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## European Technical Assessment

**ETA 13/0311  
of 22.12.2023**



### General part

<b>Technical Assessment Body issuing the ETA: ITeC</b>	
ITeC has been designated according to Article 29 of Regulation (EU) No 305/2011 and is member of EOTA (European Organisation for Technical Assessment)	
<b>Trade name of the construction product</b>	<b>Kits for AQUAPANEL® Cladding Systems</b> WL121C; WL122C; WL221C; WL222C; WL321C; WL322C; WL131C; WL132C; WL231C; WL232C; WL331C; WL332C.
<b>Product family to which the construction product belongs</b>	Kits for external wall claddings of mineral boards with renderings applied in-situ.
<b>Manufacturer</b>	<b>KNAUF AQUAPANEL GMBH &amp; CO. KG</b>  Zur Helle 11 58638 Iserlohn Germany
<b>Manufacturing plant(s)</b>	According to Annex N kept by ITeC.
<b>This European Technical Assessment contains</b>	46 pages including 8 annexes which form an integral part of this assessment.
<b>This European Technical Assessment is issued in accordance with Regulation (EU) 305/2011, on the basis of</b>	EAD 090119-00-0404.  <i>Kits for external wall claddings of mineral boards with renderings applied in-situ. July 2018.</i>
<b>This ETA replaces</b>	ETA 13/0311, issued on 14.01.2022.

### **General comments**

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

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## Specific parts of the European Technical Assessment

### 1 Technical description of the product

This ETA refers to the following kits:

- 1) Kit for AQUAPANEL® Cladding Systems WL121C; WL122C; WL221C; WL222C; WL321C; WL322C<sup>1</sup> based on galvanized steel subframe.
- 2) Kit for AQUAPANEL® Cladding Systems WL131C; WL132C; WL231C; WL232C; WL331C; WL332C based on aluminium alloy subframe.

These kits consist of six rendering systems (different combinations of base-coats and finishing-coats), the AQUAPANEL® Cement Board Outdoor, its joint treatment and its board-fixings, the metallic subframes (vertical profiles, brackets and fixings made of galvanized steel or aluminium alloy) and optionally the flexible sheets for waterproofing and the mineral wool thermal insulation.

Kit components are given in table 1.1 related with AQUAPANEL® Cladding Systems components.

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

**Table 1.1:** Cladding systems components.

Assembled system layer	AQUAPANEL® Cladding Systems WL121C; WL122C; WL221C; WL222C; WL321C; WL322C	AQUAPANEL® Cladding Systems WL131C; WL132C; WL231C; WL232C; WL331C; WL332C	Technical description
Rendering systems	FC: Finishing-coat		Annex 2
	P: Primer		
	BC: Base-coat		
	M: Reinforcing mesh		
External layer	EB: AQUAPANEL® Cement Board Outdoor		Annex 3
	EBFx: Board-fixings		Annex 5
	WPL: Flexible sheet for waterproofing (optional) (*)		
Subframe	GSF: Galvanized steel vertical profiles and brackets	ASF: Aluminium alloy vertical profiles and brackets	Annex 4
Others	Thermal insulation (optional) (*)		Annex 5
	Fixings between the subframe and the substrate (optional) (*)		Annex 4
(*) These components may not be part of the kit, but they are always part of the assembled system. They may not be supplied by the kit manufacturer; however, they are available on the market, and they have to meet the specifications indicated in this ETA (see Annex 4 and Annex 5).			

The fixings between the subframe brackets and the supporting structure are always needed for the execution of the assembled systems, and they should be chosen according to the supporting structure material and the resistance required due to wind load and dead load.

<sup>1</sup> W = wall; L = cladding; 1st number = type of substrate or supporting structure (1 = solid wall; 2 = timber frame wall; 3 = metal frame wall); 2nd number = material of subframe (2 = galvanized steel; 3 = aluminium alloy); 3rd number = ventilated or non-ventilated cladding system (1 = non-ventilated; 2 = ventilated); C = cement as external board material.

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

Kit for AQUAPANEL® Cladding Systems WL121.C; WL122.C; WL221.C; WL222.C; WL321.C; WL322.C based on galvanized steel subframe and kit for AQUAPANEL® Cladding Systems WL131.C; WL132.C; WL231.C; WL232.C; WL331.C; WL332.C based on aluminium alloy subframe are to be used as:

- Use 1: Ventilated cladding systems (rain-screens) for external walls.
- Use 2: Non-ventilated cladding systems for external walls.

This ETA covers the kits for family 1, according to table 1.1 of EAD 090119-00-0404 as shown in tables of Annex 1.

The provisions made in this European Technical Assessment are based on an assumed working life of at least 25 years for the kits. The indications given on the working life cannot be interpreted as a guarantee given by the producer but are to be regarded only as a means for choosing the right products in relation to the expected economically reasonable working life of the works.

AQUAPANEL® Cladding Systems are made of non-load bearing construction components. They do not contribute directly to the stability of the wall on which they are installed, but they may contribute to its durability by providing enhanced protection from the effect of weathering.

Construction details are given in Annex 6 and Annex 7.

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

The assessment of the kits for AQUAPANEL® Cladding Systems for the intended use was performed following EAD 090119-00-0404 *Kits for external wall claddings of mineral boards with renderings applied in-situ*.

**Table 3.1:** Summary of the performance (see also detailed performances in relevant annexes).

Basic Working Requirement	EAD clause	Essential characteristic	Performance	
			Use 1	Use 2
Product:	Kits for Aquapanel® Cladding System	Intended use:	Use 1: Ventilated cladding systems (rain-screens) for external walls. Use 2: Non-ventilated cladding systems for external walls.	
BWR 2 Safety in case of fire	2.2.1	Reaction to fire	See table A1.3 in Annex 1	
	2.2.2	Façade fire performance	Not assessed	
BWR 3 Hygiene, health, and the environment	2.2.3	Propensity to undergo continuous smouldering	Not assessed	
	2.2.4	Watertightness (protection against driving rain)	See table A1.3 in Annex 1	
	2.2.5	Water absorption	See table A1.3 in Annex 1	
	2.2.6	Water vapour permeability	Not relevant	See table A1.3 in Annex 1
	2.2.7	Drainability	See table A1.3 in Annex 1	
BWR 4 Safety and accessibility in use	2.2.8	Content, emission and/or release of dangerous substances	Not assessed	
	2.2.9	Wind load resistance	See clause 3.1	
	2.2.10	Impact resistance	See table A1.3 in Annex 1	
	2.2.11	Resistance to horizontal point loads	See table A1.3 in Annex 1	
	2.2.12.1	Bond strength	See table A1.3 in Annex 1	
	2.2.12.2	Bending strength of the board	See table A1.3 in Annex 1	
	2.2.12.3	Embedding/Shear strength	See table A1.3 in Annex 1	
	2.2.12.4	Fixing pull-through / pull-out strength	See table A1.3 in Annex 1	
	2.2.12.5	Resistance of profiles	See table A1.3 in Annex 1	
	2.2.12.6	Tension/pull-out resistance	See table A1.3 in Annex 1	
BWR 5 Protection against noise	2.2.12.7	Shear load resistance	See table A1.3 in Annex 1	
	2.2.12.8	Bracket resistance (horizontal and vertical load)	See table A1.3 in Annex 1	
BWR 6 Energy economy and heat retention	2.2.13	Airborne sound insulation	Not assessed	
Durability	2.2.14	Thermal resistance	See table A1.3 in Annex 1	
	2.2.15.1	Accelerated ageing behaviour	See table A1.3 in Annex 1	
	2.2.15.2	Cracking strength due to board deformation	Not assessed	
	2.2.15.3	Dimensional stability by humidity	See table A1.3 in Annex 1	
	2.2.15.4	Dimensional stability by temperature	See table A1.3 in Annex 1	
	2.2.15.5	Moisture content	See table A1.3 in Annex 1	
	2.2.15.6	Corrosion	See table A1.3 in Annex 1	
	2.2.15.6	UV radiation resistance	See table A1.3 in Annex 1	

#### Complementary information:

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

The fire resistance requirement is applicable to the wall (made of masonry, concrete, timber, or metal frame) and not to the kit itself.

#### 3.1 Wind load resistance

The wind load resistance of the kits has been assessed according to clause 2.2.9 of EAD 090119-00-0404.

Table A1.3 in Annex 1 gives the wind load resistance obtained in the test carried out for AQUAPANEL® Cladding Systems WL121.C; WL122.C; WL221.C; WL222.C; WL321.C; WL322.C based on galvanized steel subframe and for AQUAPANEL® Cladding Systems WL131.C; WL132.C; WL231.C; WL232.C; WL331.C; WL332.C based on aluminium alloy subframe.

In addition, tables 3.1.1 give the wind load resistance for other different span of kit subframe components considering the weakest subframe components.

**Table 3.1.1:** Wind load resistance for kits with galvanized steel subframe.

Span between (mm)		Characteristic value Q (kN/m <sup>2</sup> ) (*)	Failure condition
Vertical profiles	Brackets		
400	600	≤ 3,2	Maximum load of test results
	800		
	1000	≤ 2,6	Retaining bracket (Rbk-2) horizontal load resistance characteristic value (R <sub>c1</sub> ) for 1 mm residual deformation (see table A4.1.3 in Annex 4).
	1200	≤ 2,1	
	1400	≤ 1,8	
600	600	≤ 2,8	Retaining bracket (Rbk-2) horizontal load resistance characteristic value (R <sub>c1</sub> ) for 1 mm residual deformation (see table A4.1.3 in Annex 4).
	800	≤ 2,1	
	1000	≤ 1,7	
	1200	≤ 1,4	
	1400	≤ 1,2	

(\*) Calculated values using continuous beam uniformly distributed load with three supports formulas.

**Table 3.1.2:** Wind load resistance for kits with aluminium alloy subframe.

Span between (mm)		Characteristic value Q (kN/m <sup>2</sup> ) (*)	Failure condition
Vertical profiles	Brackets		
400	600	≤ 2,8	Supporting bracket Sbk-5 horizontal load resistance characteristic value (R <sub>c1</sub> ) for 1 mm residual deformation (see table A4.2.3 in Annex 4).
	800	≤ 2,1	
	1000	≤ 1,7	
	1200	≤ 1,4	
	1400	≤ 1,2	
600	600	≤ 1,9	
	800	≤ 1,4	
	1000	≤ 1,1	
	1200	≤ 0,9	
	1400	≤ 0,8	

(\*) Calculated values using continuous beam uniformly distributed load with three supports formulas.

In other configurations of the assembled system (other subframe components), the wind load resistance may be calculated according to:

- Horizontal load resistance characteristic value of brackets for 1 mm residual deformation, see Annex 4.
- Maximum tension of the vertical profiles, see elastic limit of profile material in Annex 4.
- Maximum deflection of the vertical profiles, L/250.

This calculated wind load value should not be greater than the maximum resistance given in table A1.3 of Annex 1.

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

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

**Table 4.1:** Applicable AVPC system.

Product		Intended use		Level or class	System
Kits for external wall claddings of mineral boards with renderings applied in-situ	without flexible sheet for waterproofing	Ventilated and non-ventilated façades	not subject to fire regulations	Any	2+
			subject to fire regulations	B-s1,d0 A1	3
	with flexible sheet for waterproofing	Ventilated and non-ventilated façades	not subject to fire regulations	Any	2+
			subject to fire regulations	B-s1,d0 E	3 3 or 4

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

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

Issued in Barcelona on 22 December 2023.

by the Catalonia Institute of Construction Technology.



Ferran Bermejo Nualart

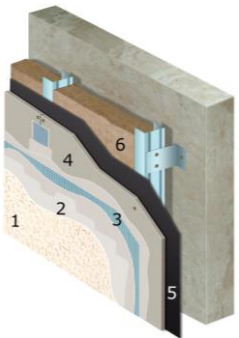
Technical Director, ITeC

<sup>2</sup> 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.

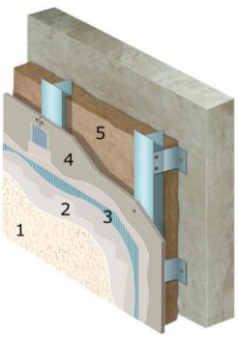
<sup>3</sup> The *Control Plan* is a confidential part of the ETA and is only handed over to the notified certification body involved in the assessment and verification of constancy of performance.

## ANNEX 1 - AQUAPANEL® CLADDING SYSTEMS

**Table A1.1:** Description of AQUAPANEL® Cladding Systems WL121.C; WL122.C; WL221.C; WL222.C; WL321.C; WL322.C – Family 1.

	<b>Family 1 – vertical profiles fixed by means of the webs</b>		
	<b>Use:</b> Non-ventilated and ventilated cladding systems  <b>Release scenario with respect to dangerous substances:</b> S/W2: Product with indirect contact to soil, ground- and surface water.  <b>Subframe material:</b> Galvanized steel.		
<ol style="list-style-type: none"> <li>1. Finishing coat</li> <li>2. Primer.</li> <li>3. Base-coat and reinforcing mesh.</li> <li>4. Board and joint treatment.</li> <li>5. Flexible sheet for waterproofing (optional).</li> <li>6. Subframe, thermal insulation (optional) and substrate.</li> </ol>	<b>System main components:</b>		
	Cladding element	Rendering system	See Annex 2
		Cement board outdoor	See Annex 3
	Board-fixing		See Annex 3
	Galvanized steel subframe		See clause A4.1
	Flexible sheet for waterproofing (optional) (*)		See clause A5.1
	Thermal insulation (optional) (*)		See clause A5.2
Fixings between the subframe and the substrate (optional) (*)		See Annex 4	
(*) These components may not be part of the kit, but they are always part of the assembled system. They may not be supplied by the manufacturer; however, they are available on the market and they have to meet the specifications indicated in the respective annexes.			

**Table A1.2:** Description of AQUAPANEL® Cladding Systems WL131.C; WL132.C; WL231.C; WL232.C; WL331.C; WL332.C – Family 1.

	<b>Family 1 – vertical profiles fixed by means of the webs</b>		
	<b>Use:</b> Non-ventilated and ventilated cladding systems  <b>Release scenario with respect to dangerous substances:</b> S/W2: Product with indirect contact to soil, ground- and surface water.  <b>Subframe material:</b> Aluminium alloy.		
<ol style="list-style-type: none"> <li>1. Finishing coat</li> <li>2. Primer.</li> <li>3. Base-coat and reinforcing mesh.</li> <li>4. Board and joint treatment.</li> <li>5. Subframe, thermal insulation (optional) and substrate.</li> </ol>	<b>Kit main components:</b>		
	Cladding element	Rendering system	See Annex 2
		Cement board outdoor	See Annex 3
	Board-fixing		See Annex 3
	Aluminium alloy subframe		See clause A4.1
	Flexible sheet for waterproofing (optional) (*)		See clause A5.1
	Thermal insulation (optional) (*)		See clause A5.2
Fixings between the subframe and the substrate (optional) (*)		See Annex A4	
(*) These components may not be part of the kit but, they are always part of the assembled system. They may not be supplied by the manufacturer; however, they are available on the market and they have to meet the specifications indicated in the respective annexes.			

AQUAPANEL® Cladding Systems-Family 1		Annex 1 of European Technical Assessment ETA 13/0311
Galvanized steel subframe	WL121.C; WL122.C; WL221.C; WL222.C; WL321.C; WL322.C	
Aluminium alloy subframe	WL131.C; WL132.C; WL231.C; WL232.C; WL331.C; WL332.C	



**Table A1.3:** Performance of AQUAPANEL® Cladding Systems – Family 1.

Nr	Essential characteristic	Kit for Aquapanel® Cladding Systems relevant configurations	Performance	
<b>Basic Works Requirement 2: Safety in case of fire</b>				
1	Reaction to fire (front side)	AQUAPANEL® Outdoor (EB-1) as external-board and rendering system (RS-01 to RS-06)	B-s1,d0	
	Reaction to fire (rear side)	AQUAPANEL® Outdoor (EB-1) without flexible sheet for waterproofing	A1	
		AQUAPANEL® Outdoor (EB-1) with flexible sheet for waterproofing (WPL-2 or WPL-3)	E	
2	Façade fire performance		Not assessed	
3	Propensity to undergo continuous smouldering		Not assessed	
<b>Basic Works Requirement 3: Hygiene, health and the environment</b>				
4	Watertightness (protection against driving rain)	AQUAPANEL® Outdoor (EB-1) as external-board, any rendering system (RS-01 to RS-06) with and without flexible sheet of waterproofing (WPL-2 or WPL-3)	1350 Pa without water penetration	
5	Water absorption by capillarity	AQUAPANEL® Outdoor (EB-1) as external-board and rendering system (RS-01 to RS-06)	without ageing	0,13 kg/m <sup>2</sup> (after 3 min) 0,16 kg/m <sup>2</sup> (after 1 h) 0,78 kg/m <sup>2</sup> (after 24 h)
			after hygrothermal cycles	0,04 kg/m <sup>2</sup> (after 3 min) 0,14 kg/m <sup>2</sup> (after 1 h) 0,62 kg/m <sup>2</sup> (after 24 h)
		AQUAPANEL® Outdoor (EB-1) as external-board and base coat (BC-1 to BC-3)	without ageing	0,24 kg/m <sup>2</sup> (after 3 min) 0,59 kg/m <sup>2</sup> (after 1 h) 1,24 kg/m <sup>2</sup> (after 24 h)
			after hygrothermal cycles	0,20 kg/m <sup>2</sup> (after 3 min) 0,62 kg/m <sup>2</sup> (after 1 h) 1,22 kg/m <sup>2</sup> (after 24 h)
	Water permeability (water column)			Not assessed
	Water absorption of the board		AQUAPANEL® Outdoor (EB-1)	21,2% by mass
Watertightness of the breather membrane		Flexible sheet for waterproofing (WPL2 or WPL3)	W1	
6	Water vapour permeability of the rendering system	RS-01 on AQUAPANEL® Outdoor (EB-1)	$\mu = 45$	
		RS-02 on AQUAPANEL® Outdoor (EB-1)	$\mu = 41$	
		RS-03 to RS-06 on AQUAPANEL® Outdoor (EB-1)	Not assessed	
	Water vapour permeability of the boards		AQUAPANEL® Outdoor (EB-1)	Not assessed
	Water vapour permeability of the thermal insulation		Mineral Wool	$\mu = 1$
Water vapour permeability of the breather membrane		Flexible sheet for waterproofing (WPL1 or WPL2)	$S_d = 0,025$ m	
7	Drainability	Galvanized steel subframe (GSF1 & GSF2)	No water accumulation or moisture damage or leakage. See Annex 6.	
		Aluminium alloy subframe (ASF1)	No water accumulation or moisture damage or leakage. See Annex 7.	
7	Content, emission and/or release of dangerous substances		Not assessed	
<b>Basic Works Requirement 4: Safety and accessibility in use</b>				
9	Wind load resistance	AQUAPANEL® Outdoor (EB-1) and galvanized steel subframe (GSF-1 & GSF-2) with maximum span between vertical profiles 600 mm	3200 Pa; $\delta \leq L/200$ See also clause 3.1	
		AQUAPANEL® Outdoor (EB-1) and aluminium alloy subframe (ASF-1) with maximum span between vertical profiles 600 mm	2800 Pa; $\delta \leq L/200$ See also clause 3.1	
<b>AQUAPANEL® Cladding Systems-Family 1</b>			<b>Annex 1</b> of European Technical Assessment ETA 13/0311	
<b>Galvanized steel subframe</b>	WL121.C; WL122.C; WL221.C; WL222.C; WL321.C; WL322.C			
<b>Aluminium alloy subframe</b>	WL131.C; WL132.C; WL231.C; WL232.C; WL331.C; WL332.C			

Nr	Essential characteristic	Kit for Aquapanel® Cladding Systems relevant configurations	Performance	
10	Impact resistance	AQUAPANEL® Outdoor (EB-1), rendering system (RS-01 to RS-06) and both galvanized steel subframe (GSF-1 & GSF-2) and aluminium alloy subframe (ASF-1) with maximum span between vertical profiles 600 mm	Resists (Category II): - Hard body 0,5 kg, 3 J - Hard body 1,0 kg, 10 J (deterioration, no penetration) - Soft body 3,0 kg, 60 J - Soft body 50,0 kg, 400 J	
11	Resistance to horizontal point loads	AQUAPANEL® Outdoor (EB-1) as external-board and rendering system (RS-01 to RS-06) with maximum span between vertical profiles 600 mm	No visible deformation	
12	Bond strength	AQUAPANEL® Outdoor (EB-1) as external-board and rendering system (RS-01 to RS-06)	without ageing	$R_m = 0,30$ MPa $R_{min} = 0,20$ MPa 100% Cohesive rupture in the board
			after hygrothermal cycles	$R_{min} = 0,20$ MPa
			after freeze-thaw cycles	Not assessed
		AQUAPANEL® Outdoor (EB-1) as external-board and base coat (BC-1 to BC-3)	without ageing	$R_m = 0,40$ MPa $R_{min} = 0,30$ MPa BC-1 & BC-2: 100% Cohesive rupture in the board BC-3: 92% Cohesive rupture in the board
		after hygrothermal cycles	$R_{min} = 0,15$ MPa	
13	Bending strength of the board	AQUAPANEL® Outdoor (EB-1)	$f_{m,0,k} = 5,0$ MPa $f_{m,90,k} = 8,1$ MPa	
14	Embedding/Shear strength	AQUAPANEL® Outdoor (EB-1) and screw (EBF-1 or EBF-2) Ø4,2 mm	Corner ( $a_{edge} \geq 21$ mm)	$F_m = 540$ N; $F_c = 420$ N
			Border ( $a_{edge} \geq 15$ mm)	$F_m = 700$ N; $F_c = 400$ N
15	Pull-through resistance	AQUAPANEL® Outdoor (EB-1)	$F_c = 390$ N	
	Pull-out resistance	Galvanized steel vertical profiles (EVP-1 & EVP-2) and screws (EBF-1 or EBF-2)	$F_m = 770$ N; $F_c = 630$ N	
		Galvanized steel vertical profiles (EVP-1 & EVP-2) and screws (C-SF-1, C-SF-2, C-SF-5 and C-SF-6)	$F_m = 780$ N; $F_c = 660$ N	
	Aluminium alloy vertical profiles (EVP-16 & EVP-17) and screws (EBF-7)	$F_m = 1700$ N; $F_c = 1400$ N		
16	Resistance of profiles	Galvanized steel subframe (GSF-1 & GSF-2)	See Annex 4.1	
		Aluminium alloy subframe (ASF-1)	See Annex 4.2	
17	Tension/Pull-out resistance of subframe fixings	Screw (C-SF-1) for galvanized steel subframe	$N_{R,k} \geq 1780$ N	
		Screw (C-SF-2) for galvanized steel subframe	$N_{R,k} \geq 1600$ N	
		Screw (C-SF-5) for galvanized steel subframe	$N_{R,k} \geq 1400$ N	
		Screw (C-SF-6) for galvanized steel subframe	$N_{R,k} \geq 1400$ N	
		Screw (C-SF-3, C-SF-4, C-SF-7 & C-SF-8) for aluminium alloy subframe	Not assessed	
		Screw (C-SF-9) for aluminium alloy subframe	$N_{R,k} \geq 1830$ N	
		Screw (C-SF-10) for aluminium alloy subframe	$N_{R,k} \geq 1770$ N	
18	Shear resistance of subframe fixings	Screw (C-SF-1) for galvanized steel subframe	$V_{R,k} \geq 3000$ N	
		Screw (C-SF-2) for galvanized steel subframe	$V_{R,k} \geq 1780$ N	
		Screw (C-SF-5) for galvanized steel subframe	$V_{R,k} \geq 1380$ N	
		Screw (C-SF-6) for galvanized steel subframe	$V_{R,k} \geq 1380$ N	
		Screw (C-SF-3, C-SF-4, C-SF-7 & C-SF-8) for aluminium alloy subframe	Not assessed	
		Screw (C-SF-9) for aluminium alloy subframe	$V_{R,k} \geq 1130$ N	
		Screw (C-SF-10) for aluminium alloy subframe	$V_{R,k} \geq 1230$ N	
19	Bracket resistance	Brackets (SBk-1 to SBk-8 & RBk-1 to RBk-8) for galvanized steel subframe	See table A4.1.3	
		Brackets (SBk-4, SBk-15, RBk-4 & RBk-15) for aluminium alloy subframe	See table A4.2.3	

**AQUAPANEL® Cladding Systems-Family 1**

<b>Galvanized steel subframe</b>	WL121.C; WL122.C; WL221.C; WL222.C; WL321.C; WL322.C	<b>Annex 1</b> of European Technical Assessment ETA 13/0311
<b>Aluminium alloy subframe</b>	WL131.C; WL132.C; WL231.C; WL232.C; WL331.C; WL332.C	

Nr	Essential characteristic	Kit for Aquapanel® Cladding Systems relevant configurations	Performance	
<b>Basic Works Requirement 5: Protection against noise</b>				
20	Improvement of the airborne sound insulation		Not assessed	
	Airflow resistivity of the thermal insulation	Mineral wool	See table A5.2.2	
<b>Basic Works Requirement 6: Energy economy and heat retention</b>				
21	Thermal resistance	For use in non-ventilated façade	Not assessed	
		Mineral wool thermal insulation for use in ventilated façade	See table A5.2.2	
<b>Durability</b>				
22	Accelerated ageing behaviour	Hygrothermal behaviour	No defects	
		Freeze thaw behaviour	Not assessed	
		Combined hygrothermal and freeze thaw behaviour	Not assessed	
23	Cracking strength due to board deformation		Not assessed	
24	Dimensional stability by humidity	AQUAPANEL® Outdoor (EB-1)	Expansion (65 % to 85 %)	Length: 0,2 mm/m Thickness: 0,02 %
			Shrinkage (65 % to 30 %)	Length: - 0,4 mm/m Thickness: - 0,04 %
	Linear thermal expansion	Galvanized steel subframe (GSF-1 & GSF-2)	$\alpha = 12 \mu\text{m}/\text{m}\cdot\text{K}^{-1}$ for $T \leq 100 \text{ }^\circ\text{C}$	
		Aluminium alloy subframe (ASF-1)	$\alpha = 23 \mu\text{m}/\text{m}\cdot\text{K}^{-1}$ for $T \leq 100 \text{ }^\circ\text{C}$	
25	Moisture content	AQUAPANEL® Outdoor (EB-1)	10,3% by mass	
26	Corrosion	Galvanized steel subframe (GSF-1 & GSF-2)	See table A4.1.7	
		Aluminium alloy subframe (ASF-1)	See table A4.2.6	
27	UV radiation resistance	Flexible sheet for waterproofing (WPL-2 and WPL-3)	See clause A5.1	

<b>AQUAPANEL® Cladding Systems-Family 1</b>		<b>Annex 1</b> of European Technical Assessment ETA 13/0311
<b>Galvanized steel subframe</b>	WL121.C; WL122.C; WL221.C; WL222.C; WL321.C; WL322.C	
<b>Aluminium alloy subframe</b>	WL131.C; WL132.C; WL231.C; WL232.C; WL331.C; WL332.C	

## ANNEX 2 - RENDERING SYSTEMS COMPONENTS

Characteristic		Types					
		RS-01	RS-02	RS-03	RS-04	RS-05	RS-06
Generic components	Finishing coat (FC)	FC1	FC4	FC3	FC5	FC3	FC5
	Primer (P)	P1	P2	P-3			
	Base-coat (BC)	BC1		BC2		BC3	
	Reinforcing mesh (M)	M1					
Range of application thickness (mm)		5 - 9	5 - 11	5 - 11	5 - 11	5 - 11	5 - 11
Mass per square meter (kg/m <sup>2</sup> )		7,3 – 11,6	7,3 – 13,8	6,5 – 12,5	6,5 – 12,9	6,6 – 12,6	6,6 – 13,0
PCS <sub>s</sub> -value	(MJ/kg)	≤ 3,1	≤ 1,0	≤ 2,7	≤ 1,1	≤ 0,4	≤ 1,1
	(MJ/m <sup>2</sup> )	≤ 31,9	≤ 12,3	≤ 31,1	≤ 12,8	≤ 4,9	≤ 12,8
Reaction to fire		B-s1,d0					
Water absorption by capillarity (kg/m <sup>2</sup> ) (*)	after 3 min. (**)	0,02	0,04	0,13	0,04	0,10	0,05
	after 1 h. (***)	0,02	0,15	0,06	0,14	0,07	0,16
	after 24 h. (***)	0,19	0,43	0,32	0,78	0,28	0,71
Bond strength (MPa) (*)	Mean	0,57	0,48	0,31	0,37	0,32	0,69
	Minimum	0,51	0,43	0,26	0,22	0,28	0,52
	Cohesive rupture	100%	100%	100%	100%	100%	100%
Thermal conductivity - λ <sub>23/80</sub> W/(m·K) (*)		< 0,45	< 0,45	ND	ND	ND	ND
Thermal resistance - R <sub>23/80</sub> (m <sup>2</sup> ·K)/W (*)		> 0,04	> 0,04	ND	ND	ND	ND
(*) Rendering system applied on the AQUAPANEL® Cement Board Outdoor (EB-1).							
(**) Values from initial immersion.							
(***) Values from 3 minutes immersion.							
ND = not defined.							

Generic component	Code	Trade name	Reference
Finishing coat	FC-1	Pintura lisa flexible GRC	---
	FC-3	AQUAPANEL® Exterior Mineral Finish – white	EN 998-1
	FC-4	Acabado Pétreo GRC	EN 15824
	FC-5	AQUAPANEL® Exterior Dispersion Plaster - white	EN 15824
Primer (before render or paint)	P-1	Primecoin GRC	---
	P-2	Imprimación Fondo Pétreo GRC	---
	P-3	AQUAPANEL® Base-coat Primer	---
Base-coat	BC-1	Mortero Superficial AQUAPANEL® Outdoor	EN 998-1
	BC-2	AQUAPANEL® Exterior Base-coat - white	EN 998-1
	BC-3	AQUAPANEL® Exterior Base-coat	EN 998-1
Reinforcing mesh	M-1	AQUAPANEL® Reinforcing Mesh	EAD 040016-00-0404
"---" = not applicable.			

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Characteristics		Reference	FC-1	
Trade name		---	Pintura lisa flexible GRC	
Generic type		EN 1062-1	Acrylic paint with binder based on a siloxane modified acrylic resins and soluble in water	
Range of application thickness (mm)		---	≤ 0,2	
Coverage (l/m <sup>2</sup> )		---	≤ 0,250	
Density of delivered product – liquid (kg/m <sup>3</sup> )		A.3.1 of EAD 090119-00-0404 or EN ISO 2811-1	1400 ± 50	
Particle size (%) > 40 µm		EN 787-7	0,46	
Organic content	Dry extract (liquid)	A.5 of EAD 090119-00-0404	65,7	
	Ash content (%) at 450 °C	A.6.1 of EAD 090119-00-0404	64,7	
	PCS <sub>s</sub> -value	(MJ/kg)	EN ISO 1716	8,3
		(MJ/m <sup>2</sup> )		2,3
"---" = not applicable.				

Characteristics		Reference	FC-3	
Trade name		---	AQUAPANEL® Exterior Mineral Finish – white	
Designation		EN 998-1	CR – Coloured rendering mortar	
Range of application thickness (mm)		---	≤ 2,0	
Coverage (kg/m <sup>2</sup> )		---	≤ 3,0	
Density of delivered product – powder (kg/m <sup>3</sup> )		A.3.1 of EAD 090119-00-0404	1680 ± 50	
Particle size (%)	< 2 mm	EN 1015-1 or A.4 of EAD 090119-00-0404	100	
	< 1 mm		61	
	< 0,5 mm		57	
Bulk density of fresh mortar - water 25% (kg/m <sup>3</sup> )		EN 1015-6 or A.3.3 of EAD 090119-00-0404	1700 ± 50	
Consistence - water 25% (mm)		EN 1015-3	155	
Dry bulk density of hardened mortar (kg/m <sup>3</sup> )		EN 1015-10	1450 ± 50	
Mechanical characteristics of hardened mortar	Flexural strength (MPa)	EN 1015-11	1,5 to 5,0 (CSII)	
	Compressive strength (MPa)		> 3,0	
	Static modulus of elasticity at break (MPa)	A.7 of EAD 090119-00-0404	0,40	
	Tensile strength at break (MPa)		1753	
	Elongation at break (mm)		0,09	
Organic content	Ash content (%) at 450 °C	A.6.1 of EAD 090119-00-0404	99,7	
	PCS <sub>s</sub> -value	MJ/kg	EN ISO 1716	0,0
		MJ/m <sup>2</sup>		
"---" = not applicable.				

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Characteristics		Reference	FC-4	FC-5
Trade name		---	Acabado Pétreo GRC	AQUAPANEL® Exterior Dispersion Plaster - white
Generic type		EN 15824	Acrylic mortar with binder based on modified acrylic copolymers and soluble in water.	Water based organic resin plaster and soluble in water
Range of application thickness (mm)		---	≤ 2,2	≤ 2,2
Coverage (kg/m <sup>2</sup> )		---	≤ 3,3	≤ 3,1
Density of delivered product – paste (kg/m <sup>3</sup> )		A.3.1 of EAD 090119-00-0404	1650 ± 50	1900 ± 50
Particle size (%)	size < 2 mm	EN 1015-1 or A.4 of EAD 090119-00-0404	99,5	99,4
	size < 1 mm		76	71
	size < 0,5 mm		68	67
Bulk density of fresh mortar (kg/m <sup>3</sup> )		EN 1015-6 or A.3.3 of EAD 090119-00-0404	1650 ± 50	1900 ± 50
Consistence (mm)		EN 1015-3	165	170
Dry bulk density of hardened mortar (kg/m <sup>3</sup> )		EN 1015-10	1700 ± 50	1950 ± 50
Mechanical characteristics of hardened mortar	Flexural strength (MPa)	EN 1015-11	1,5 to 5,0 (CSII)	1,5 to 5,0 (CSII)
	Compressive strength (MPa)		> 3,5	> 1,5
	Static modulus of elasticity at break (MPa)	A.7 of EAD 090119-00-0404	0,45	0,14
	Tensile strength at break (MPa)		198	66
	Elongation at break (mm)		1,03	0,78
Organic content	Dry extract – paste (%)	A.5 of EAD 090119-00-0404	76,5	85,5
	Ash content (%) at 450 °C	A.6.1 of EAD 090119-00-0404	88,0	89,3
	PCS <sub>s</sub> -value	MJ/kg	3,3	2,5
MJ/m <sup>2</sup>		10,8	7,8	

“---” = not applicable.

Characteristics		Reference	P-1	P-2	P-3
Trade name		---	Imprimación GRC	Imprimación Fondo Pétreo GRC	AQUAPANEL® Base-coat Primer
Generic type		EN 1062-1	(i)	(i)	(ii)
Range of application thickness (mm)		---	≤ 0,2	≤ 0,2	≤ 1,0
Coverage (kg/m <sup>2</sup> )		---	≤ 0,20	≤ 0,17	≤ 0,15
Density of delivered product – liquid (kg/m <sup>3</sup> )		A.3.1 of EAD 090119-00-0404 or EN ISO 2811-1	1050 ± 50	1500 ± 50	1050 ± 50
Organic content	Dry extract – liquid (%)	A.5 of EAD 090119-00-0404	9,3	65,7	21,8
	Ash content (%) at 450 °C	A.6.1 of EAD 090119-00-0404	2,0	81,0	34,4
	PCS <sub>s</sub> -value	MJ/kg	EN ISO 1716	27,4	4,5
MJ/m <sup>2</sup>		28,8		0,6	2,6

(i) Acrylic primer with binder based on modified acrylic copolymers and soluble in water.  
(ii) Aqueous dispersion of an acrylic-acid ester copolymer, limestone and additives.  
“---” = not applicable.

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Characteristics		Reference	BC-1	BC-2	BC-3
Trade name		---	Mortero Superficial AQUAPANEL® Outdoor	AQUAPANEL® Exterior Base-coat - white	AQUAPANEL® Exterior Base-coat
Designation		EN 998-1	GP – General purpose rendering/plastering mortar		
Range of application thickness (mm)		---	5 – 7	4 – 6	5 – 7
Coverage (kg/m <sup>2</sup> )		---	7,3 – 10,2	6,5 – 9,1	6,6 – 9,2
Density of delivered product – powders (kg/m <sup>3</sup> )		A.3.1 of EAD 090119-00-0404	1300 ± 150	1350 ± 150	1500 ± 150
Particle size (%)	size < 2 mm	EN 1015-1 or A.4 of EAD 090119-00- 0404	100	100	100
	size < 1 mm		100	100	95
	size < 0,5 mm		81	81	58
Bulk density of fresh mortar - water 25% (kg/m <sup>3</sup> )		EN 1015-6 or A.3.3 of EAD 090119-00- 0404	1650 ± 150	1450 ± 150	1650 ± 150
Consistence - water 25% (mm)		EN 1015-3	147	138	164
Dry bulk density of hardened mortar (kg/m <sup>3</sup> )		EN 1015-10	1450 ± 150	1300 ± 150	1450 ± 150
Mechanical characteristics of hardened mortar	Flexural strength (MPa)	EN 1015-11	1,5 to 5,0 (CSII)	1,5 to 5,0 (CSII)	1,5 to 5,0 (CSII)
	Compressive strength (MPa)		> 5,0	> 5,0	> 5,0
	Static modulus of elasticity at break (MPa)	A.7 of EAD 090119- 00-0404	ND	1,24	ND
	Tensile strength at break (MPa)		ND	4803	ND
	Elongation at break (mm)		ND	0,07	ND
	Dynamic modulus of elasticity (MPa)	A.7.1 of EAD 090119-00-0404	7561	5552	7381
	Shrinkage - 28 d (mm/m)		< 1,2	< 1,1	< 1,2
Organic content	Ash content (%) at 450 °C	A.6.1 of EAD 090119-00-0404	98,7	99,7	99,3
	PCS <sub>s</sub> -value	MJ/kg MJ/m <sup>2</sup> EN ISO 1716	0,0	0,0	0,0
Water absorption by capillarity (kg/m <sup>2</sup> ) (*)	after 3 min. (**)	Annex E of EAD 090119-00-0404	0,24	0,18	0,12
	after 1 h. (***)		0,59	0,07	0,07
	after 24 h. (***)		1,24	0,41	0,37
Bond strength (MPa) (*)	Mean	EN 1015-12	0,42	0,45	0,57
	Minimum		0,39	0,33	0,48
	Cohesive rupture		100%	100%	92%
(*) Base coat applied on the AQUAPANEL® Cement Board Outdoor (EB-1). (**) Values from initial immersion. (***) Values from 3 minutes immersion. "---" = not applicable. ND = not defined.					

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<b>Characteristics</b>		<b>Reference</b>	<b>M-1</b>
Trade name		R 131 A101	AQUAPANEL® Reinforcing Mesh
Generic type		EAD 040016-00-0404	Glass fibre reinforcing mesh
Width (m)		A.10 of EAD 090119-00-0404	1,0
Thickness (mm)			0,5
Grid width (mm)			4 x 4
Superficial mass (g/m <sup>2</sup> )		A.9 of EAD 090119-00-0404	160 ± 10
Tear resistance (N) for 50 mm		EN 13496	2500
Ash content (%) at 625 °C		Cl. 2.2.2 of EAD 040016-00-0404	82,6
Organic content (%)			17,4
PCS <sub>s</sub> -value	MJ/kg	EN ISO 1716	5,80
	MJ/m <sup>2</sup>		0,93

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## ANNEX 3 – CEMENT BOARD LAYER

**Table A3.1:** Trade name of external layer components.

Generic component		Code	Trade name	Reference
Cement board		EB-1	AQUAPANEL® Cement Board Outdoor	ETA 07/0173
Joint filler for cement board		EJF-1	Mortero de juntas AQUAPANEL® Outdoor	---
		EJF-2	AQUAPANEL® Joint Filler - grey	---
Joint tape for cement board		EJT-1	AQUAPANEL® Exterior Reinforcing Tape	---
		EJT-2	AQUAPANEL® Tape (10 cm)	---
Fixings for cement board	for galvanized steel subframe	EBF-1	AQUAPANEL® Maxi Screw SN (needle point)	EN 14566
		EBF-2	AQUAPANEL® Maxi Screw SB (drill point)	EN 14566
	for aluminium alloy subframe	EBF-7	AQUAPANEL® Drill point screw on aluminium profile	---

“---” = not applicable.

**Table A3.2:** CEMENT BOARD.

Characteristics	Reference	EB-1
Trade name	---	AQUAPANEL® Cement Board Outdoor
Thickness (mm)	ETA 07/0173	12,50 ± 1,25 mm
Width (mm)		≤ 1250
Length (mm)		≤ 3000
Apparent density – dry (kg/m <sup>3</sup> )		1200 ± 175
Reaction to fire		A1
Heat-rain resistance		Pass for Category B
Freeze-thaw resistance		R <sub>L,FTC</sub> = 0,91 for Category B
Air permeability		Not permeable
Thermal conductivity (W/(m·K))		ND

“---” = not applicable.  
ND = not defined.

**Table A3.3:** JOINT FILLER FOR CEMENT EXTERNAL BOARD.

Characteristics	Reference	EJF-1	EJF-2
Trade name	---	Mortero de juntas AQUAPANEL® Outdoor	AQUAPANEL® Joint Filler - grey
Designation	EN 998-1	GP – General purpose rendering/plastering mortar	
Bulk density of fresh mortar (kg/m <sup>3</sup> )	EN 1015-6	1600 - 1700	1400 - 1500
Dry bulk density of hardened mortar (kg/m <sup>3</sup> )	EN 1015-10	1150 - 1250	1150 - 1370
Ash content (%) at 450 °C	A.6.1 of EAD 090119-00-0404	98,0	99,7
Reaction to fire	EN 13501-1	A1	A1

“---” = not applicable.

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Characteristics	Reference	EJT-1	EJT-2
Trade name	---	AQUAPANEL® Exterior Reinforcing Tape (20 cm)	AQUAPANEL® Tape (10 cm)
Generic type	EN 13496	Glass fibre reinforcing joint tape	
Width (m)	---	0,20	0,10
Thickness (mm)	---	0,5	
Grid width (mm)	---	4 x 4	
Superficial mass (g/m <sup>2</sup> )	---	160 ± 10	
"---" = not applicable.			

Characteristics	Reference	EBF-1	EBF-2	EBF-7	EBF-8
Trade name	---	AQUAPANEL® Maxi Screw SN (needle point)	AQUAPANEL® Maxi Screw SB (drill point)	AQUAPANEL® Drill point screw on aluminium profile	EJOT self-drilling screw JT4-ST3-3-4.8
Generic type	EN 14566	Drywall self-tapping normal screw for steel profile thickness up to 0,7 mm	Drywall self-drilling screw for steel profile thickness up to 2,25 mm	Drywall self-drilling screw for aluminium profile thickness up to 2,25 mm	Drywall self-drilling screw for profile thickness up to 3,0 mm
Diameter x length (mm)	---	4,2 x 25 4,2 x 39 4,2 x 55	4,2 x 25 4,2 x 39	4,8 x 35 5,5 x 25	4,8 x 35
Pin shape	---	Needle point	Drill point	Drill point	Drill point
Material type	EN 10083 or EN 10084	Carbon steel case hardened and galvanized	Carbon steel case hardened and galvanized	Carbon steel case hardened and galvanized	ND
Corrosion protection	EN ISO 12944-6	Class C4 long	Class C4 long	Class C4 long	ND
Bending resistance	EN 14566	> 10°	> 10°	> 10°	ND
Hardness (HRC) at 600HV	EN ISO 6508-1	55	55	55 HRC (600 HV)	ND
Pull out strength screw/profile (N)	EN 14566	> 450	> 450	> 450	ND
Reaction to fire	EN 13501-1	A1	A1	A1	A1
"---" = not applicable. ND = Not defined.					

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## ANNEX 4 - SUBFRAMES

### A4.1 - GALVANIZED STEEL SUBFRAME COMPONENTS

**Table A4.1.1: TYPE OF GALVANIZED STEEL SUBFRAMES.**

Components	GSF-01	GSF-02
Vertical profile	EVP-1a / EVP-1b	EVP-2a / EVP-2b
Horizontal profile	EHP-1a / EHP-1b	EHP-2a / EHP-2b
Supporting bracket	SBk-1a / SBk-1b / SBk-2a / SBk-2b / SBk-3a / SBk-3b / SBk-6 / SBk-7 / SBk-8	
Retaining bracket	RBk-1a / RBk-1b / RBk-2a / RBk-2b / RBk-3a / RBk-3b / RBk-6 / RBk-7 / RBk-8	
Fixing between profiles and brackets	C-SF-1 / C-SF-2 / C-SF-5 / C-SF-6	
Fixings between brackets and substrate (optional)	This component is an optional kit component. This means that it can be delivered by the ETA holder as a kit component, or it can be bought by the kit user on the open market. In any case, see the specifications given in table A4.1.9.	

**Table A4.1.2: GALVANIZED STEEL SUBFRAME COMPONENTS.**

Generic component	Code		Trade name	Reference		
Vertical profile	EVP-1a	EVP-1b	Knauf C-profile	C50x50x0,7	C50x50x0,8	EN 14195
	EVP-2a	EVP-2b		C75x50x0,7	C75x50x0,8	
Horizontal profile	EHP-1a	EHP-1b	Knauf U-profile	U50x40x0,7	U50x40x0,8	EN 14195
	EHP-2a	EHP-2b		U75x40x0,7	U75x40x0,8	
Supporting bracket	SBk-1a	SBk-1b	Knauf Supporting bracket	100x80x65x2	100x80x65x3	---
	SBk-2a	SBk-2b		100x120x65x2	100x120x65x3	
	SBk-3a	SBk-3b		100x150x65x2	100x150x65x3	
	SBk-6			107x80x65x2		
	SBk-7			107x100x65x2		
	SBk-8			107x150x65x2		
Retaining bracket	RBk-1a	RBk-1b	Knauf Retaining bracket	60x80x50x2	60x80x50x3	---
	RBk-2a	RBk-2b		60x120x50x2	60x120x50x3	
	RBk-3a	RBk-3b		60x150x50x2	60x150x50x3	
	RBk-6			57x80x65x2		
	RBk-7			57x120x65x2		
	RBk-8			57x150x65x2		
Fixing between profiles and brackets	C-SF-1		Self-drilling screw S-MD53Z 6,3x25 with hexagon head and integrated washer.		ETA 10/0182	
	C-SF-2		Self-drilling screw S-MD03Z 4,8x18 with hexagon head and integrated washer.			
	C-SF-5		Self-drilling screw JT2-2HPlus-5.5x25 with hexagon head and integrated washer with sealing washer		ETA 10/0200	
	C-SF-6		Self-drilling screw JF2-2HPlus-4.8x19 with hexagon head and integrated washer with sealing washer			

"---" = not applicable.

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**Table A4.1.3: BRACKET RESISTANCE (HORIZONTAL AND VERTICAL LOADS).**

Bracket type (H x L x B x t)			Horizontal load resistance (kN)				Vertical load resistance (kN)							
			R <sub>m1</sub>	R <sub>c1</sub>	R <sub>msh</sub>	R <sub>csh</sub>	R <sub>mr</sub>	R <sub>cr</sub>	R <sub>m1d</sub>	R <sub>c1d</sub>	R <sub>m3d</sub>	R <sub>c3d</sub>	R <sub>m3v</sub>	R <sub>c3v</sub>
Supporting	SBk-1a	100x80x65x2	1,79	1,63	2,00	1,73	1,17	0,49	0,89	0,53	1,95	1,38	2,70	2,08
	SBk-1b	100x80x65x3												
	SBk-2	100x120x65x2	1,61	1,50	1,92	1,82	0,92	0,72	0,61	0,42	1,05	0,89	1,93	1,72
	SBk-2b	100x120x65x3												
	SBk-3a	100x150x65x2	1,76	1,61	2,00	1,81	0,66	0,59	0,33	0,23	0,59	0,46	1,11	0,93
	SBk-3b	100x150x65x3												
	SBk-6	107x80x65x2	2,21	2,01	4,46	4,00	0,57	0,44	0,49	0,42	0,99	0,88	1,92	1,77
	SBk-7	107x120x65x2	1,91	1,83	3,79	3,55	0,23	0,13	0,15	0,13	0,37	0,36	0,76	0,65
SBk-8	107x150x65x2	1,89	1,66	3,85	3,54	0,39	0,33	0,23	0,23	0,71	0,67	0,99	0,89	
Retaining	RBk-1a	60x80x50x2	1,58	1,44	2,16	1,92	0,36	0,26	0,29	0,24	0,59	0,56	1,10	1,01
	RBk-1b	60x80x50x3												
	RBk-2a	60x120x50x2	1,59	1,29	2,14	1,79	0,27	0,15	0,20	0,17	0,42	0,39	0,76	0,72
	RBk-2b	60x120x50x3												
	RBk-3a	60x150x50x2	1,64	1,44	2,18	1,90	0,20	0,13	0,11	0,06	0,21	0,15	0,44	0,35
	RBk-3b	60x150x50x3												
	RBk-6	57x80x65x2	0,73	0,66	1,18	1,09	---	---	---	---	---	---	---	---
	RBk-7	57x120x65x2	0,68	0,49	1,19	1,13	---	---	---	---	---	---	---	---
RBk-8	57x150x65x2	0,56	0,50	1,05	1,02	---	---	---	---	---	---	---	---	

Where:

R<sub>m...</sub> = mean value.  
R<sub>c...</sub> = characteristic value giving 75% confidence that 95% of the results will be greater than this value.  
R<sub>...1</sub> = horizontal load (mean or characteristic) value that causes a residual deformation equal to 1mm at the head of the bracket wing.  
R<sub>...sh</sub> = the horizontal load (mean or characteristic) value that causes 10 mm of displacement at the head of the bracket wing (considered as failure).  
R<sub>...r</sub> = vertical load (mean or characteristic) value that causes a residual deformation equal to 0,2% of the wing length at the head of the bracket wing.  
R<sub>...1d</sub> = vertical load (mean or characteristic) value that causes 1 mm of displacement at the head of the bracket wing.  
R<sub>...3d</sub> = vertical load (mean or characteristic) value that causes 3 mm of displacement at the head of the bracket wing.  
R<sub>...sv</sub> = vertical load (mean or characteristic) value that causes 10 mm of displacement at the head of the bracket wing (considered as failure).  
--- = Values not available.

Characteristics		EVP-1a	EVP-1b	EVP-2a	EVP-2b
Trade name		Knauf C-profile			
Form		See figure A4.1.1			
Designation		C50x50x0,7	C50x50x0,8	C75x50x0,7	C75x50x0,8
Dimensions	Web width (mm) – a	48,0 ± 0,5		73,5 ± 0,5	
	Flange width (mm) – b/c	50,0 ± 0,5		50,0 ± 0,5	
	Fold (mm) – m/n	48,0 ± 0,5		48,0 ± 0,5	
	Thickness (mm) - e	0,70 ± 0,06	0,80 ± 0,06	0,70 ± 0,06	0,80 ± 0,06
	Length (mm)	Various		Various	
	X1g (mm)	24,56		37,27	
Y1g (mm)	15,73		13,57		
Cross-section area (mm <sup>2</sup> )		89,42		103,9	
Moment of inertia	Ixx (mm <sup>4</sup> )	27914		31940	
	Iyy (mm <sup>4</sup> )	40130		99779	
Cross-section modulus	Wxx (mm <sup>3</sup> )	839		902	
	Wyy (mm <sup>3</sup> )	1634		2685	

Characteristics		EHP-1a	EHP-1b	EHP-2a	EHP-2b
Trade name		Knauf U-profile			
Form		See figure A4.1.2			
Designation		U50x40x0,7	U50x40x0,8	U75x40x0,7	U75x40x0,8
Dimensions	Web width (mm) -a	50,0 ± 1,0		75,0 ± 1,0	
	Flange width (mm) – b/c	40,0 ± 0,5		40,0 ± 0,5	
	Thickness (mm) -e	0,70 ± 0,06	0,80 ± 0,06	0,70 ± 0,06	0,80 ± 0,06
	Length (mm)	Various		Various	
	X1g (mm)	25,00		37,50	
	Y1g (mm)	27,47		29,46	
Cross-section area (mm <sup>2</sup> )		75		89	

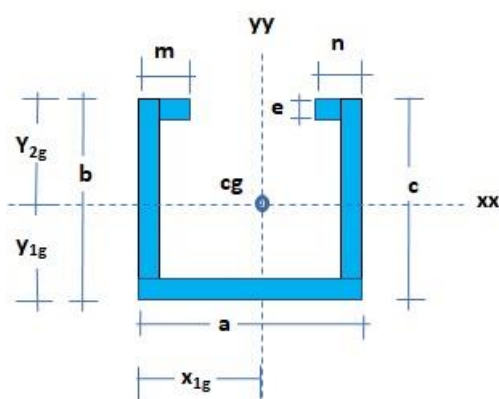


Figure A4.1.1: Knauf C-profile.

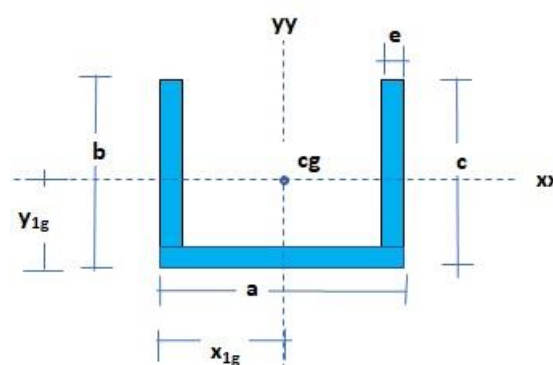


Figure A4.1.2: Knauf U-profile.

Table A4.1.6: GEOMETRIC CHARACTERISTICS OF BRACKETS.										
Characteristics	Designation	Dimension (mm)				Holes		Form		
		Height length	Wing length	Base width	Thickness					
Supporting brackets	SBk-1a	100x80x65x2	100,0 ± 0,5	80,0 ± 0,5	65,0 ± 0,5	2,0 ± 0,1	See figure A4.1.3	a = 22,0	See figure A4.1.7	
	SBk-1b	100x80x65x3						3,0 ± 0,1		b = 35,4
	SBk-2a	100x120x65x2	100,0 ± 0,5	120,0 ± 0,5	65,0 ± 0,5	2,0 ± 0,1		d = 22,0		
	SBk-2b	100x120x65x3						3,0 ± 0,1		e = 29,6
	SBk-3a	100x150x65x2	100,0 ± 0,5	150,0 ± 0,5	65,0 ± 0,5	2,0 ± 0,1		f = 13,9		
	SBk-3b	100x150x65x3						3,0 ± 0,1		g = 12,0
	SBk-6	107x80x65x2	107,0 ± 0,5	80,0 ± 0,5	65,0 ± 0,5	2,0 ± 0,1		See figure A4.1.5		See figure A4.1.9
	SBk-7	107x120x65x2	107,0 ± 0,5	120,0 ± 0,5	65,0 ± 0,5	2,0 ± 0,1				
SBk-8	107x150x65x2	107,0 ± 0,5	150,0 ± 0,5	65,0 ± 0,5	2,0 ± 0,1					
Retaining brackets	RBk-1a	60x80x50x2	60,0 ± 0,5	80,0 ± 0,5	50,0 ± 0,5	2,0 ± 0,1	See figure A4.1.4	a = 7,4	See figure A4.1.8	
	RBk-1b	60x80x50x3						3,0 ± 0,1		b = 5,0
	RBk-2a	60x120x50x2	60,0 ± 0,5	120,0 ± 0,5	50,0 ± 0,5	2,0 ± 0,1		d = 12,5		
	RBk-2b	60x120x50x3						3,0 ± 0,1		e = 21,2
	RBk-3a	60x150x50x2	60,0 ± 0,5	150,0 ± 0,5	50,0 ± 0,5	2,0 ± 0,1		f = 14,5		
	RBk-3b	60x150x50x3						3,0 ± 0,1		g = 25,5
	RBk-6	57x80x65x2	57,0 ± 0,5	80,0 ± 0,5	65,0 ± 0,5	2,0 ± 0,1		See figure A4.1.6		See figure A4.1.10
	RBk-7	57x120x65x2	57,0 ± 0,5	120,0 ± 0,5	65,0 ± 0,5	2,0 ± 0,1				
RBk-8	57x150x65x2	57,0 ± 0,5	150,0 ± 0,5	65,0 ± 0,5	2,0 ± 0,1					

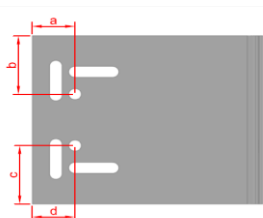


Figure A4.1.3: Supporting bracket holes for SBk-1 to SBk-3.

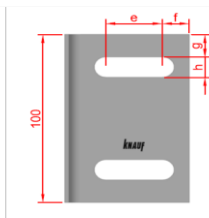
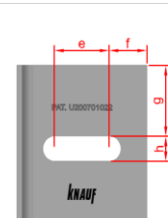
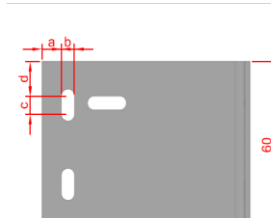


Figure A4.1.4: Retaining bracket holes for RBk-1 to RBk-3.



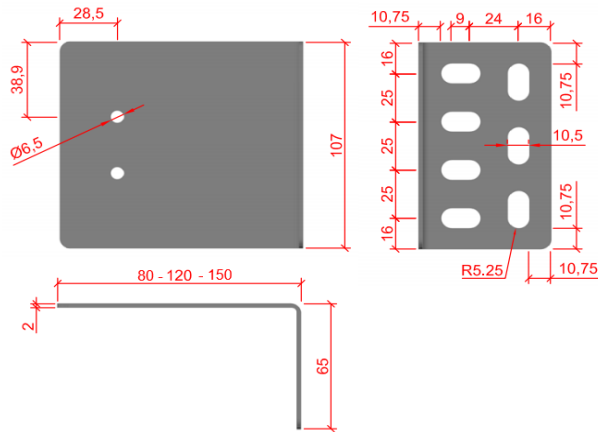


Figure A4.1.5: Supporting bracket holes for SBk-6 to SBk-8.

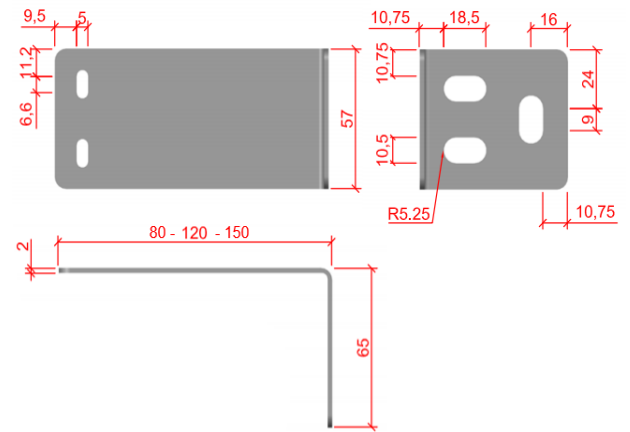


Figure A4.1.6: Retaining bracket holes for RBk-6 to RBk-8.

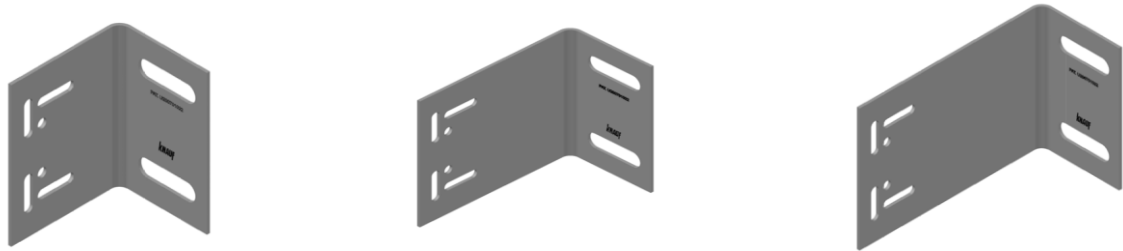


Figure A4.1.7: Galvanized steel supporting brackets for SBk-1 to SBk-3.

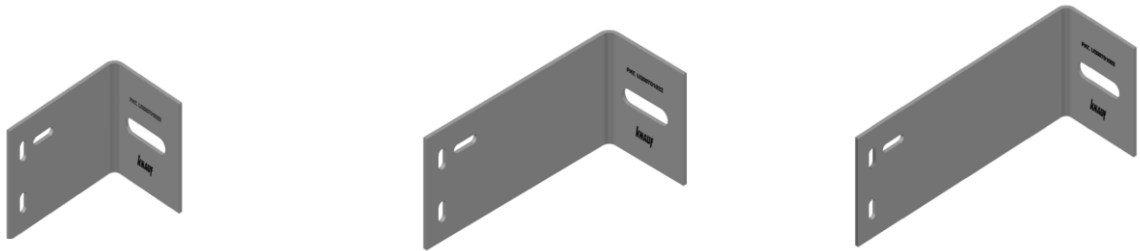


Figure A4.1.8: Galvanized steel retaining brackets for RBk-1 to RBk-3.



Figure A4.1.9: Galvanized steel supporting brackets for SBk-6 to SBk-8.

<p><b>Galvanized steel subframe for cladding systems</b> Technical description</p>	<p><b>Annex A4.1</b> of European Technical Assessment ETA 13/0311</p>
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Figure A4.1.10: Galvanized steel retaining brackets for RBk-6 to RBk-8.





Characteristic	Reference	Material properties
Type of material	EN 10346	DX51D (1.0226)
Corrosion protection		Z275 / Z450 / ZM250
Density (kg/m <sup>3</sup> )		7850
Yield A <sub>80</sub> (%)	EN 1993-1	≥ 22
Fracture stress - R <sub>m</sub> (MPa)		270 ≤ R <sub>m</sub> ≤ 500
Elastic limit – Re (MPa)		≥ 140
Modulus of elasticity – E (MPa)		210.000
Shear modulus – G (MPa)		81.000
Poisson ratio in elastic stage - ν		0,3
Thermal expansion coefficient - α (μm/m·K <sup>-1</sup> ) for T ≤ 100 °C		12

Characteristics	C-SF-1	C-SF-2	C-SF-5	C-SF-6	
Generic type	Self-drilling screw with hexagon head and integrated washer	Self-drilling screw with hexagon head and integrated washer	Self-drilling screw with hexagon head and integrated washer with sealing washer	Self-drilling screw with hexagon head and integrated washer with sealing washer	
Trade name	S-MD 53 Z 6,3xL	S-MD 03 Z 4,8xL	JT2-2HPlus-5.5xL	JF2-2HPlus-4.8xL	
Dimensions (mm)	Fastener	6,3 x (length ≥ 25)	4,8 x (length ≥ 19)	5,5 x (length ≥ 25)	4,8 x (length ≥ 19)
	Integrated washer	12,2	9,8	14,5	14,5
	Sealing washer	---	---	≥ 16,0	≥ 14,0
Material	Fastener	Carbon steel case hardened and galvanized	Carbon steel case hardened and galvanized	Carbon steel case hardened and galvanized	Carbon steel case hardened and galvanized
	Integrated washer				
	Sealing washer	---	---	Stainless steel A2 with vulcanised EPDM seal	Stainless steel A2 with vulcanised EPDM seal
	Minimum corrosion protection	Equivalent to Z275 / Z450 / ZM250	Equivalent to Z275 / Z450 / ZM250	Equivalent to Z275 / Z450 / ZM250	Equivalent to Z275 / Z450 / ZM250
Drilling capacity (mm)	≤ 6,00	≤ 2,75	≤ 3,50	≤ 3,50	
Shear strength (kN)	V <sub>R,k</sub> ≥ 3,00 (t <sub>N,I</sub> = 0,63 mm; t <sub>N,II</sub> = 2,0 mm)	V <sub>R,k</sub> ≥ 2,30 (t <sub>N,I</sub> = 0,63 mm; t <sub>N,II</sub> = 1,5 mm)	V <sub>R,k</sub> ≥ 1,38 (t <sub>N,I</sub> = 0,63 mm; t <sub>N,II</sub> = 1,5 mm)	V <sub>R,k</sub> ≥ 1,38 (t <sub>N,I</sub> = 0,63 mm; t <sub>N,II</sub> = 1,5 mm)	
Pull-out strength (kN)	N <sub>R,k</sub> ≥ 1,78 (t <sub>N,I</sub> = 0,63 mm; t <sub>N,II</sub> = 2,0 mm)	N <sub>R,k</sub> ≥ 1,60 (t <sub>N,I</sub> = 0,63 mm; t <sub>N,II</sub> = 1,5 mm)	N <sub>R,k</sub> ≥ 1,40 (t <sub>N,I</sub> = 0,63 mm; t <sub>N,II</sub> = 1,5 mm)	N <sub>R,k</sub> ≥ 1,40 (t <sub>N,I</sub> = 0,63 mm; t <sub>N,II</sub> = 1,5 mm)	

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Characteristics	C-SF-1	C-SF-2	C-SF-5	C-SF-6
Form				
"---" = not applicable.				

Characteristics	Minimum required specification	
Generic type	The fixings between brackets and substrate must be chosen taking into account the substrate material (e.g. normal concrete, cracked concrete, masonry, steel structure, etc.) and the minimum specifications indicated in this table.	
Diameter	Fastener	≥ M6
	Washer	≥ Ø 16 mm
Material (*)	Galvanized steel (minimum corrosion protection equivalent to Z275 / Z450 / ZM250) Stainless steel (A2 or A4)	
Minimum pull-out strength (**)	≥ 2,5 kN or greater than the reaction due to wind load.	
Minimum shear strength	≥ 2,0 kN or greater than the reaction due to dead load.	
Other	Reference	The fixings between the brackets and the substrate may be CE marked according to an ETA on the basis of the relevant EAD as long as this CE marking is mandatory in the Member State where the kit is used.
	Serviceability	The serviceability conditions such as load directions, material of supporting structure (concrete type, masonry type, etc.), minimum distance to edges, etc. must be taken into account.
(*) The fixing material must guarantee the electrochemical compatibility between the different materials.		
(**) Minimum pull-out strength must be guaranteed on substrate material.		

**A4.2 - ALUMINIUM ALLOY SUBFRAME COMPONENTS**

<b>Table A4.2: TYPE OF ALUMINIUM ALLOY SUBFRAME.</b>	
<b>Components</b>	<b>ASF-01</b>
Vertical profile	EVP-16 / EVP-17
Supporting bracket	SBk-4 / SBk-5 / SBk-9 / SBk-10 / SBk-11 / SBk-12 / SBk-13 / SBk-14 / SBk-15
Retaining bracket	RBk-4 / RBk-5 / RBk-9 / RBk-10 / RBk-11 / RBk-12 / RBk-13 / RBk-14 / RBk-15
Fixing between profiles and brackets	C-SF-3 / C-SF-4 / C-SF-7 / C-SF-8 / C-SF-9 / C-SF-10
Fixings between brackets and substrate (optional)	This component is an optional kit component. This means that it can be delivered by the ETA holder as a kit component or it can be bought by the kit user on the open market. In any case, see the specifications given in table A4.2.8.

<b>Table A4.2.2: ALUMINIUM ALLOY SUBFRAME COMPONENTS.</b>				
<b>Generic component</b>	<b>Code</b>	<b>Trade name</b>		<b>Reference</b>
Vertical profile	EVP-16	Knauf T-profile	T110x50x2,0	---
	EVP-17	Knauf L- profile	L50x50x2,0	
Supporting bracket	SBk-4	Knauf aluminium supporting bracket	100x60x65x3,0	---
	SBk-5		100x100x65x3,0	
	SBk-9		150x40x40x3,0	
	SBk-10		150x60x40x3,0	
	SBk-11		150x80x40x3,0	
	SBk-12		150x100x40x3,0	
	SBk-13		150x120x40x3,0	
	SBk-14		150x140x40x3,0	
Retaining bracket	RBk-4	Knauf aluminium retaining bracket	50x60x50x3,0	---
	RBk-5		50x100x50x3,0	
	RBk-9		75x40x40x3,0	
	RBk-10		75x60x40x3,0	
	RBk-11		75x80x40x3,0	
	RBk-12		75x100x40x3,0	
	RBk-13		75x120x40x3,0	
	RBk-14		75x140x40x3,0	
Fixing between profiles and brackets	C-SF-3	S-MD 51 S 4,8x19 (stainless steel screw)		ETA 10/0182
	C-SF-4	S-MD 53 S 6,3x25 (stainless steel screw)		
	C-SF-7	S-MD 01 S 4,8x22 (stainless steel screw)		
	C-SF-8	S-MD 03 S 6,3x25 (stainless steel screw)		
	C-SF-9	JT4-4-4,8x22 (stainless steel screw)		ETA 10/0200
	C-SF-10	JT4-6 5,5X22 (stainless steel screw)		
"---" = not applicable.				

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**Table A4.2.3: BRACKET RESISTANCE (HORIZONTAL AND VERTICAL LOADS).**

Bracket type (H x L x B x t)			Horizontal load resistance (kN)				Vertical load resistance (kN)							
			R <sub>m1</sub>	R <sub>c1</sub>	R <sub>msh</sub>	R <sub>csh</sub>	R <sub>mr</sub>	R <sub>cr</sub>	R <sub>m1d</sub>	R <sub>c1d</sub>	R <sub>m3d</sub>	R <sub>c3d</sub>	R <sub>msv</sub>	R <sub>csv</sub>
Supporting	SBk-4	100x60x65x3	1,02	0,96	1,67	1,61	1,70	1,28	0,76	0,41	3,21	2,87	5,57	5,07
	SBk-5	100x100x65x3	0,94	0,85	1,67	1,55	0,72	0,66	0,22	0,11	0,87	0,74	2,65	2,41
	SBk-9	150x40x40x3	3,22	3,01	5,16	4,82	1,94	1,53	4,19	0,15	7,01	6,46	9,77	9,21
	SBk-10	150x60x40x3 (i)	2,70	2,51	5,01	4,66	1,75	1,38	1,67	1,51	3,65	3,53	6,55	6,10
	SBk-11	150x80x40x3 (i)												
	SBk-12	150x100x40x3	2,49	2,29	4,52	4,12	1,04	0,82	0,76	0,64	1,69	1,53	3,07	2,88
	SBk-13	150x120x40x3 (i)												
	SBk-14	150x140x40x3 (i)												
SBk-15	150x160x40x3													
Retaining	RBk-4	50x60x50x3	1,33	1,25	1,95	1,85	0,60	0,42	0,62	0,60	0,82	0,69	1,47	1,27
	RBk-5	50x100x50x3	1,29	1,03	1,99	1,87	0,40	0,31	0,11	0,09	0,53	0,39	0,77	0,65
	RBk-9	75x40x40x3 (ii)	2,18	1,67	3,84	3,57	2,44	1,92	4,09	3,16	5,52	4,78	11,4	10,5
	RBk-10	75x60x40x3 (i)	2,38	2,10	3,94	3,64	1,36	1,19	1,53	1,32	2,75	2,64	5,98	5,28
	RBk-11	75x80x40x3 (i)												
	RBk-12	75x100x40x3 (ii)	2,24	2,02	3,53	3,41	1,11	0,80	0,80	0,68	1,56	1,32	3,37	3,25
	RBk-13	75x120x40x3 (i)												
	RBk-14	75x140x40x3 (i)												
RBk-15	75x160x40x3 (ii)													

Where:

R<sub>m...</sub> = Mean value.R<sub>c...</sub> = Characteristic value giving 75% confidence that 95% of the results will be greater than this value.R<sub>...1</sub> = the horizontal load (mean or characteristic) value that causes a residual deformation equal to 1mm at the head of the bracket wing.R<sub>...sh</sub> = the horizontal load (mean or characteristic) value that causes 10 mm of displacement at the head of the bracket wing (considered as failure).R<sub>...r</sub> = the vertical load (mean or characteristic) value that causes a residual deformation equal to 0,2% of the wing length at the head of the bracket wing.R<sub>...1d</sub> = the vertical load (mean or characteristic) value that causes 1 mm of displacement at the head of the bracket wing.R<sub>...3d</sub> = the vertical load (mean or characteristic) value that causes 3 mm of displacement at the head of the bracket wing.R<sub>...sv</sub> = the vertical load (mean or characteristic) value that causes 10 mm of displacement at the head of the bracket wing (considered as failure).

(i) = Brackets that use the same result of another bracket.

(ii) = Test done with double bracket.

Characteristics		EVP-16	EVP-17
Designation		T110x50x2,0	L50x50x2,0
Dimensions	Web width (mm)	50,0 ± 0,5	50,0 ± 0,5
	Flange width (mm)	110,0 ± 0,5	50,0 ± 0,5
	Thickness (mm)	2,0 ± 0,1	2,0 ± 0,1
	Length (mm)	Various	Various
Cross-section area (mm <sup>2</sup> )		320,0	183,5
Moment of inertia	I <sub>xx</sub> (mm <sup>4</sup> )	60417	44179
	I <sub>yy</sub> (mm <sup>4</sup> )	221877	44179
Cross-section modulus	W <sub>xx</sub> (mm <sup>3</sup> )	1455	1187
	W <sub>yy</sub> (mm <sup>3</sup> )	4034	1187
Form		See figure A4.2.1	See figure A4.2.2

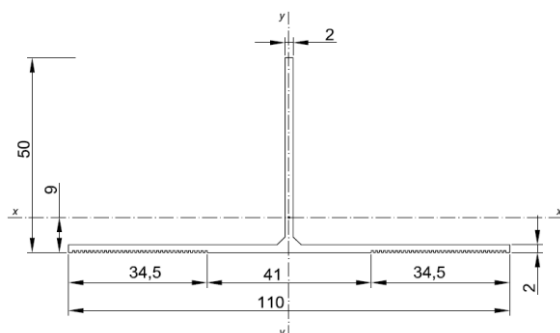


Figure A4.2.1: Profile T110x50x2,0.

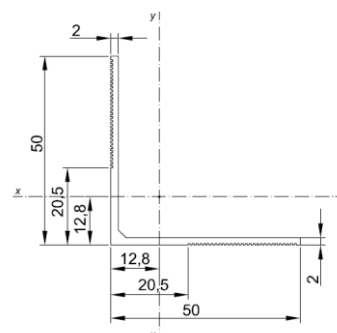


Figure A4.2.2: Profile L50x50x2,0.

Characteristics	Designation	Dimensions				Form	
		Height length (mm)	Wing length (mm)	Base width (mm)	Thickness (mm)		
Supporting brackets	SBk-4	100x60x65x3	100,0 ± 0,5	60,0 ± 0,5	65,0 ± 0,5	3,0 ± 0,1	See figure A4.2.3
	SBk-5	100x100x65x3	100,0 ± 0,5	100,0 ± 0,5	65,0 ± 0,5	3,0 ± 0,1	See figure A4.2.4
	SBk-9	150x40x40x3	150,0 ± 0,5	40,0 ± 0,5	40,0 ± 0,5	3,0 ± 0,1	See figure A4.2.5
	SBk-10	150x60x40x3	150,0 ± 0,5	60,0 ± 0,5	40,0 ± 0,5	3,0 ± 0,1	
	SBk-11	150x80x40x3	150,0 ± 0,5	80,0 ± 0,5	40,0 ± 0,5	3,0 ± 0,1	
	SBk-12	150x100x65x3	150,0 ± 0,5	100,0 ± 0,5	40,0 ± 0,5	3,0 ± 0,1	
	SBk-13	150x120x40x3	150,0 ± 0,5	120,0 ± 0,5	40,0 ± 0,5	3,0 ± 0,1	
	SBk-14	150x140x40x3	150,0 ± 0,5	140,0 ± 0,5	40,0 ± 0,5	3,0 ± 0,1	
	SBk-15	150x160x40x3	150,0 ± 0,5	160,0 ± 0,5	40,0 ± 0,5	3,0 ± 0,1	

Characteristics		Designation	Dimensions				Form
			Height length (mm)	Wing length (mm)	Base width (mm)	Thickness (mm)	
Retaining brackets	<b>RBk-4</b>	50x60x50x3	50,0 ± 0,5	60,0 ± 0,5	50,0 ± 0,5	3,0 ± 0,1	See figure A4.2.6
	<b>RBk-5</b>	50x100x50x3	50,0 ± 0,5	100,0 ± 0,5	50,0 ± 0,5	3,0 ± 0,1	See figure A4.2.7
	<b>RBk-9</b>	75x40x40x3	75,0 ± 0,5	40,0 ± 0,5	40,0 ± 0,5	3,0 ± 0,1	See figure A4.2.8
	<b>RBk-10</b>	75x60x40x3	75,0 ± 0,5	60,0 ± 0,5	40,0 ± 0,5	3,0 ± 0,1	
	<b>RBk-11</b>	75x80x40x3	75,0 ± 0,5	80,0 ± 0,5	40,0 ± 0,5	3,0 ± 0,1	
	<b>RBk-12</b>	75x100x40x3	75,0 ± 0,5	100,0 ± 0,5	40,0 ± 0,5	3,0 ± 0,1	
	<b>RBk-13</b>	75x120x40x3	75,0 ± 0,5	120,0 ± 0,5	40,0 ± 0,5	3,0 ± 0,1	
	<b>RBk-14</b>	75x140x40x3	75,0 ± 0,5	140,0 ± 0,5	40,0 ± 0,5	3,0 ± 0,1	
	<b>RBk-15</b>	75x160x40x3	75,0 ± 0,5	160,0 ± 0,5	40,0 ± 0,5	3,0 ± 0,1	

Characteristic	Reference	Material properties
Type of material	EN 1999-1-1	AW-6063 T5
Durability class		B
Density (kg/m <sup>3</sup> )		2700
Modulus of elasticity – E (MPa)		70.000
Shear modulus – G (MPa)		27.000
Poisson ratio in elastic stage - $\nu$		0,3
Thermal expansion coefficient - $\alpha$ ( $\mu\text{m}/\text{m}\cdot\text{K}^{-1}$ ) for T ≤ 100 °C		23,0
Yield A <sub>80</sub> (%)		≥ 8
Tensile strength – Rm (MPa)	EN 755-2 & EN 1999-1-1	≥ 215
Elastic limit – Re (MPa)		≥ 170

**Aluminium alloy subframe for cladding systems**  
Technical description

**Annex A4.2**  
of European Technical  
Assessment ETA 13/0311

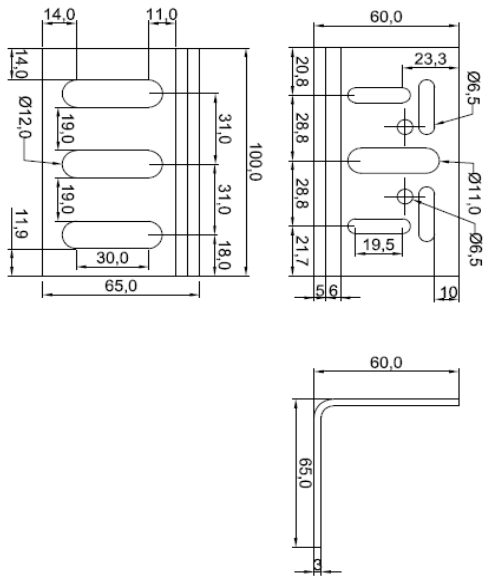


Figure A4.2.3: Aluminium alloy supporting brackets for SBk-4

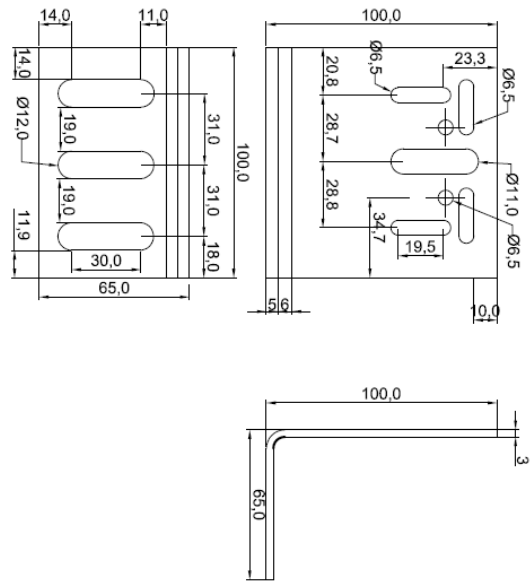


Figure A4.2.4: Aluminium alloy supporting brackets for SBk-5.

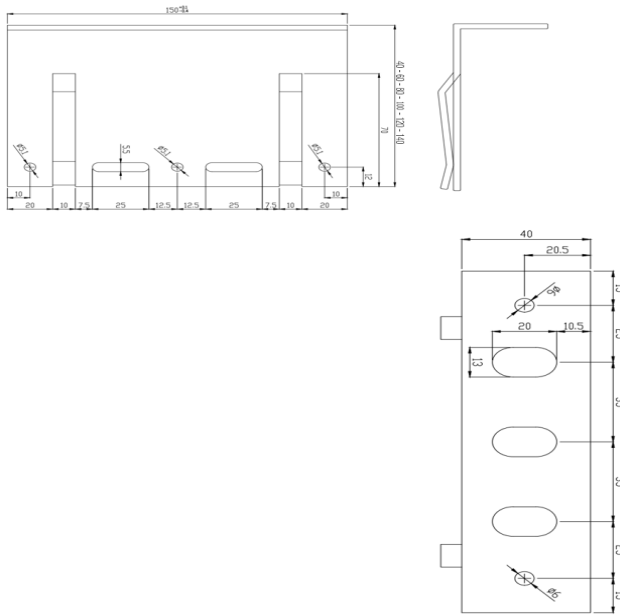


Figure A4.2.5: Aluminium alloy supporting brackets for SBk-9 to SBk-15.

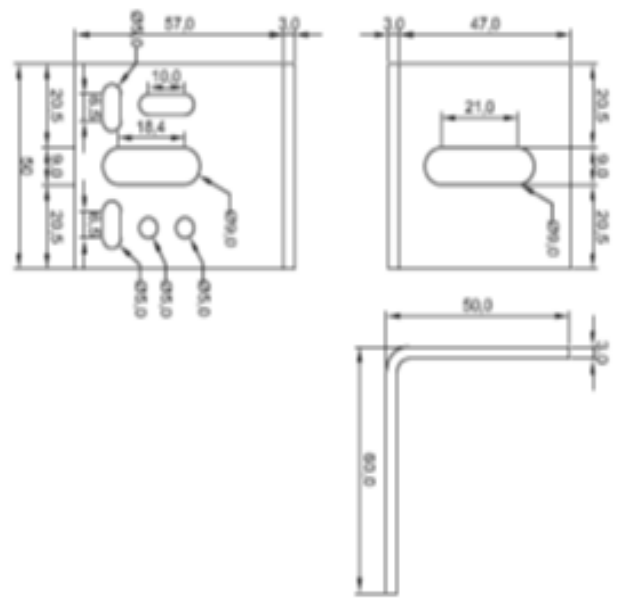


Figure A4.2.6: Aluminium alloy retaining brackets for RBk-4.

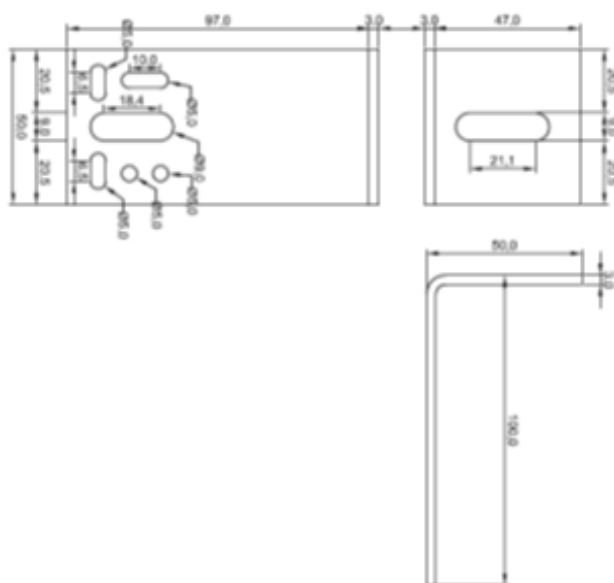


Figure A4.2.7: Aluminium alloy retaining brackets for RBk-5.

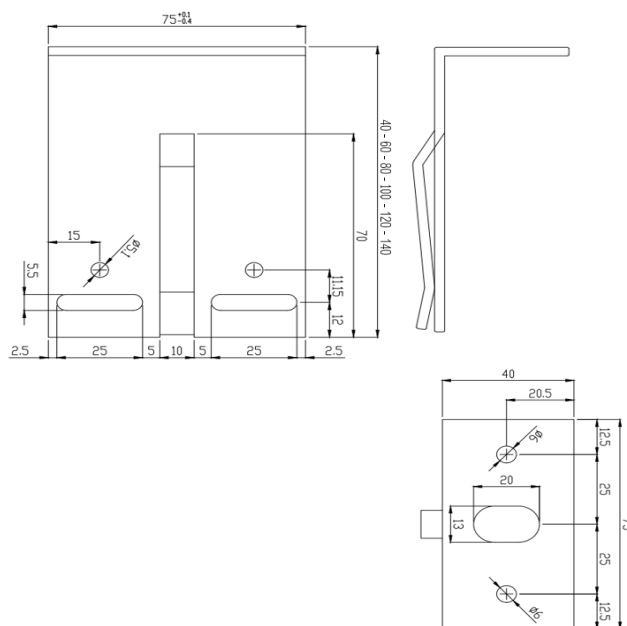


Figure A4.2.8: Aluminium alloy retaining brackets for RBk-9 to RBk-15.

Table A4.2.7: FIXINGS BETWEEN PROFILES & BRACKETS.

Characteristics	C-SF-3	C-SF-4	C-SF-7	C-SF-8	C-SF-9	C-SF-10	
Generic type	Self-drilling screw with hexagon head and integrated washer						
Trade name	S-MD 51 S 4,8xL	S-MD 53 S 6,3xL	S-MD 01 S 4,8xL	S-MD 03 S 6,3xL	JT4-4-4,8xL	JT4-6-5,5xL	
Dimensions (mm)	Fastener	4,8 x (L ≥ 19)	6,3 x (L ≥ 25)	4,8 x (L ≥ 22)	6,3 x (L ≥ 25)	4,8 x (L ≥ 22)	5,5 x (L ≥ 22)
	Integrated washer	11,2	12,2	10,5	12,7	10,0	10,5
Material	Fastener	Stainless steel (1.4301, 1.4401, 1.4404, 1.4567)				Stainless steel A2 or A4	
	Integrated washer						
Drilling capacity (mm)	≤ 2,00	≤ 6,00	≤ 2,00	≤ 6,00	≤ 4,50	≤ 6,50	
Shear strength (kN)	No data on aluminium alloy sheets				$V_{R,k} \geq 1,13 (t_{N,I} = 0,60 \text{ mm}; t_{N,II} = 2,0 \text{ mm})$	$V_{R,k} \geq 1,23 (t_{N,I} = 0,60 \text{ mm}; t_{N,II} = 2,0 \text{ mm})$	
Pull-out strength (kN)	No data on aluminium alloy sheets				$N_{R,k} \geq 1,83 (t_{N,II} = 2,0 \text{ mm})$	$N_{R,k} \geq 1,77 (t_{N,II} = 2,0 \text{ mm})$	
Form							

<b>Table A4.2.8: FIXINGS BETWEEN BRACKETS &amp; SUBSTRATE.</b>		
<b>Characteristics</b>		<b>Minimum required specification</b>
Generic type		The fixings between brackets and substrate must be chosen taking into account the substrate material (e.g. normal concrete, cracked concrete, masonry, steel structure, etc.) and the minimum specifications indicated in this table.
Diameter	Fastener	≥ M6
	Washer	≥ Ø 16 mm
Material (*)		Stainless steel (A2 or A4)
Minimum pull-out strength (**)		≥ 2,5 kN or greater than the reaction due to wind load.
Minimum shear strength		≥ 2,0 kN or greater than the reaction due to dead load.
Other	Reference	The fixings between the brackets and the substrate may be CE marked according to an ETA on the basis of the relevant EAD as long as this CE marking is mandatory in the Member State where the kit is used.
	Serviceability	The serviceability conditions such as load directions, material of substrate (concrete type, masonry type, etc.), minimum distance to edges, etc. must be taken into account.
(*) The fixing material must guarantee the electrochemical compatibility between the different materials.		
(**) Minimum pull-out strength must be guaranteed on substrate material.		



## ANNEX 5 - OPTIONAL COMPONENTS

### A5.1 - FLEXIBLE SHEET FOR WATERPROOFING (OPTIONAL)

Generic component	Code	Trade name	Reference
Flexible sheet for waterproofing	WPL-2	Dupont™ Tyvek® Housewrap (1060B)	EN 13859-2
	WPL-3	AQUAPANEL® Water Barrier	

Characteristic		Reference	WPL-2	WPL-3
Trade name		---	Dupont™ Tyvek® Housewrap	AQUAPANEL® Water Barrier
Generic type		EN 13859-2	Moisture permeable water barrier	
Thickness (µm)		EN 1849-2	175	500
Mass per unit area (g/m <sup>2</sup> )			60 ± 5	130 ± 5
Reaction to fire		EN 13501-1	E	E
Water vapour transmission – Sd (m)		EN ISO 12572	≤ 0,025	0,03 ± 0,02
Watertightness		EN 1928 (method A)	W1	W1
Maximum tensile strength (N) per 50 mm		EN 12311-1	MD: 310 ± 50 XD: 310 ± 50	MD: 210 ± 30 XD: 150 ± 30
Elongation at maximum tensile strength (%)			MD: 17 ± 5 XD: 20 ± 6	MD: 50 ± 15 XD: 40 ± 15
Resistance to tearing - nail shank (N)		EN 12310-1	MD: 55 ± 20 XD: 50 ± 20	MD: 130 ± 30 XD: 130 ± 30
Artificial ageing by UV and heat (Relative values: after/before aged)	Maximum tensile strength (%)	EN 1297 & EN 1296 EN 12311-1	MD: 80 XD: 80	MD: 100 XD: 100
	Elongation at maximum tensile strength (%)		MD: 70 XD: 70	MD: 80 XD: 75
	Watertightness	EN 1297 & EN 1296 EN 1928 (method A)	W1	W1

MD = machine direction (longitudinal). XD = transverse (cross) direction.

**Flexible sheet for waterproofing**  
Technical description

**Annex A5.1**  
of European Technical  
Assessment ETA 13/0311

**A5.2 - MINERAL WOOL THERMAL INSULATION (OPTIONAL)**

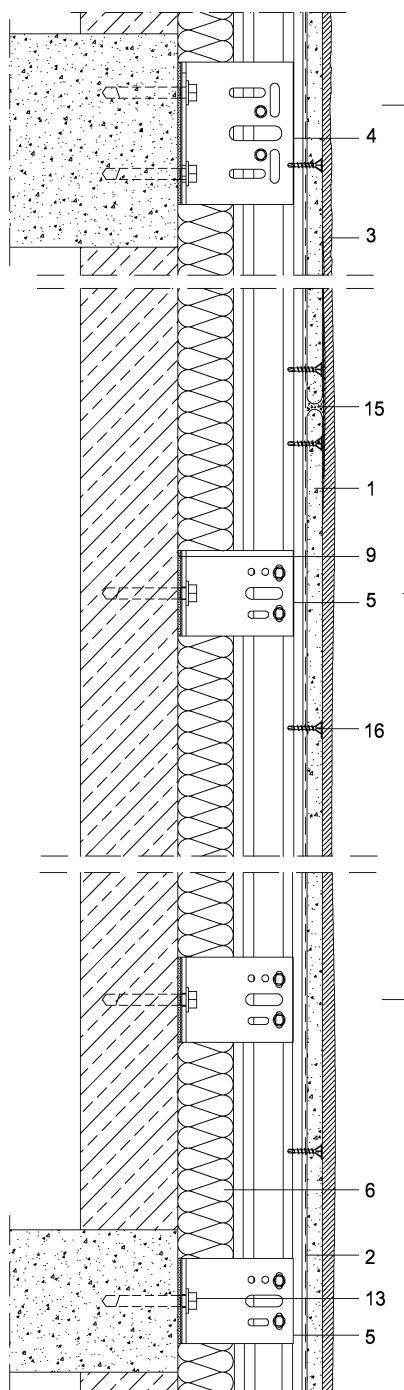
<b>Table A5.2.1: MINERAL WOOL THERMAL INSULATION.</b>	
<b>Generic component</b>	<b>Reference</b>
Thermal insulation for non-ventilated cladding systems	EN 13162
Thermal insulation for ventilated cladding systems (*)	EN 13162
(*) Thermal insulation material in a system of ventilated façades must be rigid and properly fixed in order to prevent tearing and dispersion of the material due to any strong air flow in the ventilated air-space. Greater density of insulation material also prevents the infiltration of cold air into the material.	

<b>Table A5.2.2: MINERAL WOOL.</b>			
<b>Characteristics</b>	<b>Reference</b>	<b>For non-ventilated cladding system</b>	<b>For ventilated cladding system (*)</b>
Generic type	EN 13162	Mineral Wool (MW)	Mineral Wool (MW)
Thickness (mm)	EN 823	30 – 200 (minimum tolerance T3)	30 – 100 (minimum tolerance T3)
Short term water absorption by partial immersion (kg/m <sup>2</sup> )	EN 1609	< 1,0	
Long term water absorption by total immersion (%)	EN 12087	< 3,0	
Dimensional stability under specified temperature, 70 °C, and humidity condition, 90 % RH (%)	EN 1604	---	$\Delta\epsilon_i; \Delta\epsilon_b; \Delta\epsilon_d < 1,0$ (%)
Reaction to fire	EN 13501-1	A1	
Water vapour permeability - $\mu$	EN ISO 10456	$\mu = 1$	
Airflow resistivity (kPa·s/m <sup>2</sup> )	EN 29053	$\geq 5$	
Thermal conductivity and thermal resistance - $\lambda_D$ (W/(m·K))	EN 13162	$\leq 0,040$	
Durability	EN 13162	Acceptable for reaction to fire and thermal conductivity	
(*) Thermal insulation material in a system of ventilated façades must be rigid and properly fixed in order to prevent tearing and dispersion of the material due to any strong air flow in the ventilated air-space. Greater density of insulation material also prevents the infiltration of cold air into the material. “---” = not applicable.			

**Mineral wool thermal Insulation**  
Technical description

**Annex A5.2**  
of European Technical  
Assessment ETA 13/0311

## ANNEX 6 - CONSTRUCTION DETAILS FOR GALVANIZED STEEL SUBFRAME

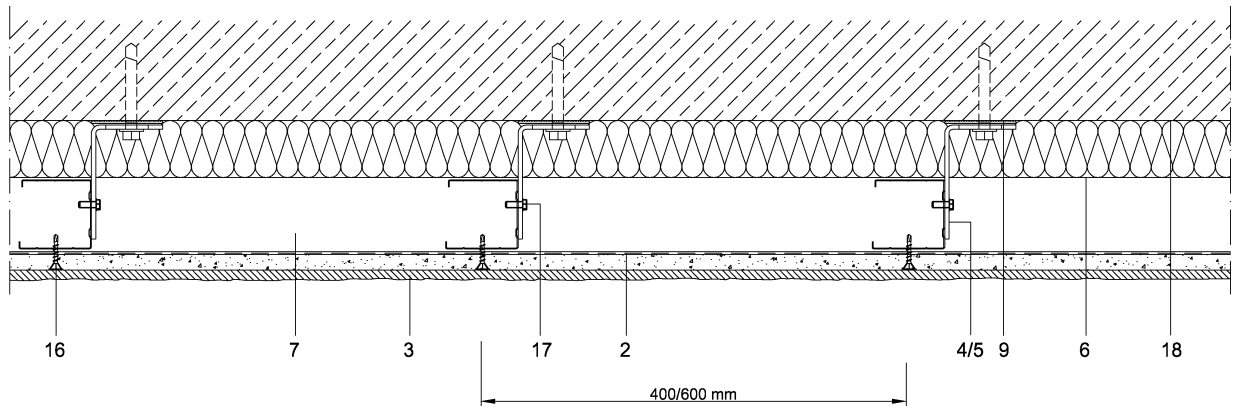


**Legend (for all figures in Annex 6):**

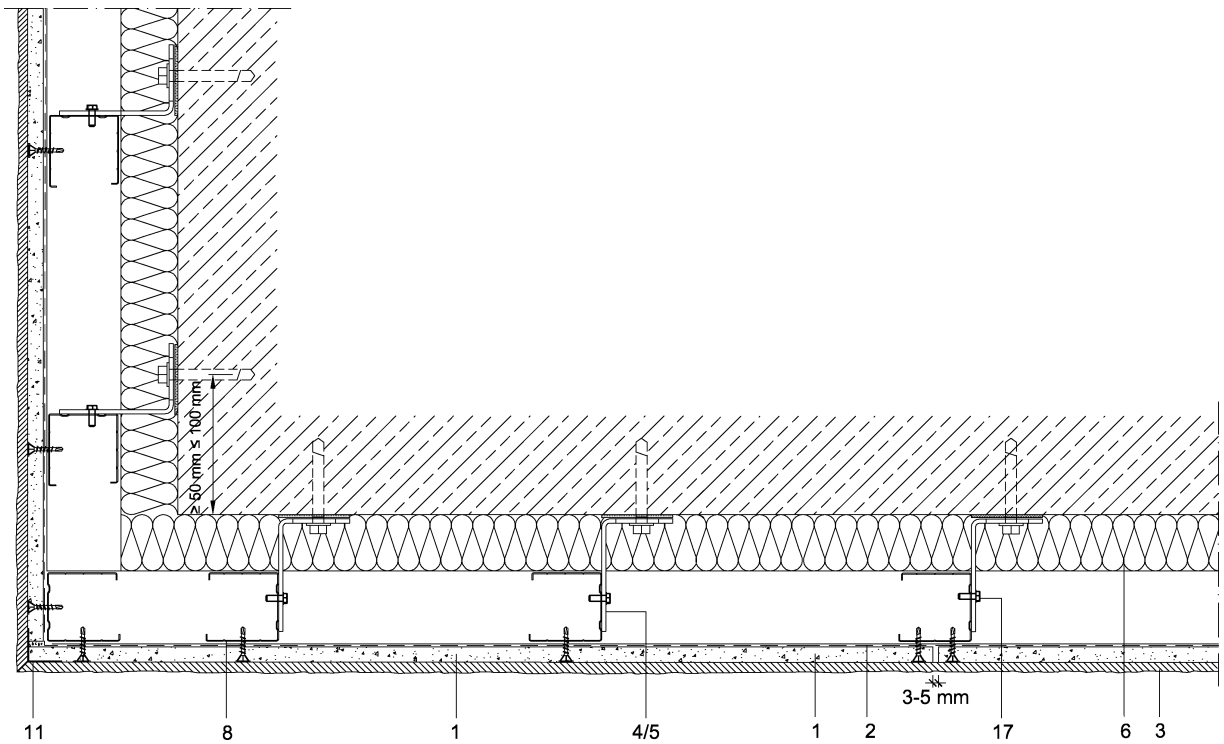
1. AQUAPANEL® Cement Board Outdoor.
2. Flexible sheet for waterproofing (optional).
3. Rendering system.
4. Supporting bracket.
5. Retaining bracket.
6. Thermal insulation (MW) (optional).
7. Vertical profile.
8. Horizontal profile.
9. Auxiliary insulation strip (optional).
10. PVC profile and reinforcing mesh for dilatation and control joints.
11. PVC profile and reinforcing mesh for corners (embedded in base-coat)
12. Finishing, gutter profile and reinforcing mesh for lintels, and edges.
13. Fixings between brackets and building structure.
14. Sealing joint.
15. Joint filler and joint tape between AQUAPANEL® Cement Boards Outdoor.
16. External board fixings. AQUAPANEL® Maxi SN or SB Screw.
17. Fixing between bracket and profiles
18. Building structure.
19. Roof edge flashing.
20. Perforated metallic sheet.
21. Finishing profile for rendering (windows, projections, or other materials).

Figure A6.1: Standard vertical cross-section.

<b>Construction details</b>		<b>Annex A6</b> of European Technical Assessment ETA 13/0311
<b>AQUAPANEL® Cladding Systems– Family 1</b>		
<b>Galvanized steel subframe</b>	WL121.C; WL122.C; WL221.C; WL222.C; WL321.C; WL322.C	



**Figure A6.2:** Standard horizontal cross-section.



**Figure A6.3:** Corner.

<b>Construction details</b> <b>AQUAPANEL® Cladding Systems– Family 1</b>		<b>Annex A6</b> of European Technical Assessment ETA 13/0311
<b>Galvanized steel subframe</b>	WL121.C; WL122.C; WL221.C; WL222.C; WL321.C; WL322.C	

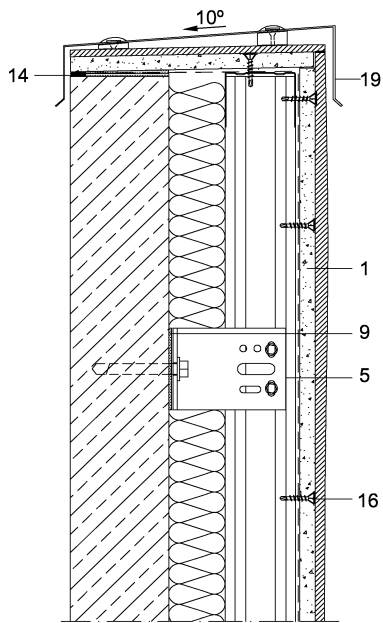


Figure A6.4.1: Roof edge (non-ventilated cladding system).

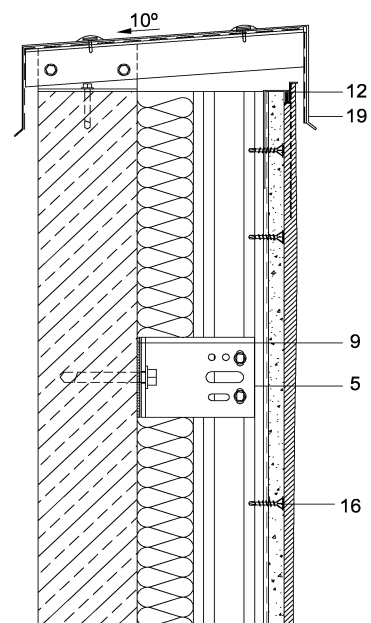


Figure A6.4.2: Roof edge (ventilated cladding system).

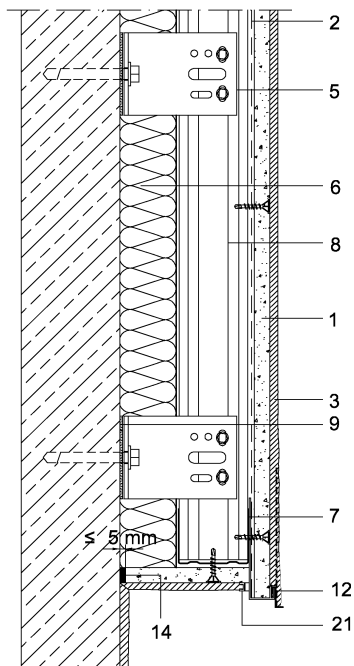


Figure A6.5.1: Base edge (non-ventilated cladding system).

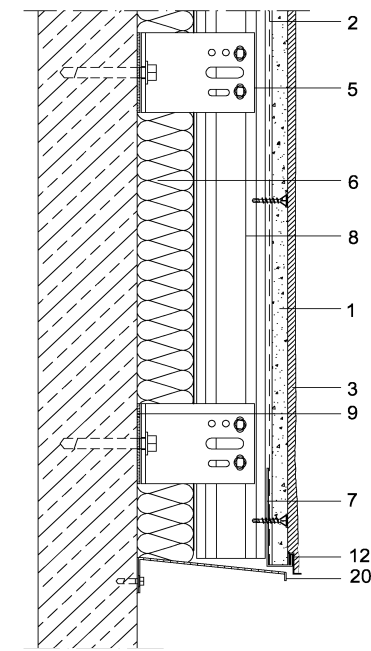


Figure A6.5.2: Base edge (ventilated cladding system).

<b>Construction details</b> <b>AQUAPANEL® Cladding Systems– Family 1</b>		<b>Annex A6</b> of European Technical Assessment ETA 13/0311
<b>Galvanized steel subframe</b>	WL121.C; WL122.C; WL221.C; WL222.C; WL321.C; WL322.C	

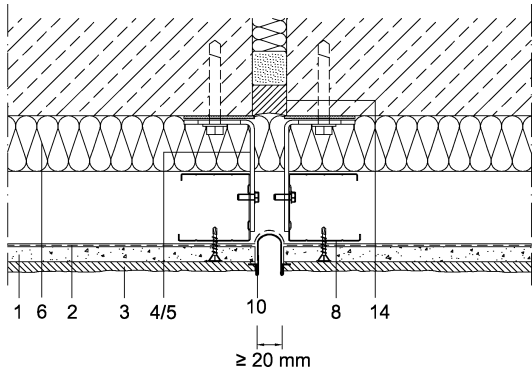


Figure A6.6: Vertical movement joint (including building structure).

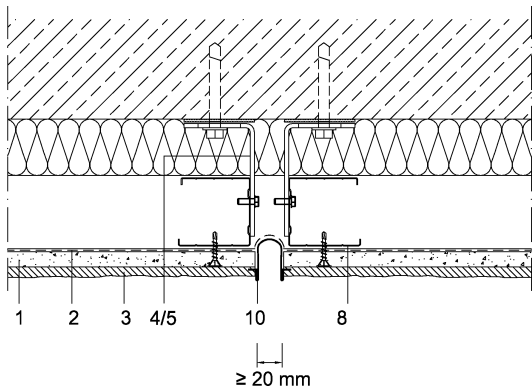


Figure A6.7: Vertical control joint.

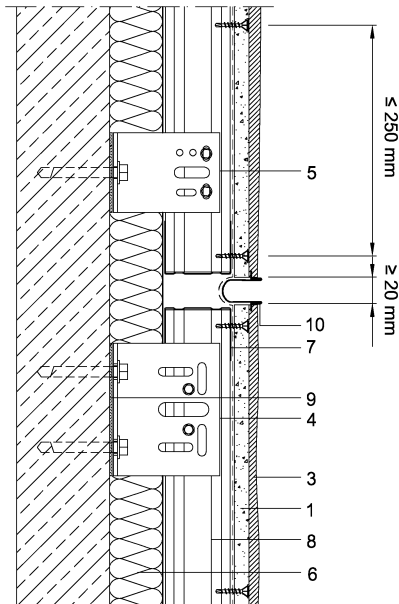


Figure A6.8: Horizontal control joint.

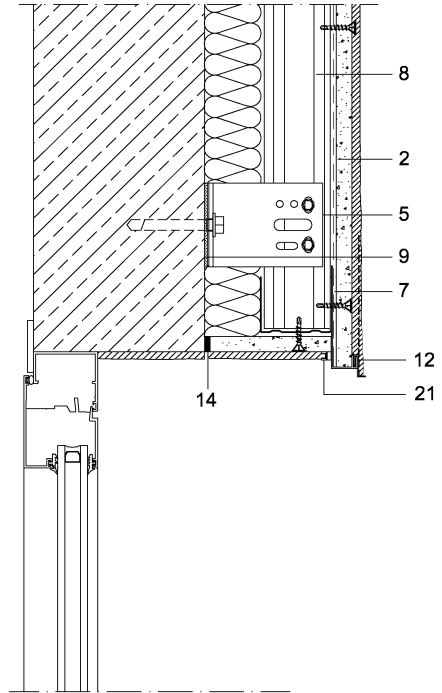


Figure A6.9: Lintel.

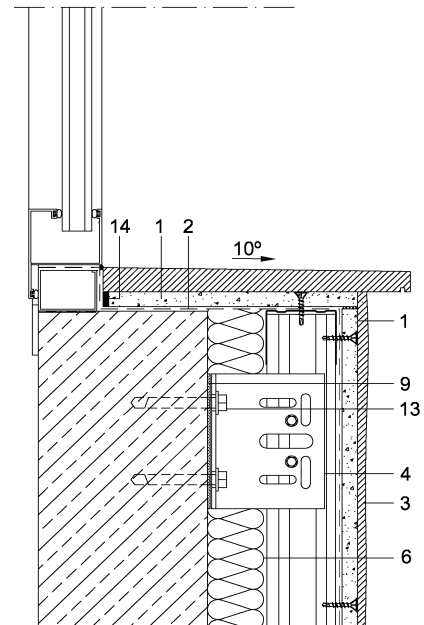


Figure A6.10: Sill.

<b>Construction details</b>		<b>Annex A6</b> of European Technical Assessment ETA 13/0311
<b>AQUAPANEL® Cladding Systems– Family 1</b>		
<b>Galvanized steel subframe</b>	WL121.C; WL122.C; WL221.C; WL222.C; WL321.C; WL322.C	

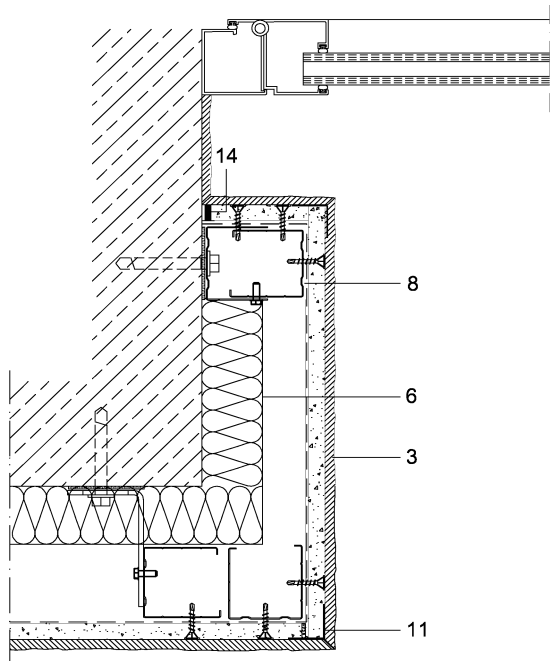


Figure A6.11.1: Jamb (air space  $\leq$  80 mm).

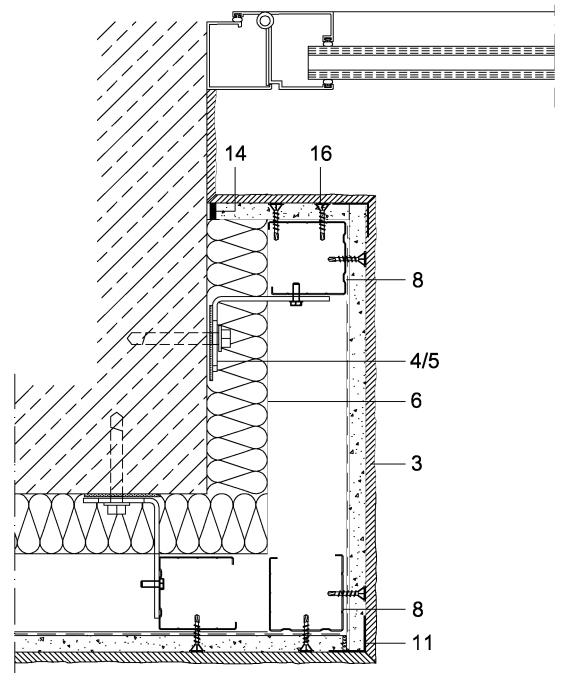


Figure A6.11.2: Jamb (air space  $>$  80 mm).

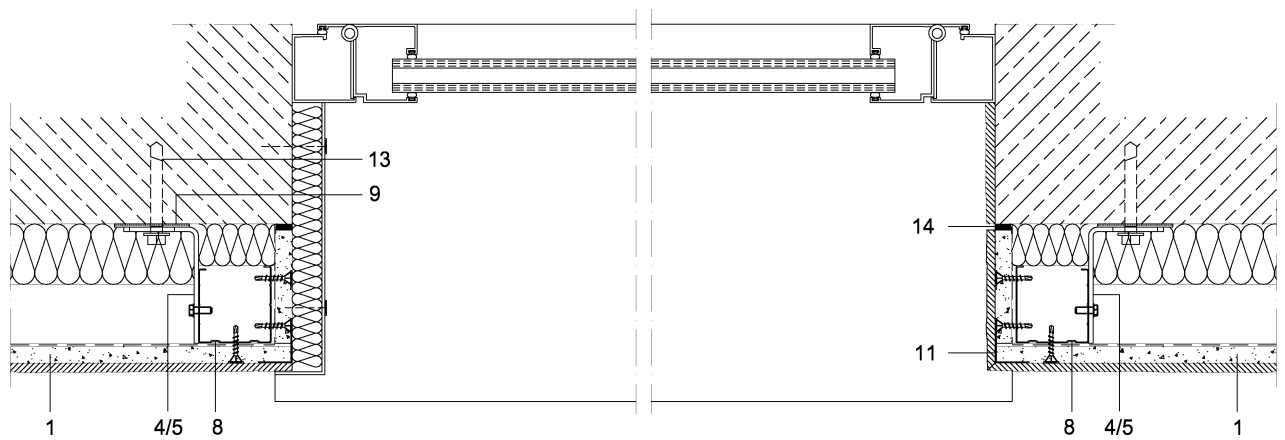
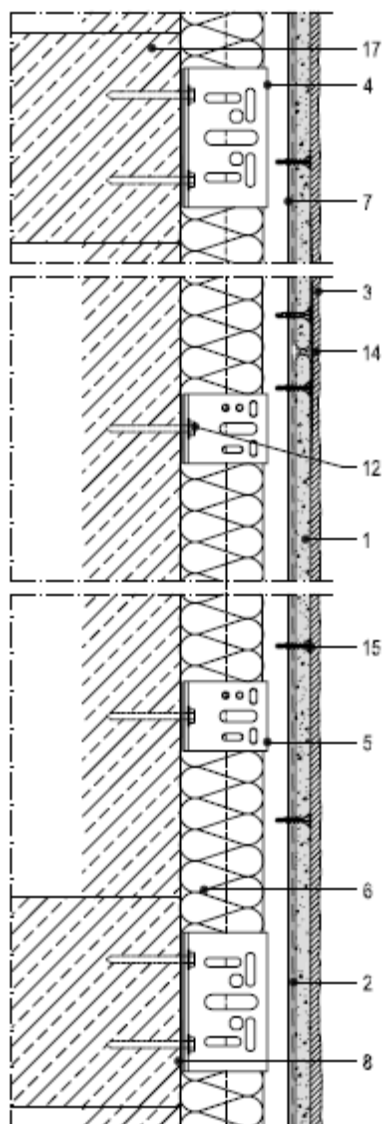


Figure A6.12a: Jamb (with thermal insulation MW).

<b>Construction details</b> <b>AQUAPANEL® Cladding Systems– Family 1</b>		<b>Annex A6</b> of European Technical Assessment ETA 13/0311
<b>Galvanized steel subframe</b>	WL121.C; WL122.C; WL221.C; WL222.C; WL321.C; WL322.C	

## ANNEX 7 - CONSTRUCTION DETAILS FOR ALUMINIUM ALLOY SUBFRAME



### Legend (for all figures in Annex 7):

1. AQUAPANEL® Cement Board Outdoor.
2. Flexible sheet for waterproofing (optional).
3. Rendering system.
4. Supporting bracket.
5. Retaining bracket.
6. Thermal insulation (MW) (optional).
7. Vertical profile.
8. Auxiliary insulation strip (optional).
9. PVC profile and reinforcing mesh for dilatation and control joints.
10. PVC profile and reinforcing mesh for corners (embedded in base-coat)
11. Finishing, gutter profile and reinforcing mesh for lintels, and edges.
12. Fixings between brackets and building structure.
13. Sealing joint.
14. Joint filler and join tape between AQUAPANEL® Cement Boards Outdoor.
15. External board fixings. AQUAPANEL® Maxi SN or SB Screw.
16. Fixing between bracket and profiles
17. Building structure.
18. Roof edge flashing.
19. Perforated metallic sheet.
20. Finishing profile for rendering (windows, projections, or other materials).
21. Corner profile.

Figure A7.1: Standard vertical cross-section.

<b>Construction details</b> <b>AQUAPANEL® Cladding Systems – Family 1</b>		<b>Annex A7</b> of European Technical Assessment ETA 13/0311
<b>Aluminium alloy subframe</b>	WL131.C; WL132.C; WL231.C; WL232.C; WL331.C; WL332.C	



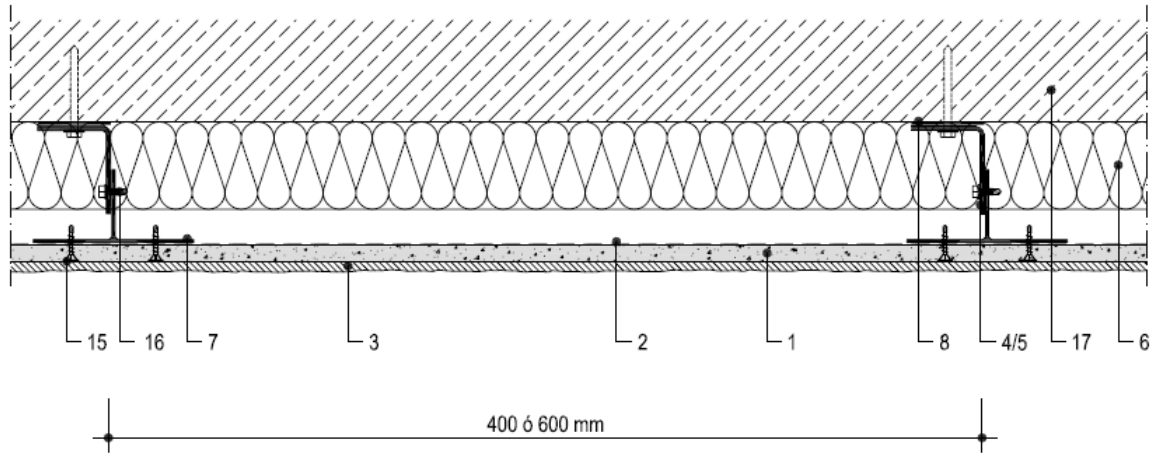


Figure A7.2: Standard horizontal cross-section.

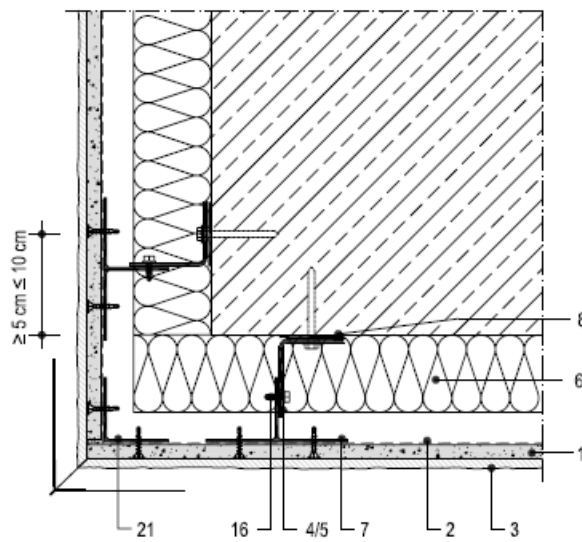


Figure A7.3.1: Convex corner.

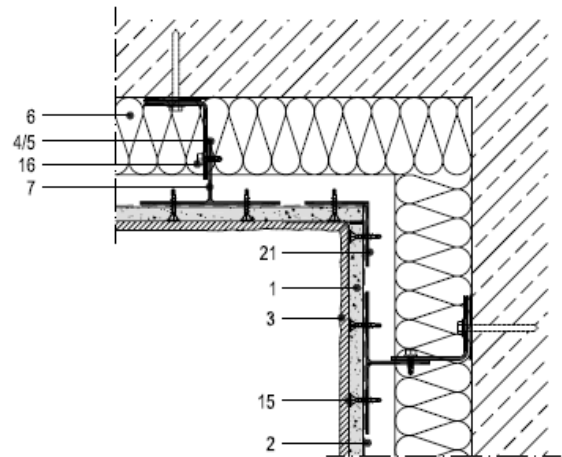


Figure A7.3.2: Concave corner.

<b>Construction details</b> <b>AQUAPANEL® Cladding Systems – Family 1</b>		<b>Annex A7</b> of European Technical Assessment ETA 13/0311
<b>Aluminium alloy subframe</b>	WL131.C; WL132.C; WL231.C; WL232.C; WL331.C; WL332.C	

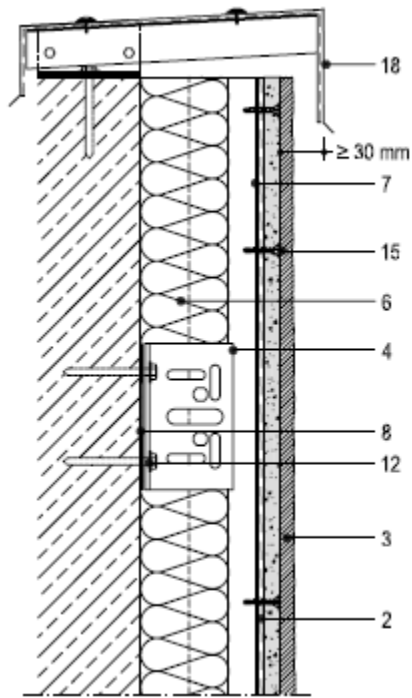


Figure A7.4: Roof edge (ventilated cladding system).

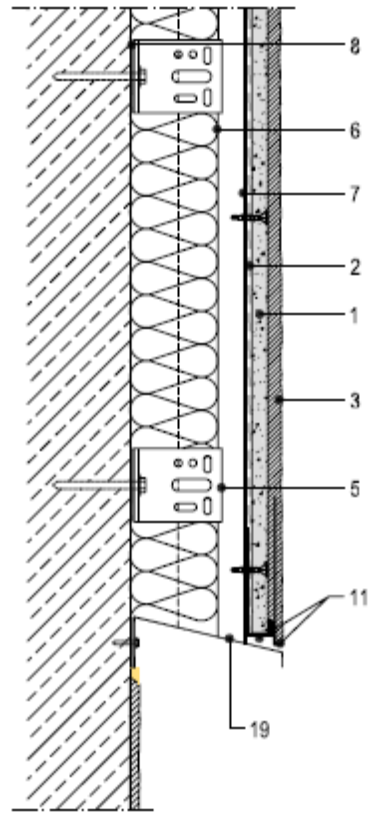


Figure A7.5: Base edge (ventilated cladding system).

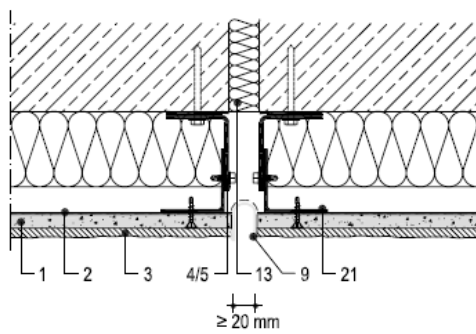


Figure A7.6: Vertical movement joint (including building structure).

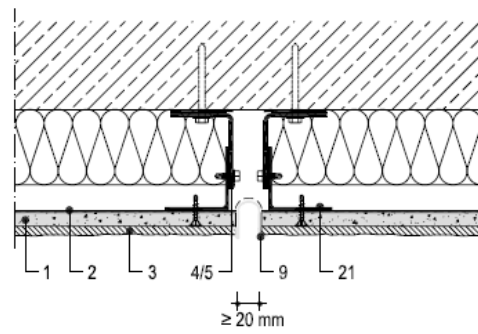


Figure A7.7: Vertical control joint.

<b>Construction details</b> <b>AQUAPANEL® Cladding Systems – Family 1</b>		<b>Annex A7</b> of European Technical Assessment ETA 13/0311
<b>Aluminium alloy subframe</b>	WL131.C; WL132.C; WL231.C; WL232.C; WL331.C; WL332.C	

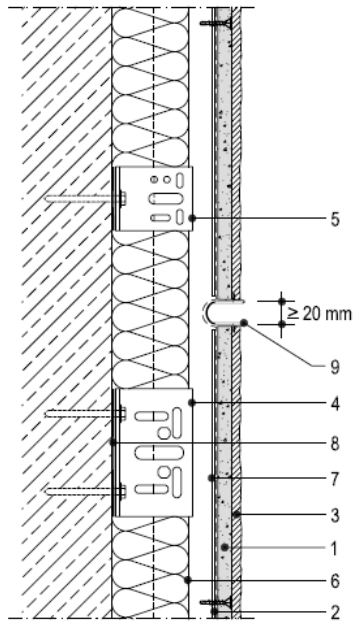


Figure A7.8: Horizontal control joint.

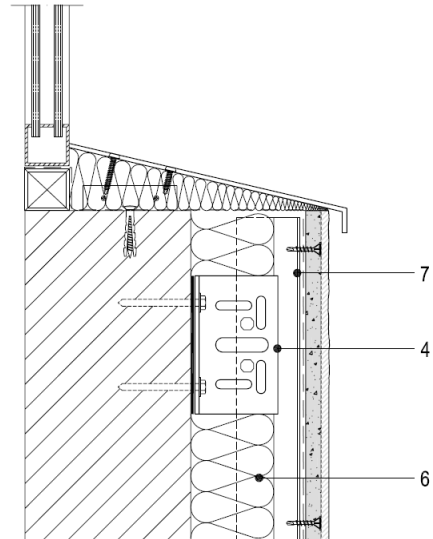


Figure A7.9: Sill.

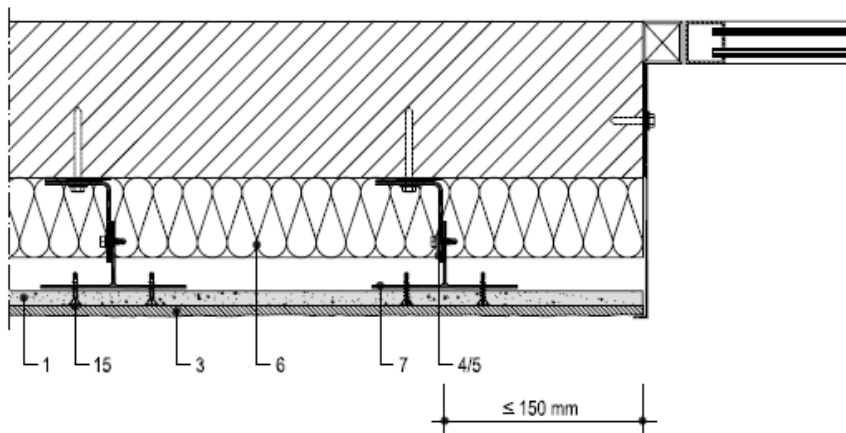


Figure A7.10: Jamb (without thermal insulation MW).

<b>Construction details</b> <b>AQUAPANEL® Cladding Systems – Family 1</b>		<b>Annex A7</b> of European Technical Assessment ETA 13/0311
<b>Aluminium alloy subframe</b>	WL131.C; WL132.C; WL231.C; WL232.C; WL331.C; WL332.C	

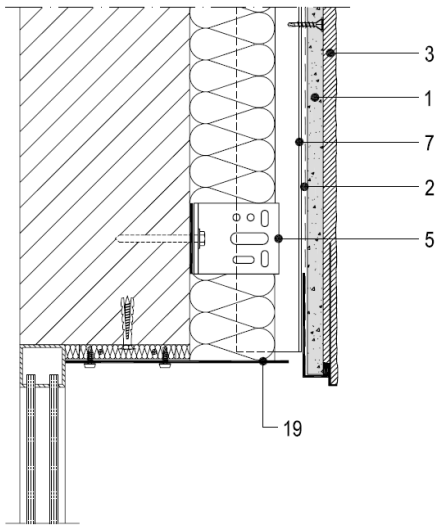


Figure A7.11.1: Lintel.

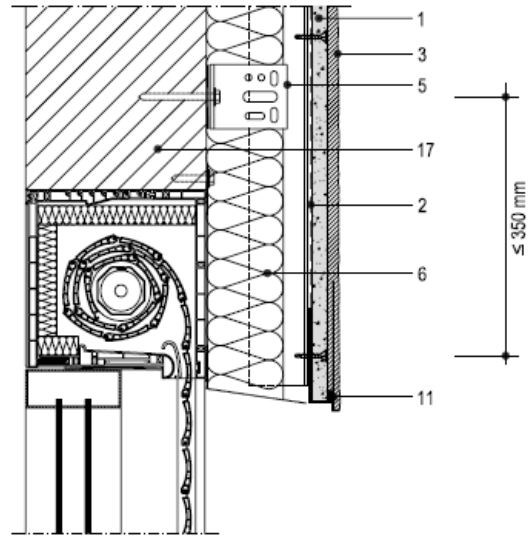


Figure A7.11.2: Lintel with shutter box.

<b>Construction details</b> <b>AQUAPANEL® Cladding Systems – Family 1</b>		<b>Annex A7</b> of European Technical Assessment ETA 13/0311
<b>Aluminium alloy subframe</b>	WL131.C; WL132.C; WL231.C; WL232.C; WL331.C; WL332.C	

## ANNEX 8 - DESIGN, INSTALLATION, MAINTENANCE AND REPAIR CRITERIA

### A8.1 Design

The design of the external wall cladding systems with renderings applied in situ for ventilated and non-ventilated façades using the kits defined in this ETA should observe the following criteria:

- The assembled system design must be checked by calculation taking into account the mechanical characteristic values of relevant components (boards, profiles, brackets and fixings) in order to verify that they resist the relevant actions (dead loads, wind loads, etc.) applying on the specific works. National safety factors must be used.
- The distances between vertical profiles must be 600 mm or 400 mm.
- The design must also accommodate the specified thermal movements of components and structural movements of the substrate without inducing damage to the assembled system or components.
- The assembled system design must be based on the standard construction details given in Annex 6 and 7. For specific conditions of the works, other solutions could be used taking into account the following aspects:
  - The weakest points of the façade are the continuity of the rendering system on the board, the connections with the openings, the base edges and the roof edges, therefore the design of these points requires special attention.
  - Flexible sheet of waterproofing is an optional component. However, in general, the use of flexible sheet of waterproofing in the assembled system is recommended by the ETA holder
  - Besides, the use of the thermal insulation in the assembled system is also recommended by the ETA holder.
- Corrosion protection of subframe components must be chosen taking into account the category of corrosivity of the atmosphere (see ISO 9223) in which will be the works.
- Fixings between brackets and the substrate must be chosen according to the substrate material and the minimum resistance required due to maximum envisaged wind load and dead load (pull-out and shear strength of fixings).
- The assessment of risk of water condensation of the façade complete solution (e.g. by means of EN ISO 13788) must distinguish between ventilated or non-ventilated façade.

### A8.2 Installation

The installation of the external wall cladding systems with renderings applied in situ for ventilated and non-ventilated façades using the kits defined in this ETA should observe the following criteria:

- The installation of the kits must be carried out in accordance with ETA holder instructions and the design and drawings prepared for the specific works. It is the responsibility of the ETA holder to ensure that the information on these provisions is given to those concerned.
- Special attention is required for the installation of the weakest points of the façade (continuity of the rendering system, opening connections, the base edges and the roof edges).
- The installation of the kits must be carried out by installation companies and by installation staff which have been trained and authorized by the ETA holder.

### **A8.3 Maintenance and repair**

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

- Regarding the rendering systems and AQUAPANEL® Cement Board Outdoor: the appearance of any damage such as cracking, detachment, delamination, mould presence due to permanent moisture or permanent irreversible deformation.
- Regarding the subframe components: the presence of corrosion or presence of water accumulation.

When necessary, any repair to localised damaged areas must be carried out with the same kit components and following the repair instructions given by the ETA holder.