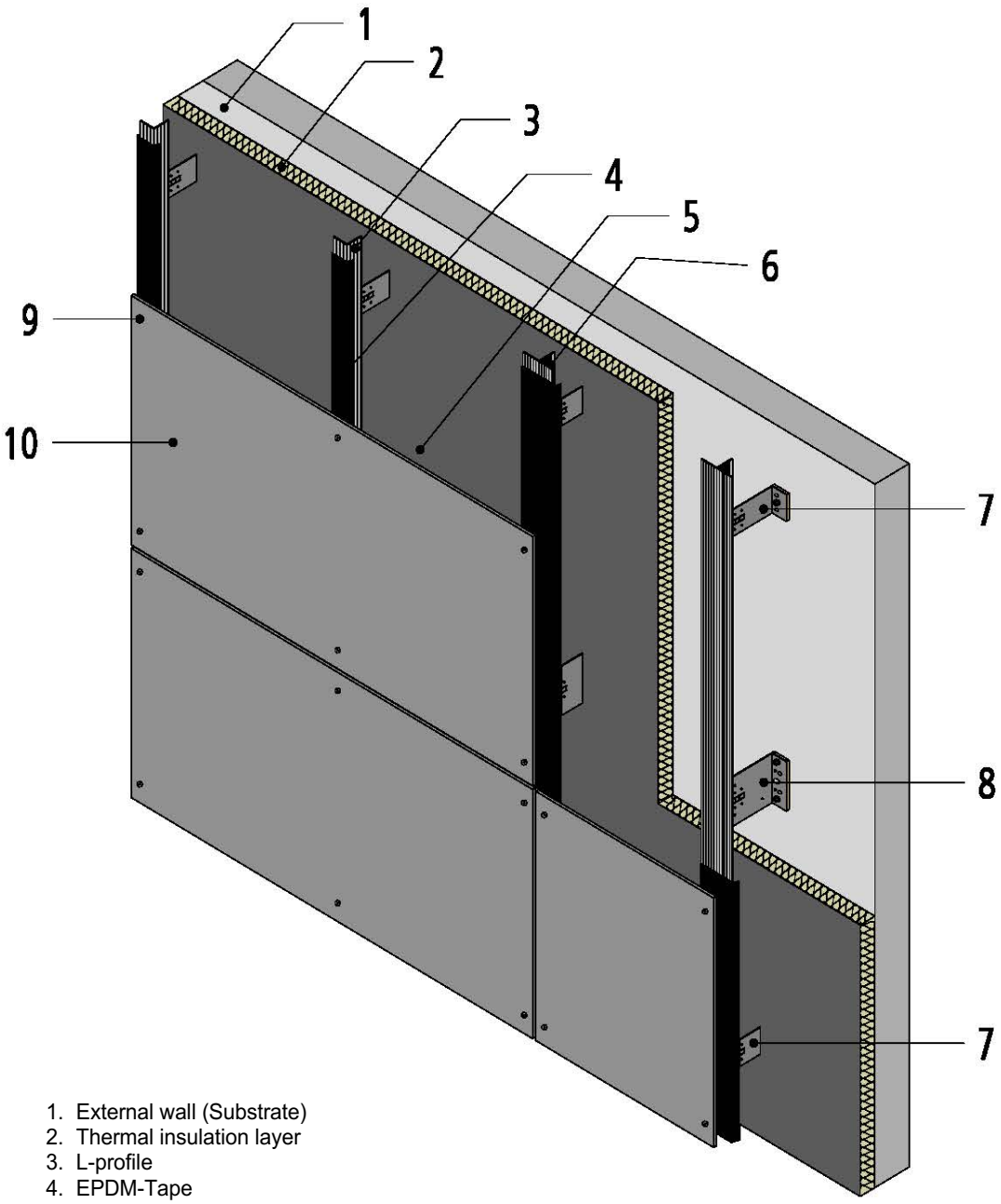
by

Ángel Castillo Talavera
Director
on behalf of Instituto de Ciencias de la Construcción Eduardo Torroja (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.

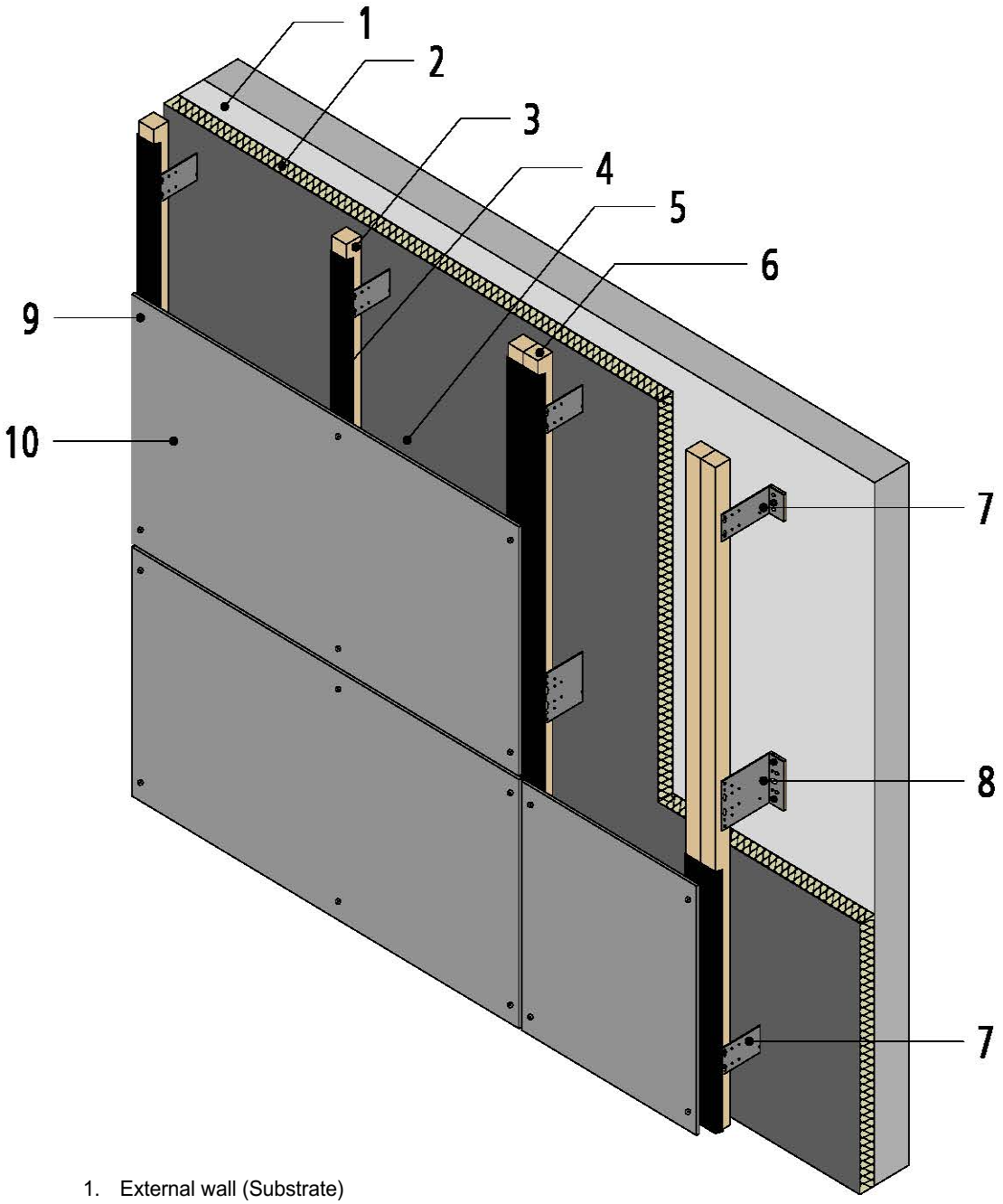
FIGURE 1: GENERAL CONFIGURATION OF THE SYSTEM

1.1: Kit type A. StoVentec FibreCement aluminium subframe (Family A)



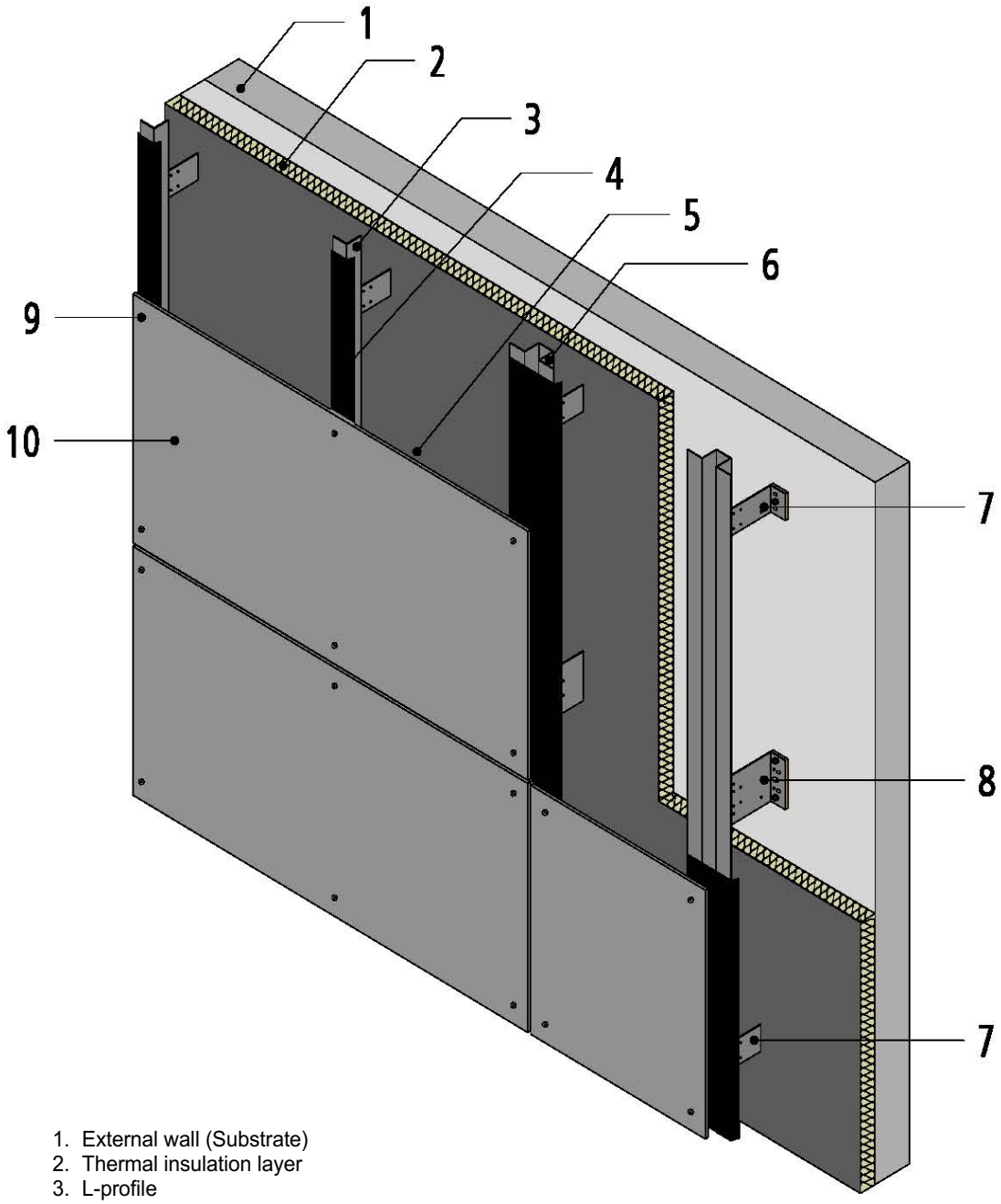
1. External wall (Substrate)
2. Thermal insulation layer
3. L-profile
4. EPDM-Tape
5. Ventilation airspace
6. T-profile
7. Wall bracket (sliding point)
8. Wall bracket (fixed point)
9. Fixing rivet
10. StoFibreCement flat sheet

1.2: Kit type B. StoVentec FibreCement timber subframe (Family A)



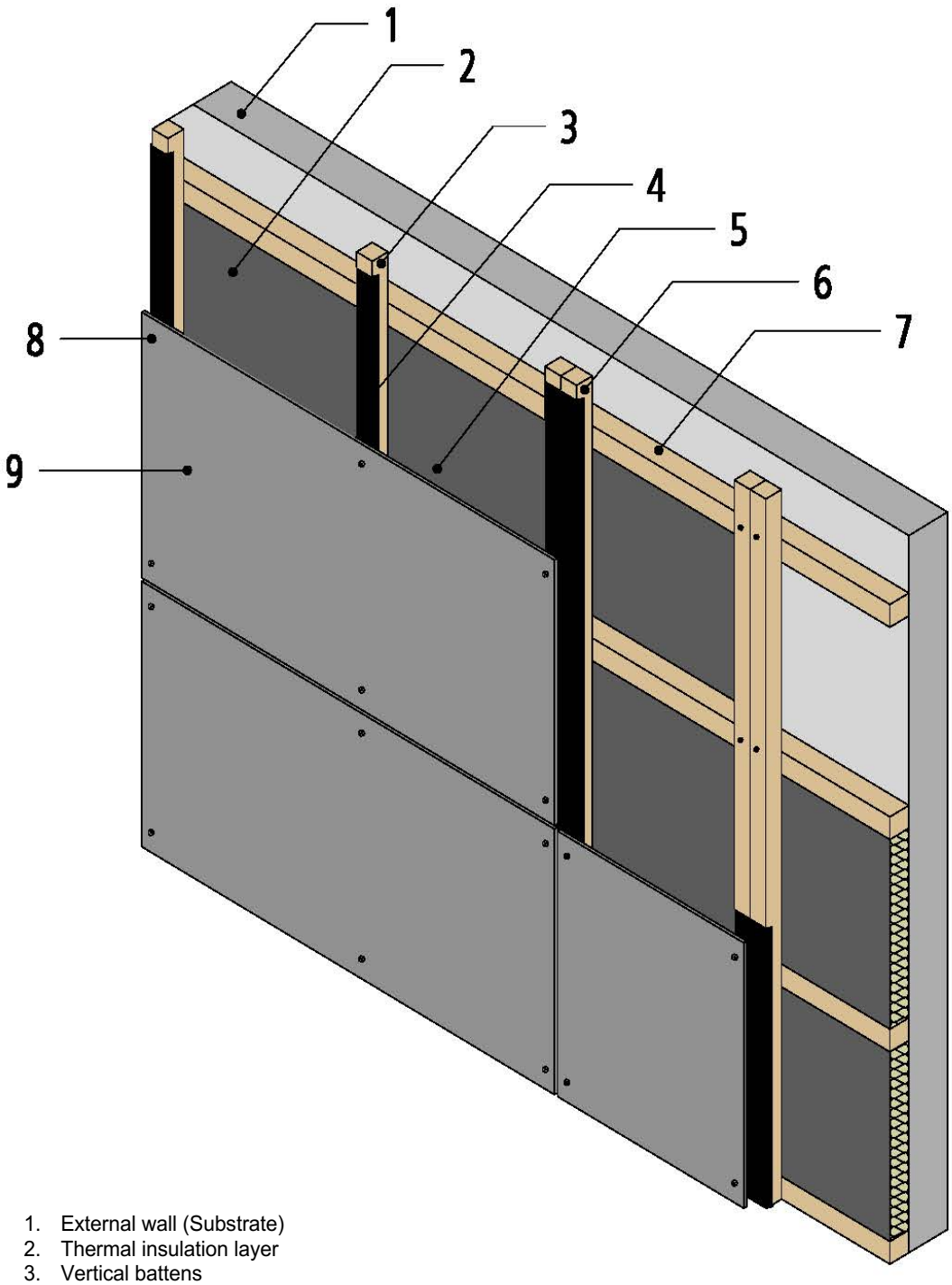
1. External wall (Substrate)
2. Thermal insulation layer
3. Vertical battens
4. EPDM- Tape
5. Ventilation airspace
6. Vertical battens (double at location of joint)
7. Wall bracket (sliding point)
8. Wall bracket (fixed point)
9. Fixing screw
10. StoFibreCement flat sheet

1.3: Kit type C. StoVentec FibreCement galvanized steel subframe (Family A)



1. External wall (Substrate)
2. Thermal insulation layer
3. L-profile
4. EPDM- Tape
5. Ventilation airspace
6. Ω-profile
7. Wall bracket (sliding point)
8. Wall bracket (fixed point)
9. Fixing rivet/screw
10. StoFibreCement flat sheet

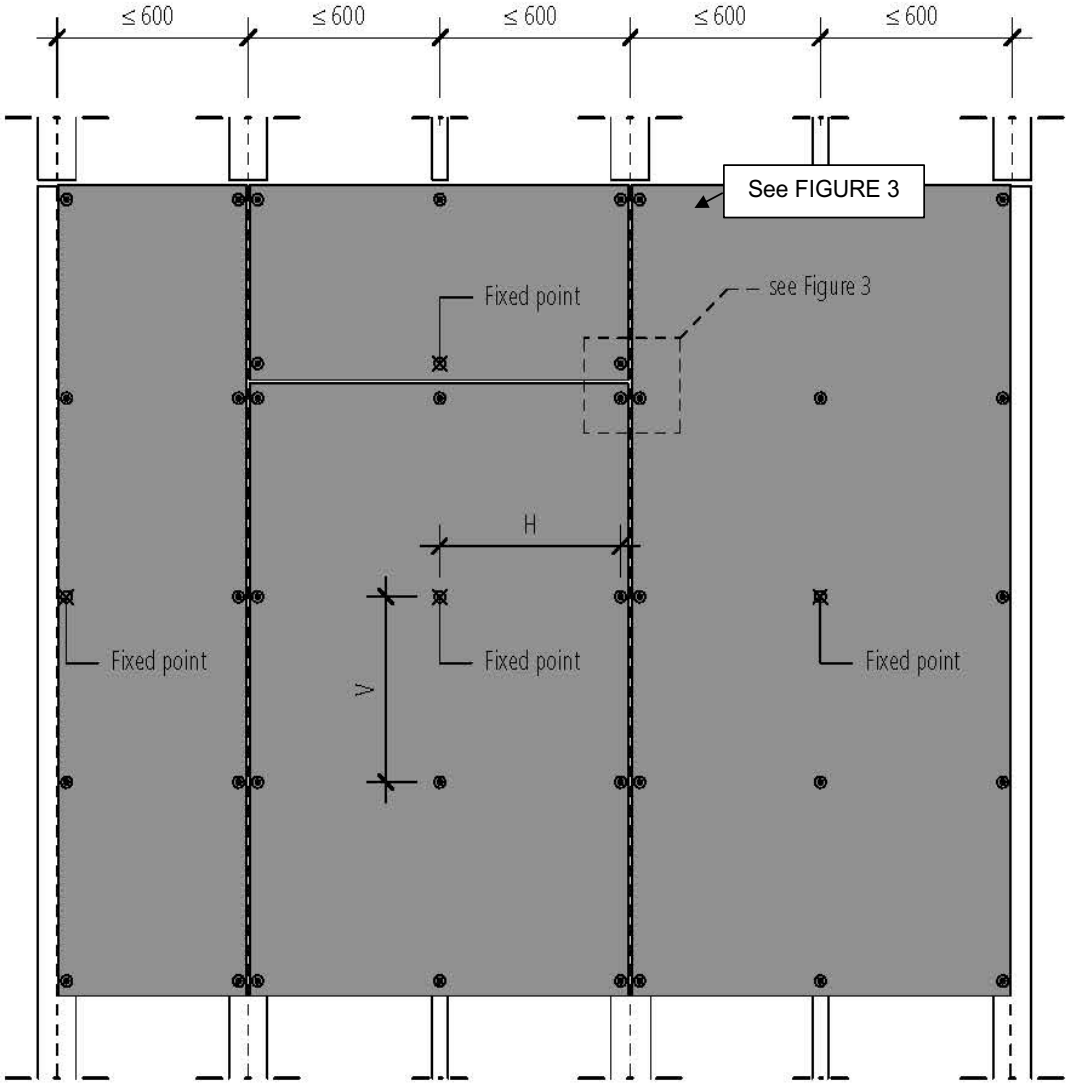
1.4: Kit type D. StoVentec FibreCement, timber/timber subframe (Family A)



1. External wall (Substrate)
2. Thermal insulation layer
3. Vertical battens
4. EPDM- Tape
5. Ventilation airspace
6. Vertical battens (double at location of joint)
7. Horizontal battens
8. Fixing screw
9. StoFibreCement flat sheet

FIGURE 2: FIXED/SLIDING POINTS ON FIBRE-CEMENT PANELS

2.1: Fixed/Sliding Points on Fibre-Cement panels



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

2.2: Fixed Point Sleeve (StoVentro Sleeve FP 001)

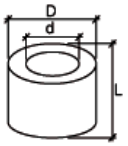
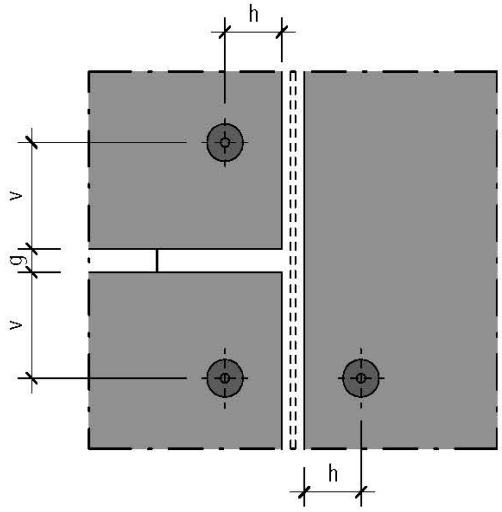


FIGURE 3: JOINTS AND HOLES DISTANCE FROM PANEL EDGES



h fixing distance to flat sheet edges:
$25 \leq \mathbf{h} \leq 65$ mm

v fixing distance to flat sheet edges:
$45 \leq \mathbf{v} \leq 65$ mm

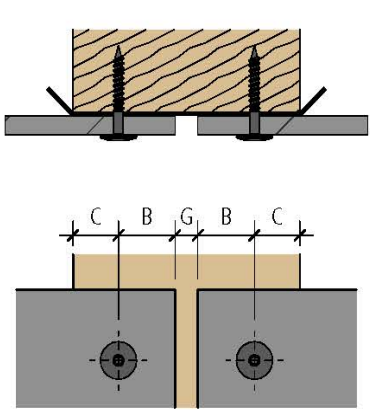
g vertical/horizontal joint between flat sheet width 8 – 10 mm

Note:

horizontal fixing distance to flat sheet edges
≠ vertical fixing distance to flat sheet edges

FIGURE 4: HOLES POSITION FROM VERTICAL ELEMENT EDGES

4.1: Holes distance from batten edges

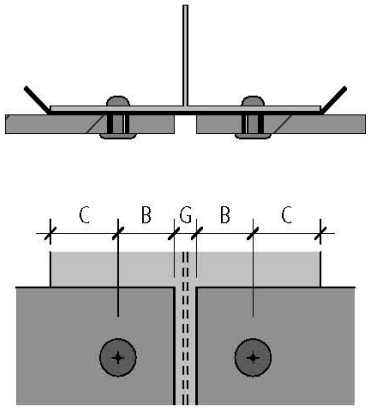


B fixing distance from the nearest flat sheet edge: $25 \text{ mm} \leq B \leq 65$ mm

C minimum fixing distance from the nearest batten edge: ≥ 15 mm

G joint width 8 mm - 10 mm

4.2: Holes distance from metallic profile edges



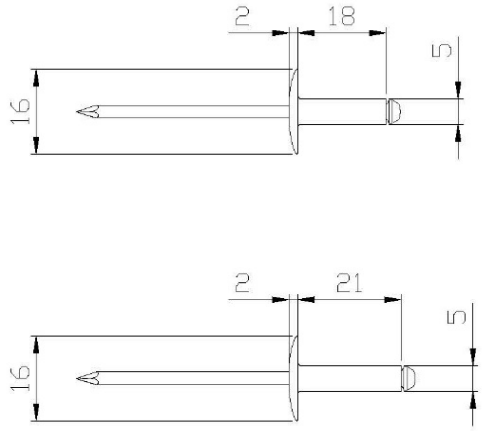
B fixing distance from the nearest flat sheet edge: $25 \text{ mm} \leq B \leq 65$ mm

C minimum fixing distance from the nearest profile edge: ≥ 10 mm

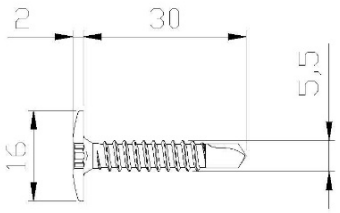
G joint width 8 mm - 10 mm

FIGURE 5.1: StoVentec FibreCement ALUMINIUM KIT – CLADDING FIXINGS

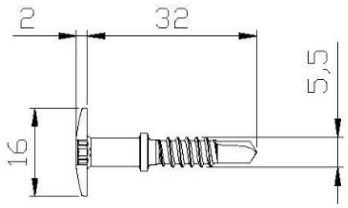
5.1.1: StoVentro Rivet 210



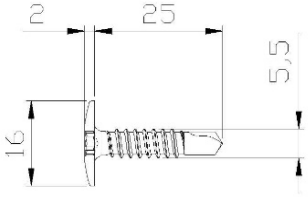
5.1.2: EJOT JT3-LT-3-5,5 KD16 L=30



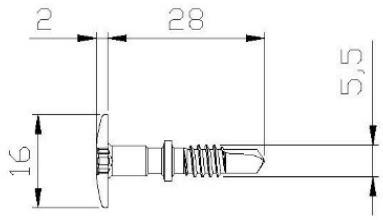
5.1.3: EJOT JT3-LT-3-5,5 KD16 L=32/8



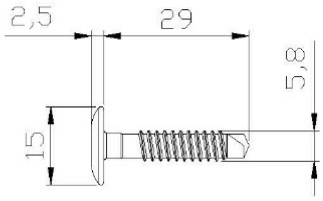
5.1.4: EJOT JT4-LT-3-5,5 KD16 L=25



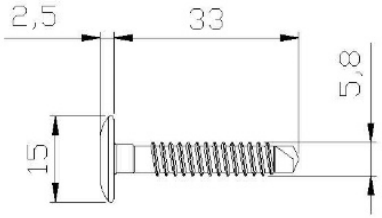
5.1.5: EJOT JT4-LT-3-5,5 KD16 L=28/8



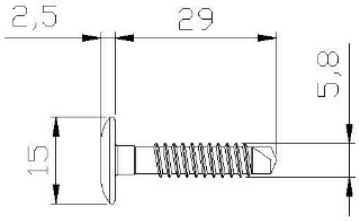
5.1.6: SFS SDA-D15-CS10/8-5,8 L=29



5.1.7: SFS SDA-D15-CS10/10-5,8 L=33 or CS10/13-5,8 L=38



5.1.8: SFS SX4-D15-CS10/8-5,8 L=29



5.1.9: SFS SX4-D15-CS10/10-5,8 L=33 or CS10/13-5,8 L=38

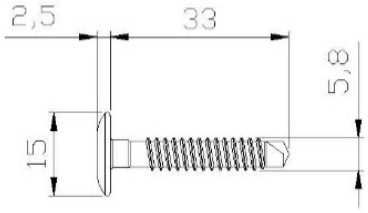
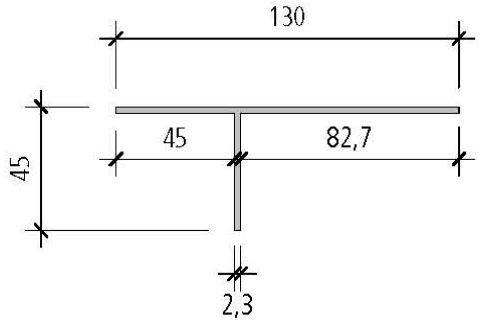
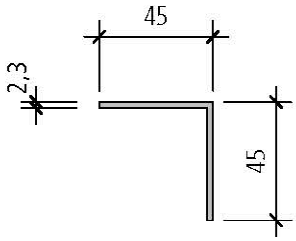


FIGURE 5.2: StoVentec FibreCement ALUMINIUM KIT – VERTICAL PROFILES

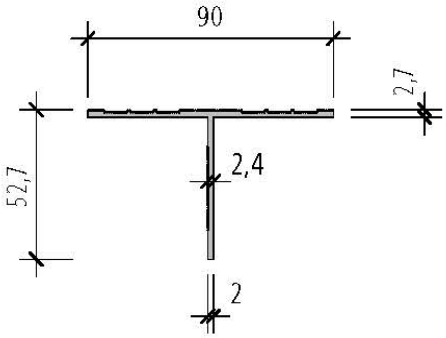
5.2.1: Asymmetrical T-profile



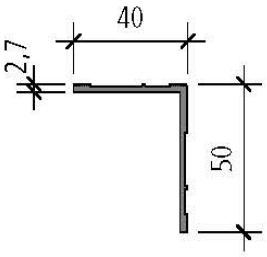
5.2.2: L-profile



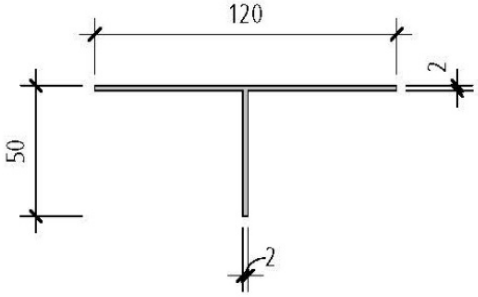
5.2.3: Sto-Aluminium T-profile (2.7mm)



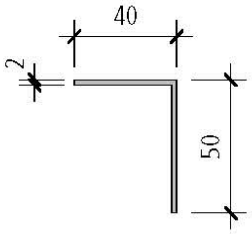
5.2.4: Sto-Aluminium L-profile (2.7mm)



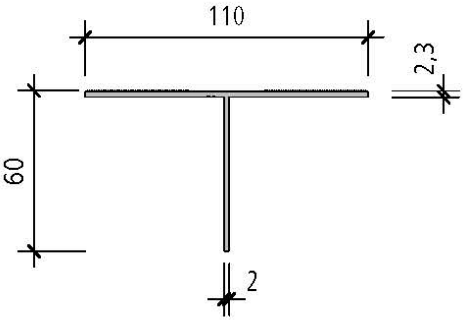
5.2.5: Sto-Aluminium T-profile smooth (2mm)



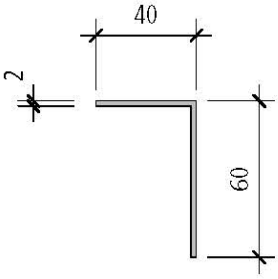
5.2.6: Sto-Aluminium L-profile smooth (2mm)



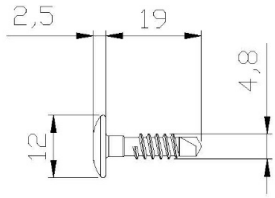
5.2.7: Sto-Aluminium T-profile (2.3mm)



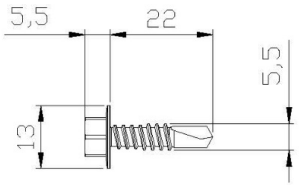
5.2.8: Sto-Aluminium L-profile (2.0mm)



5.2.9: Fixing between bracket and vertical profile – stainless steel screw
SFS SLA3/6-7-S4-SR2 D=4,8 L=19



5.2.10: Fixing between bracket and vertical profile – StoVentro Screw 108 (clamping range for components combinations 3.5-8.0mm)



5.2.11: Fixing between bracket and vertical profile – Sto-Façade Self-drilling screw 5,5x19mm (clamping range for components combinations 3.1-5,0mm)

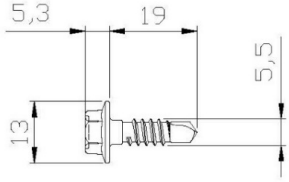
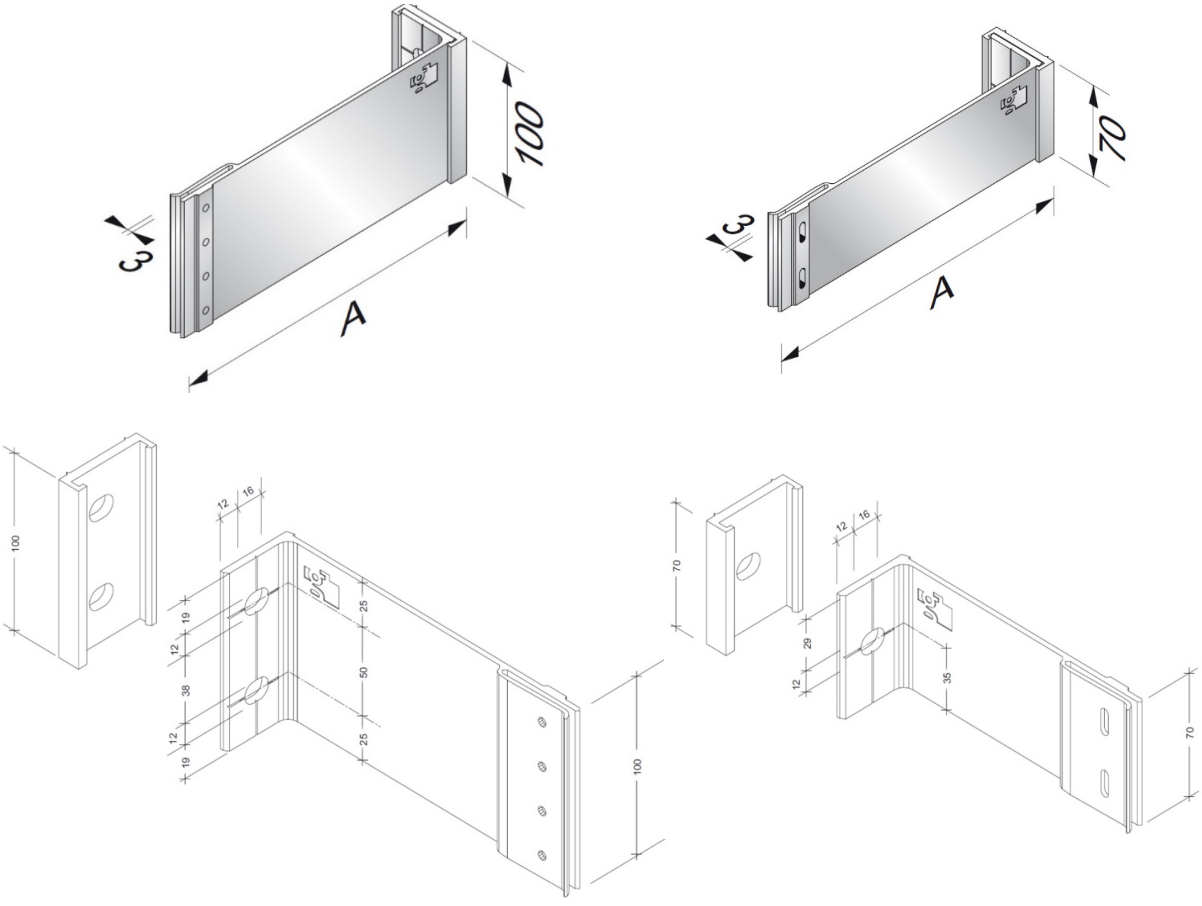


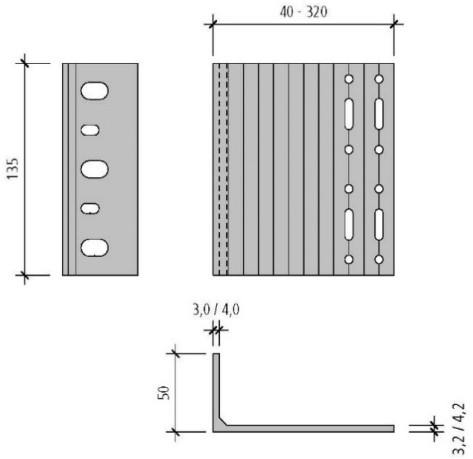
FIGURE 5.3: StoVentec FibreCement ALUMINIUM KIT – BRACKETS

5.3.1: Extruded aluminium Supporting bracket (100x45.3mm) Fixed point

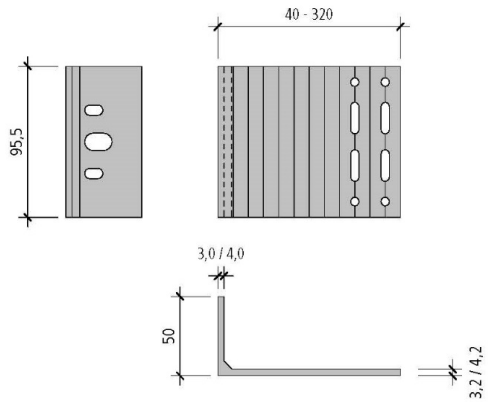


5.3.2: Extruded aluminium Retention bracket (70x45.3mm) Sliding point

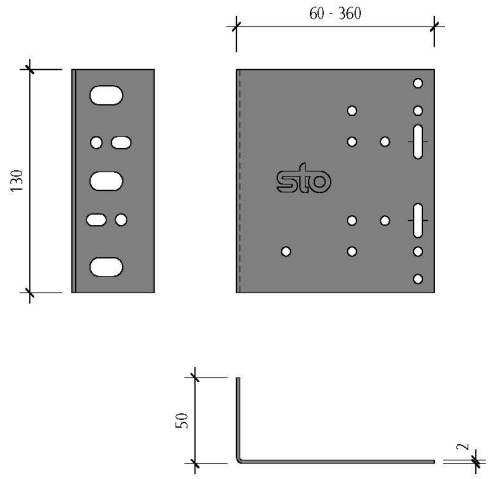
5.3.3: StoVentro Bracket L200 FP
made of Extruded aluminium



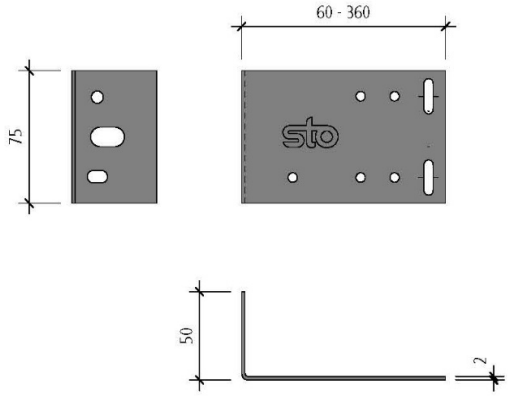
5.3.4: StoVentro Bracket L200 GP
made of Extruded aluminium



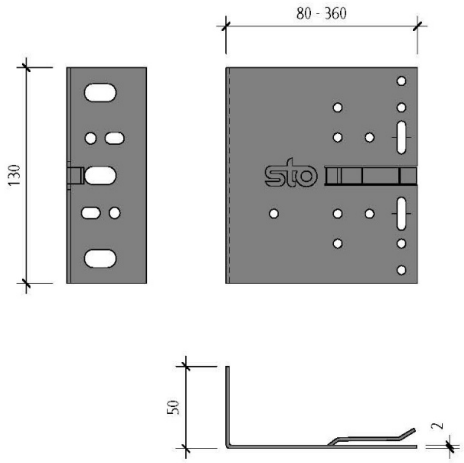
5.3.5: StoVentro Bracket L100 FP
made of Stainless steel



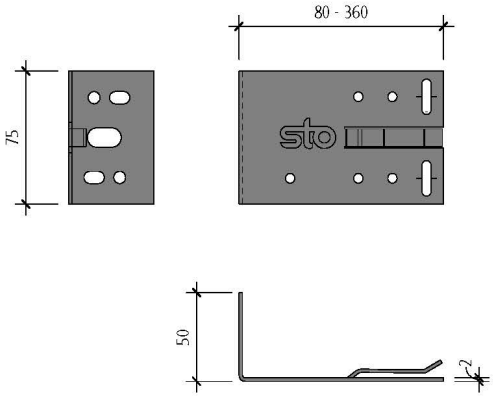
5.3.6: StoVentro Bracket L100 GP
made of Stainless steel



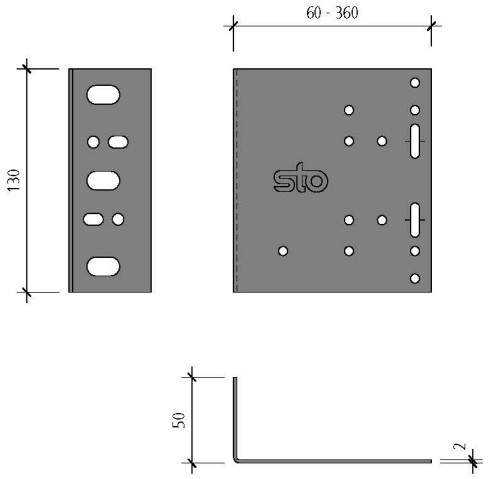
5.3.7: StoVentro Bracket L150 FP
made of Stainless steel



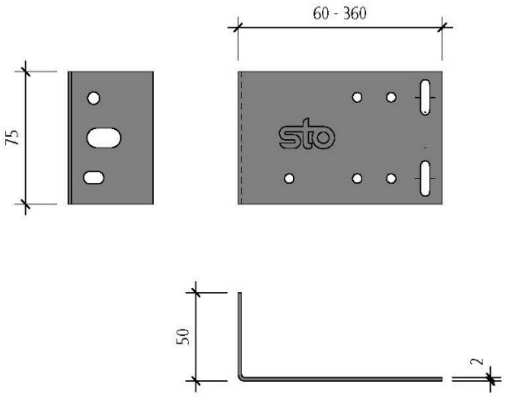
5.3.8: StoVentro Bracket L150 GP
made of Stainless steel



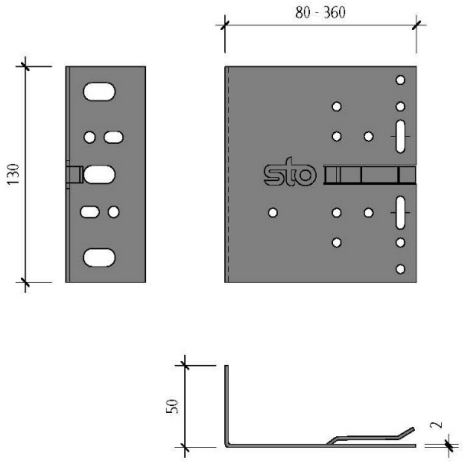
5.3.9: StoVentro Bracket L300 FP
made of galvanized steel



5.3.10: StoVentro Bracket L300 GP
made of galvanized steel



5.3.11: StoVentro Bracket L350 FP
made of galvanized steel



5.3.12: StoVentro Bracket L350 GP
made of galvanized steel

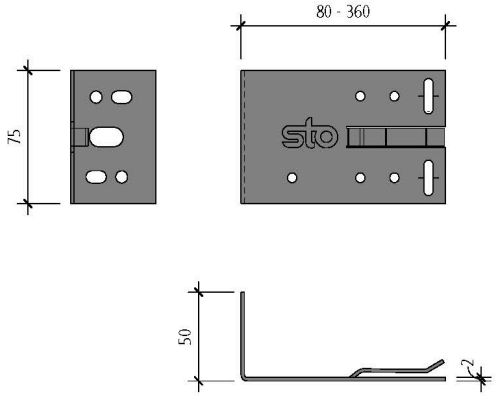
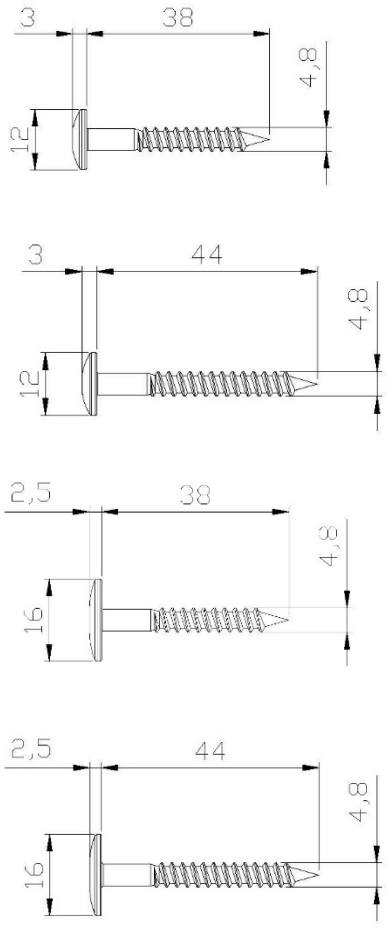


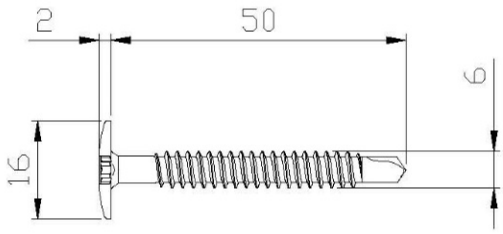
FIGURE 6: TIMBER SUBFRAME

6.1: CLADDING FIXING TO TIMBER SUBFRAME - STAINLESS STEEL SCREW

6.1.1 StoVentro Screw 270

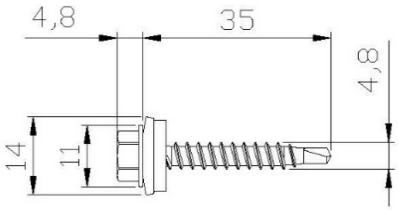


6.1.2: EJOT JT4-LT-2/6 KD16 L=50

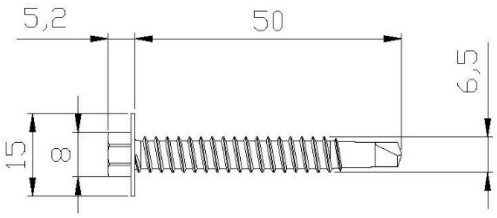


6.2: FIXING BETWEEN BRACKET AND BATTEN – STAINLESS STEEL SCREW

6.2.1: SFS SW-T-4,8 L=35



6.2.2: SFS SW-T-H15-6,5 L=50



6.3: (GALVANIZED STEEL) BRACKETS
(alternatively StoVentro Bracket L100, L200 and L300 can be used, see above)

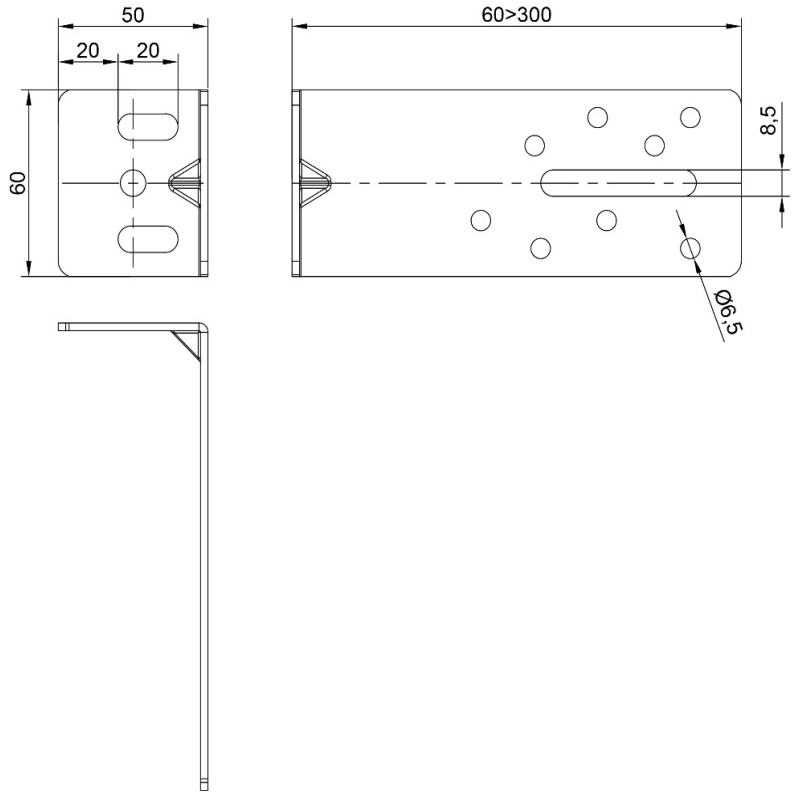
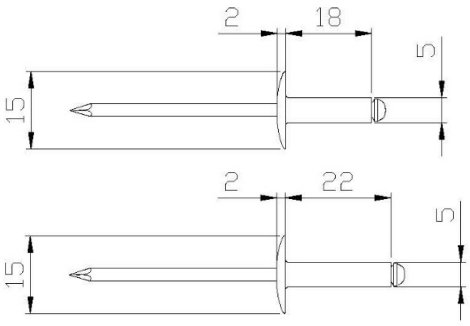


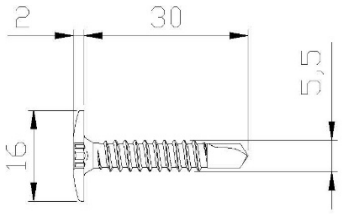
FIGURE 7: GALVANIZED STEEL SUBFRAME

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

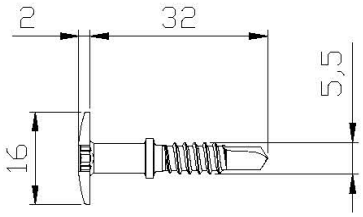
7.1.1: StoVentro Rivet 240



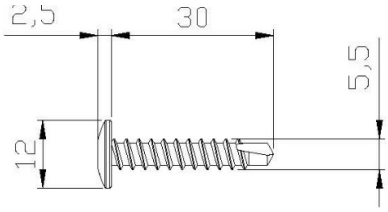
7.1.2: EJOT JT3-LT-3-5,5 KD16 L=30



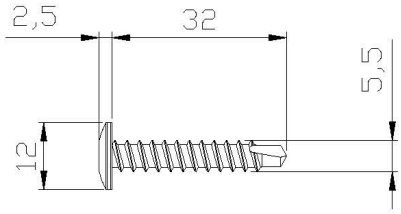
7.1.3: EJOT JT3-LT-3-5,5 KD16 L=32/8



7.1.4: SFS SX3 D12-5,5 L=30



7.1.5: SFS SX3 D12-5,5 L=32



7.1.6: SFS SX4-D15-CS10/8-5,8 or /10-5,8 or /12-5,8 L=29, 33 or 38

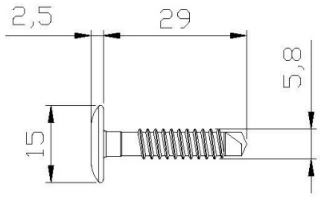
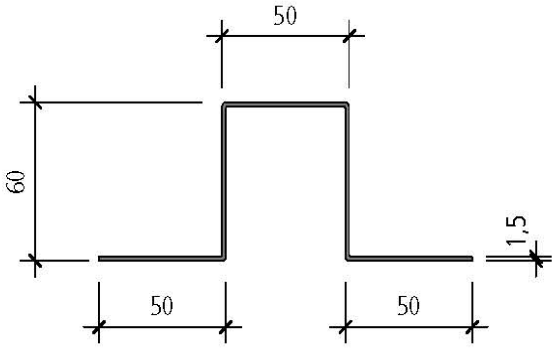
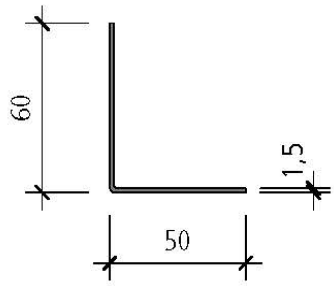


FIGURE 7.2: StoVentec FibreCement GALVANIZED STEEL KIT – VERTICAL PROFILES

7.2.1: GALVANIZED STEEL Ω PROFILE



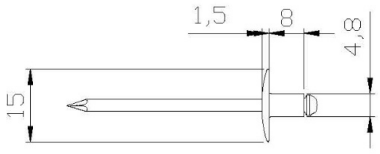
7.2.2: GALVANIZED STEEL L PROFILE



FIXING BETWEEN BRACKET (5.3.9-.5.3.12 or 6.3) AND VERTICAL PROFILE– STAINLESS STEEL RIVET / SCREW

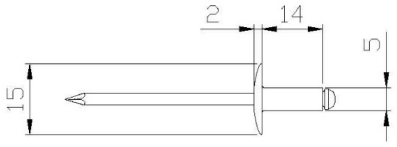
OPTION 1 – For grip range from 4 mm to 6 mm

7.2.3: SFS SSO-D 4,8 L=8

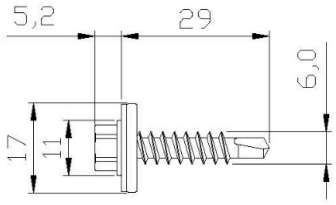


OPTION 2 – For grip range greater than 6 mm

7.2.4: SFS SSO-D15 L=14



7.2.5: SFS SX3-S16 L=29



7.2.6: SFS SX5/12-S16-5,5 L=31

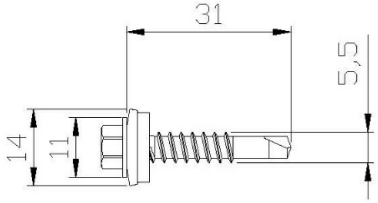


FIGURE 8.1 VERTICAL SECTION

FIGURE 8.1.1: TIMBER/TIMBER SUBFRAME

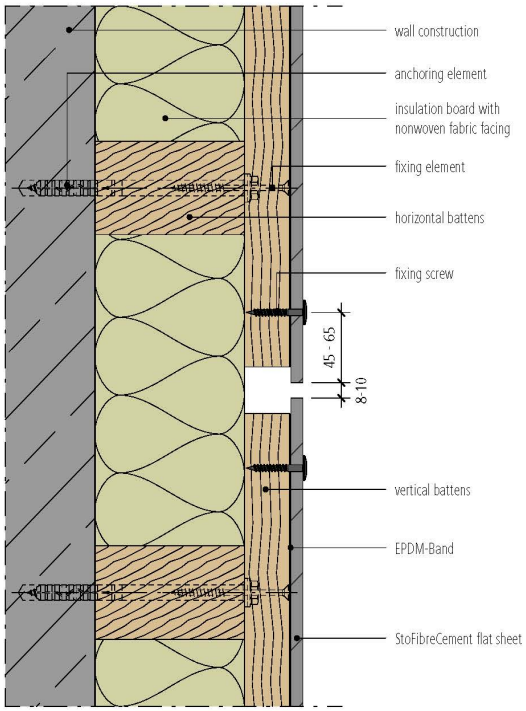


FIGURE 8.1.2: WALL BRACKET/ALUMINIUM CARRIER PROFILE

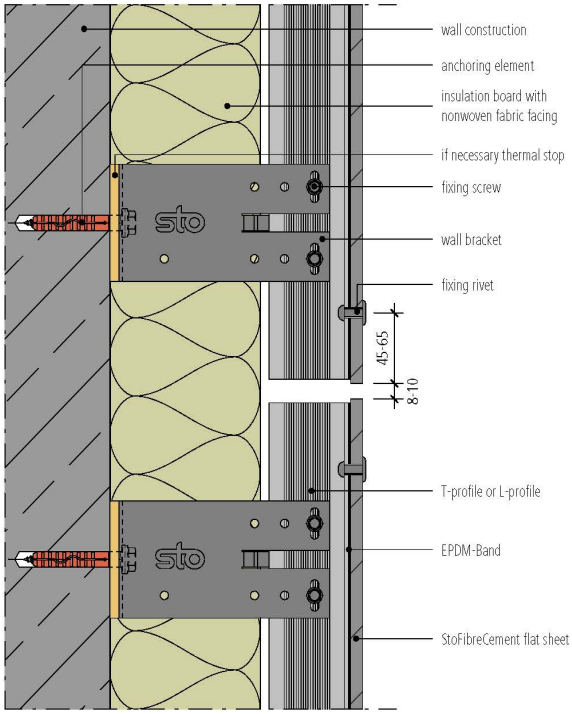


FIGURE 8.1.3: WALL BRACKET/TIMBER BATTENS

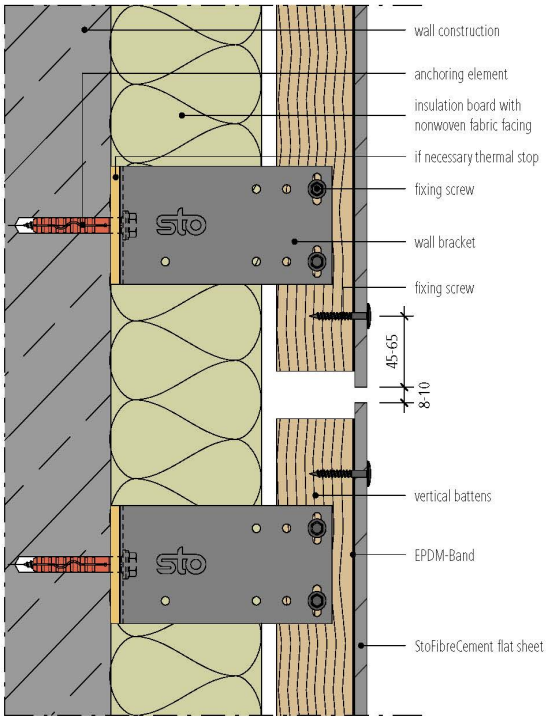


FIGURE 8.2. HORIZONTAL SECTION

FIGURE 8.2.1: TIMBER/TIMBER SUBFRAME

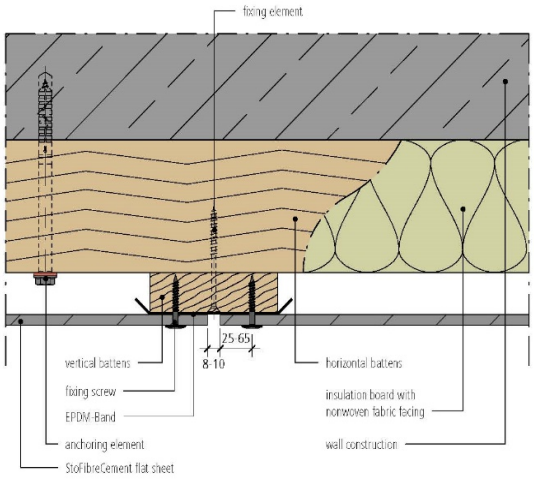


FIGURE 8.2.2: WALL BRACKET/ALUMINIUM CARRIER PROFILE

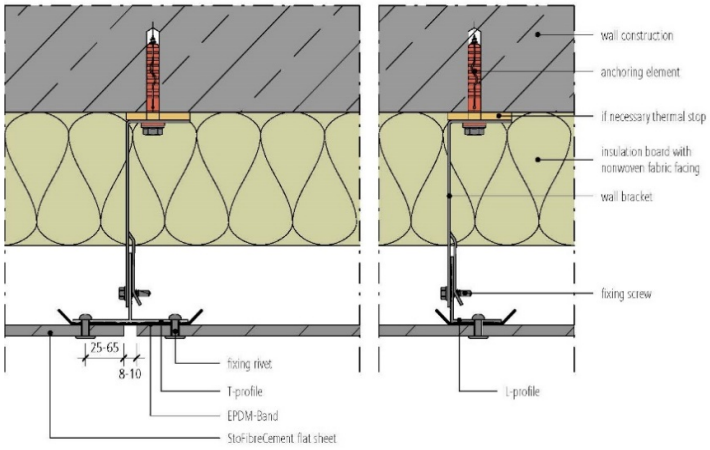


FIGURE 8.2.3: WALL BRACKET/TIMBER BATTENS

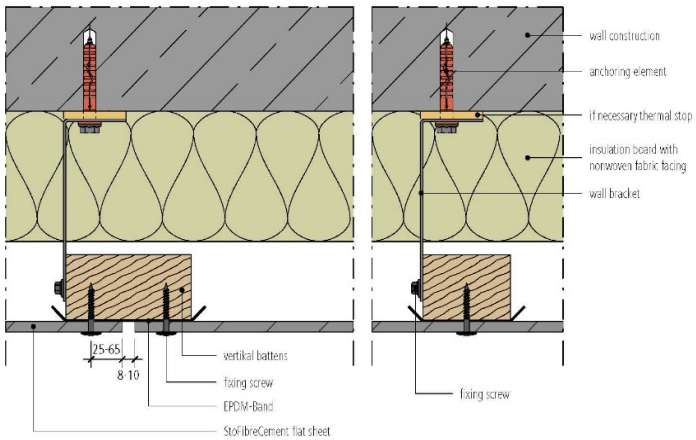


FIGURE 8.3: DETAIL OF CROWN AND BASE

FIGURE 8.3.1: TIMBER/TIMBER SUBFRAME

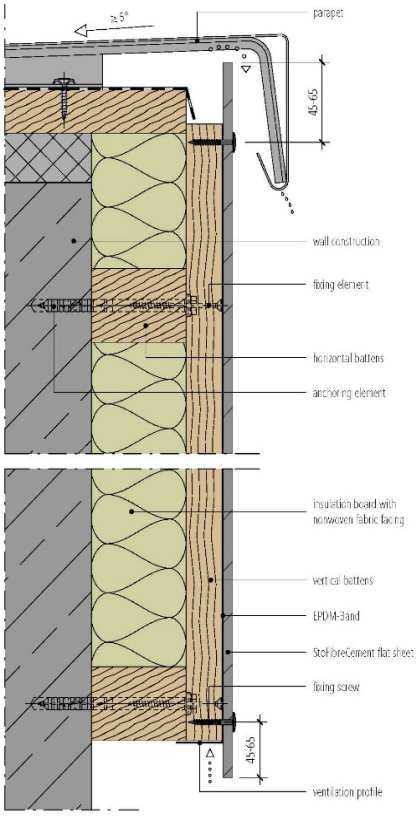


FIGURE 8.3.2: WALL BRACKET/ALUMINIUM CARRIER PROFILE

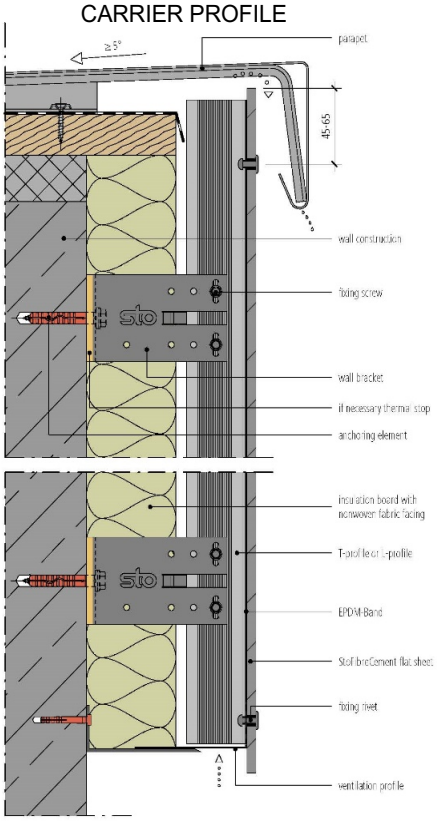


FIGURE 8.3.3: WALL BRACKET/TIMBER BATTENS

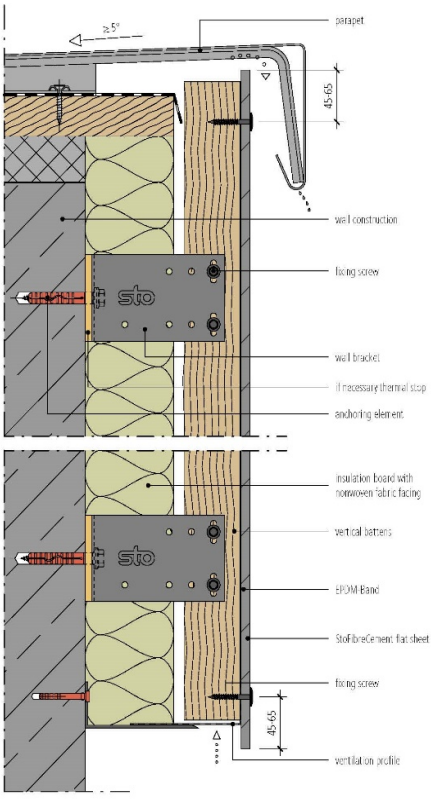


FIGURE 8.4. EXTERNAL CORNER

FIGURE 8.4.1: TIMBER/TIMBER SUBFRAME

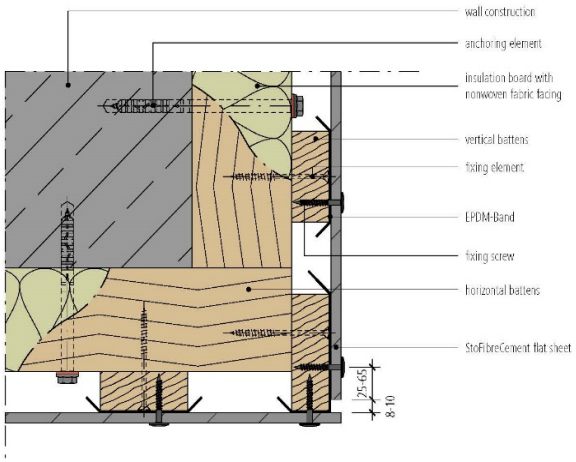


FIGURE 8.4.2: WALL BRACKET/ALUMINIUM CARRIER PROFILE

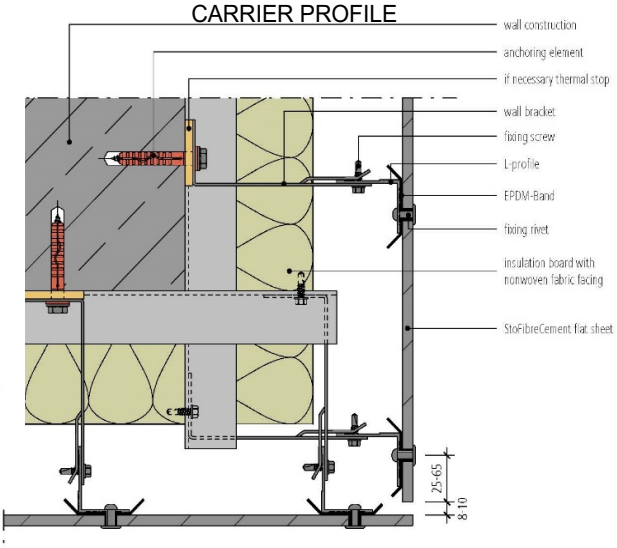


FIGURE 8.4.3: WALL BRACKET/TIMBER BATTENS

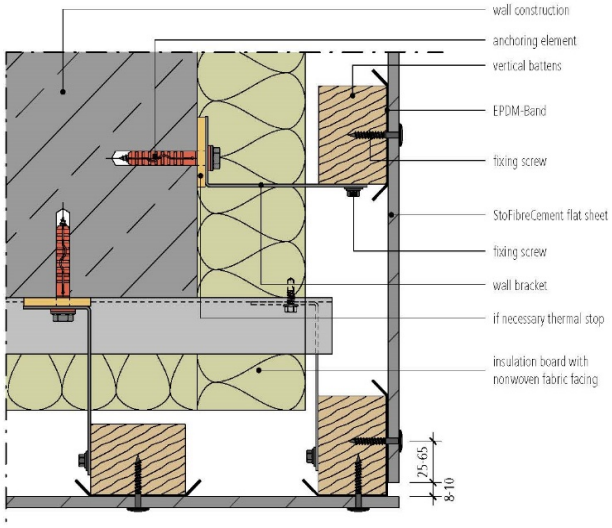


FIGURE 8.5. INTERNAL CORNER

FIGURE 8.5.1: TIMBER/TIMBER SUBFRAME

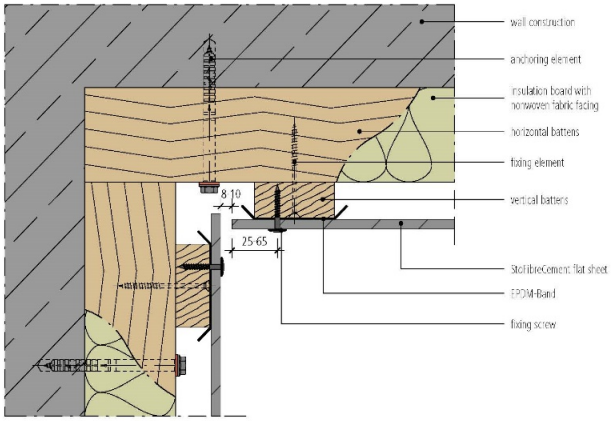


FIGURE 8.5.2: WALL BRACKET/ALUMINIUM CARRIER PROFILE

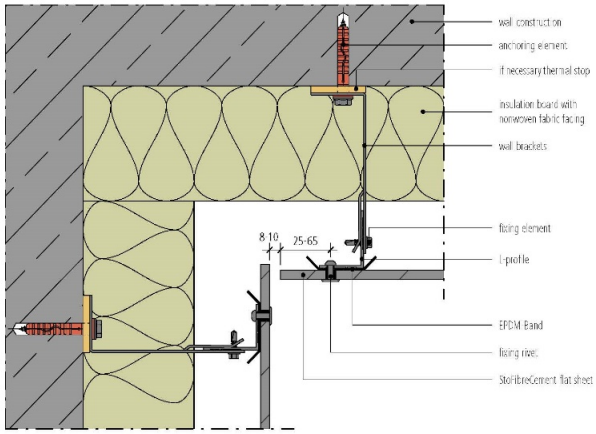
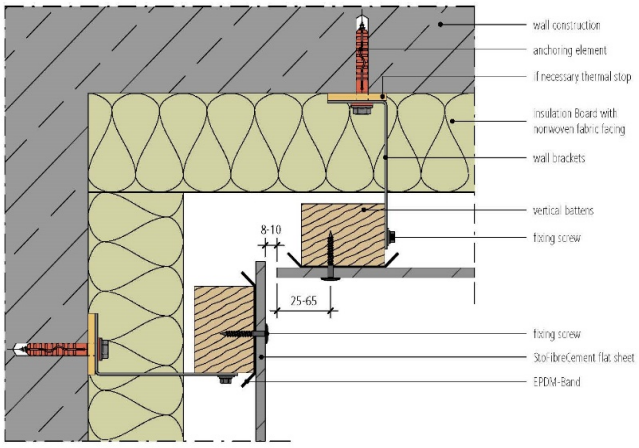


FIGURE 8.5.3: WALL BRACKET/TIMBER BATTENS



Annex A: Cladding element specifications

STANDARD DIMENSIONS[33] AND GEOMETRY[34]		
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	±0.5 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
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 (wet over dry)		≤ 25 %
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		≤ 1.3 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		

33 Available smaller dimensions with the same thickness
34 Properties according to EN 12467

Annex B: Fixings and Subframe specifications

Aluminium physical and mechanical properties

Symbolic designation	EN AW-Al MgSi	
Numeric designation	AW 6060	AW 6063
Treatment	T66	
PHYSICAL PROPERTIES		
Density	2.7 kg/dm^3	
Coefficient of linear thermal expansion (20º-100ºC)	23.2 x 10^{-6} ºC	23,5·10^{-6} ºK
Elastic modulus	69 000 N/mm^2	
MECHANICAL PROPERTIES		
Tensile strength (R_m)	≥215 N/mm^2	≥245 N/mm^2
Elastic limit ($R_{p0.2}$)	≥160 N/mm^2	≥200 N/mm^2
Elongation (A)	8 %	
Brinell hardness	75	80
According to EN 755-2[35] and EN 12020-1[36]		

Wood requirements

Resistance class	≥ C 18[37]
Durability	Class 3[38]
Processing	Autoclave level 5
Damp control	≤ 18%

Galvanized steel physical and mechanical properties

Component	Profiles	Brackets	
Type of steel	S235	S220GD	S550GD
Treatment	Z 275	Z350	ZM430
PHYSICAL PROPERTIES			
Density	7850 g/cm^3		
Coefficient of linear thermal expansion	1.2 x 10^{-5} ºC^{-1}		
Poisson coefficient	0.39	0.3	0.29
MECHANICAL PROPERTIES			
Tensile strength (R_m)	360-510 MPa	300 MPa	560 MPa
Elastic limit (R_{eH})	235 MPa	220 MPa	550 MPa
Elongation (A_{80mm})	20 mm	20 mm	--
According to EN 10025-5[39] and EN 10346[40]			

Stainless steel physical and mechanical properties

Component	Brackets (StoVentro Bracket L100/L150)
Type of steel	1.4162
PHYSICAL PROPERTIES	
Density	7700 kg/m³
Coefficient of linear thermal expansion	14,4-16,0 x 10^{-6} ºC^{-1}
Poisson coefficient	0,28
MECHANICAL PROPERTIES	
Tensile strength (R_m)	700-900 MPa
Elastic limit (R_{eH})	530 MPa
Elongation (A_{80mm})	20%
According to EN 10088-4[41]	

35 EN 755-2 Aluminium and aluminium alloys. Extruded rod/bar, tube and profiles. Part 2: Mechanical properties
36 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
37 EN 338 Structural timber - Strength classes
38 EN 335 Durability of wood and wood-based products. Use classes: definition, application to solid wood and wood-based products
39 EN 10025-5 Hot rolled products of structural steels - Part 5: Technical delivery conditions for structural steels with improved atmospheric corrosion resistance
40 EN 10346 Continuously hot-dip coated steel flat products for cold forming - Technical delivery conditions
41 EN 10088-4 Stainless steels - Part 4: Technical delivery conditions for sheet/plate and strip of corrosion resisting steels for construction purposes

StoVentec FibreCement aluminium subframe kit (Type A)
Fixings

Designation	Rivet	
	StoVentro Rivet 210 Head Diameter=16mm l=18mm	StoVentro Rivet 210 Head Diameter=16mm l=21mm
Thickness of cladding element	8mm	10-12mm
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	

Designation	Self-drilling screw			
	EJOT JT3-LT-3-5.5 KD16 l=30	EJOT JT4-LT-3-5.5 KD16 l=25	EJOT JT3-LT-3-5.5 KD16 l=32/8	EJOT JT4-LT-3-5.5 KD16 l=28/8
Thickness of cladding element	8-10-12mm		8 mm	
Diameter	5.5 mm			
Length	30 mm	25 mm	32 mm	28 mm
Material	Stainless steel A2 or A4 (EN ISO 3506-1[42])			
Mechanical strength	in accordance with ETA-10/0200			

Designation	Self-drilling screw					
	SFS SDA-D15-CS10 Head Diameter=15mm l=29mm	SFS SDA-D15-CS10 Head Diameter=15mm l=33mm	SFS SDA-D15-CS10 Head Diameter=15mm l=38mm	SFS SX4-D15-CS10 Head Diameter=15mm l=29mm	SFS SX4-D15-CS10 Head Diameter=15mm l=33mm	SFS SX4-D15-CS10 Head Diameter=15mm l=38mm
Thickness of cladding element	8 mm	10mm	12mm	8 mm	10mm	12mm
Diameter	5.8mm					
Length	29 mm	33 mm	38mm	29 mm	33 mm	38mm
Material	Stainless steel A2 or A4 (EN ISO 3506-1)					
Mechanical strength	in accordance with ETA-22/0793					

Vertical profiles geometrical and mechanical features

Reference	Asymmetrical T 130 x 45 x 2.3	L 45 x 45 x 2.3
Material	Extruded aluminium EN AW-Al MgSi AW 6060 T66	
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

Reference	Sto-Aluminium					
	T-Profile 90 x 52.7 x 2.7	L-Profile 40 x 50 x 2.7	Sto-Aluminium T-Profile 110 x 60 x 2.3	L-Profile 40 x 50 x 2.0	T-Profile 120 x 50 x 2.0	L-Profile 40 x 50 x 2.0
Material	Extruded aluminium EN AW-Al MgSi AW 6060 T66					
Thickness (mm)	2.7 (flange) 2,4mm (blade)	2.7 (flange and blade)	2.3 (flange) 2.0 mm (blade)	2.0 (flange and blade)	2.0 (flange and blade)	2.0 (flange and blade)
Section (mm^2)	2.9	1.8	3.36	1.96	3.36	1.76
$\mathbf{I_x}$ (cm^4)	6.5	4.6	10.09	2.78	6.14	4.57
$\mathbf{W_x}$ (cm^3)	1.54	1.31	2.08	0.89	1.47	1.29
$\mathbf{I_y}$ (cm^4)	12.7	2.7	22.19	7.52	28.80	2.65
$\mathbf{W_y}$ (cm^3)	2.82	0.9	4.03	1.82	4.80	0.87

42 EN ISO 3506-1 Fasteners - Mechanical properties of corrosion-resistant stainless steel fasteners - Part 1: Bolts, screws and studs with specified grades and property classes

Brackets geometrical and mechanical features

Reference	Supporting brackets			Retention brackets		
	100x45.3x80	**100x45.3x140**	**100x45.3x260**	**70x45.3x80**	**70x45.3x140**	**70x45.3x260**
Material	Extruded aluminium EN AW-Al MgSi AW 6060 T66					
Thickness (mm)	2.5	3.5	4	2.5	3.5	4

Reference	StoVentro Bracket L200 FP		StoVentro Bracket L200 GP	
	135x50x40-180	**135x50x200-320**	**95.5x50x40-180**	**95.5x50x200-320**
Material	Extruded aluminium EN AW-Al MgSi AW 6063 T66			
Thickness (mm)	3.2	4.2	3.2	4.2

Reference	StoVentro Bracket L100 FP/FP-S	StoVentro Bracket L100 GP/GP-S
	130x50x60-360/160-600	**75x50x60-360/160-600**
Material	Stainless steel 1.4162 Class S530	
Thickness (mm)	2.0	2.0

Reference	StoVentro Bracket L150 FP/FP-S	StoVentro Bracket L150 GP/GP-S
	130x50x80-360/160-600	**75x50x80-360/160-600**
Material	Stainless steel 1.4162 Class S530	
Thickness (mm)	2.0	2.0

Reference	StoVentro Bracket L300 FP	StoVentro Bracket L300 GP
	130x50x60-600	**75x50x60-600**
Material	Galvanized steel S 550GD+ZM430	
Thickness (mm)	2.0	2.0

Reference	StoVentro Bracket L350 FP	StoVentro Bracket L350 GP
	130x50x80-600	**75x50x80-600**
Material	Galvanized steel S 550GD+ZM430	
Thickness (mm)	2.0	2.0

Reference	StoVentro Bracket L300 FP-S/ L350 FP-S	StoVentro Bracket L300 GP-S/ L350 GP-S
	130x50x160-600	**75x50x160-600**
Material	Stainless steel 1.4162 Class S530	
Thickness (mm)	2.0	2.0

Stainless steel screw between bracket and vertical profile

Designation	SLA3/6-8-S4-SR2
Diameter	4.8 mm
Length	19 mm
Material	Stainless steel A4 (1.4401)
Standard	EN ISO 3506-4[43]
Tensile breaking load	7 850 N
Shear breaking load	5 235 N

Reference	Sto-Façade Self-drilling screw 5,5x19mm with overtwist lock
Clamping range for components combinations	3.1-5.0mm
Diameter	5.5 mm
Length	19 mm
Material	Stainless steel A2 or A4 (1.4301 or 1.4567)
Standard	EN 10088-1

Designation	StoVentro Screw 108
Clamping range for components combinations	3.8-8.0mm
Diameter	5.5 mm
Length	22 mm
Material	Stainless steel A4 (1.4578)
Mechanical strength	in accordance with ETA-10/0198

43 EN ISO 3506-4: 2009 Mechanical properties of corrosion-resistant stainless steel fasteners - Part 4: Tapping screws ISO 3506-4:2009)

StoVentec FibreCement timber subframe kit (Type B)

Fixings

Designation	StoVentro Screw 270 Head diameter=12 and 16mm	StoVentro Screw 270 Head diameter=12 and 16mm
Thickness of cladding element	8-10mm	10-12mm
Diameter	4.8 mm	
Length	38 mm	44 mm
Material	Stainless steel A2 (1.4567)	
Standard	EN 14592	

Designation	EJOT JT4 LT-2/6 KD16 l=50
Thickness of cladding element	8-10-12mm
Diameter	4.8 mm
Length	50 mm
Material	Stainless steel A2 or A4 (EN ISO 3506-1)
Mechanical strength	ETA-10/0200

Vertical batten geometrical features

Reference	**AT LOCATION OF JOINT**	**INTERMEDIATE SUPPORT**
Minimum width –W (mm)	2 x ≥ 70	≥ 70
Thickness – T (mm)	≥ 45	≥ 45
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		

Additionally, it is possible to use Sto Ventro Bracket L100 FP/GP, Sto Ventro Bracket L200 FP/GP and Sto Ventro Bracket L300 FP/GP.

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	

StoVentec FibreCement galvanized steel subframe kit (Type C)

Fixings

Designation	Rivet	Rivet
	StoVentro Rivet 240 Head Diameter=15mm l=18mm	StoVentro Rivet 240 Head Diameter=15mm l=22mm
Diameter	5.0 mm	
Length	18 mm	22 mm
Material	Stainless steel A4 (1.4578)	
Tensile breaking load	≥ 6500 N	
Shear breaking load	≥ 5300 N	

Designation	Self-drilling screw	
	EJOT JT3-LT-3-5.5 KD16 l=30	EJOT JT3-LT-3-5.5 KD16 l=32/8
Thickness of cladding element	8-10-12mm	8 mm
Diameter	5.5 mm	
Length	30 mm	32 mm
Material	Stainless steel A2 + carbon steel tip	
Mechanical strength	In accordance with ETA-10/0200	

Designation	Self-drilling screw				
	SFS SX3 D12 5.5 l=30	SFS SX3 D12 5.5 l=32	SFS SX4-D15-CS10 D15-5.8 l=29	SFS SX4-D15-CS10 D15-5.8 l=33	SFS SX4-D15-CS10 D15-5.8 l=38
Thickness of cladding element	8mm	10-12mm	8 mm	10mm	12mm
Diameter	5.5 mm		5.8		
Length	30 mm	32 mm	29 mm	33 mm	38 mm
Material	Stainless steel A2 or A4				
Tensile breaking load	10351 N		Mechanical strength in accordance with ETA-22/0793		
Shear breaking load	8966 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		

Additionally, it is possible to use StoVentro Bracket L300 FP/GP (Ω and L-profile) and L350 FP/GP (L-profile).

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

Fixed point sleeve

Designation	StoVentro Sleeve FP 001
Inner Diameter	5.1 mm
Outer Diameter	9.5 mm
Length	7,4 mm
Material	Aluminium

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 define type, position and number of the anchorage according to the substrate material and the resistance required due to the envisaged actions. When possible, CE marking according to the ETA via EAD 330232-00-0601, 330499-00-0601, 330747-00-0601, and 330076-00-0604 (etc.) is recommended.

Annex D: Confidential information

Quality control of components of kits manufactured by suppliers or ETA holder.
This confidential information is not included in the European Technical Assessment when that assessment is publicly available.