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Agrément Certificate
22/6111
Product Sheet 1

PORCELANOSA GROUP FAÇADE SYSTEMS

PORCELAIN PANELS VENTILATED FAÇADE SYSTEM

This Agrément Certificate Product Sheet(1) relates to the Porcelain Panels Ventilated Façade System, comprising ceramic tiles mechanically fastened to vertical aluminium rails, to provide an open-jointed, back-ventilated and drained rainscreen cladding system for use on concrete, masonry, steel-frame or timber-frame substrate walls of new and existing domestic and non-domestic buildings.

(1) Hereinafter referred to as 'Certificate'.

CERTIFICATION INCLUDES:

- factors relating to compliance with Building Regulations where applicable
- factors relating to additional non-regulatory information where applicable
- independently verified technical specification
- assessment criteria and technical investigations
- design considerations
- installation guidance
- regular surveillance of production
- formal three-yearly review.

KEY FACTORS ASSESSED

Strength and stability — the system can be designed to resist wind actions normally encountered in the UK (see section 6).
Behaviour in relation to fire — constructions incorporating the system can achieve an A2-s1, d0 classification to BS EN 13501-1 : 2007 and its use may be restricted in some cases (see section 7).
Air and water penetration — the vertical and horizontal joints between the tiles will minimise water entering the cavity. Any water collecting in the cavity will be removed by drainage and ventilation (see section 8).
Durability — under normal UK conditions, the system will perform effectively as an external cladding with a service life of at least 35 years (see section 10).

The BBA has awarded this Certificate to the company named above for the system described herein. This system has been assessed by the BBA as being fit for its intended use provided it is installed, used and maintained as set out in this Certificate.

On behalf of the British Board of Agrément

Date of First issue: 17 May 2022

Hardy Giesler
Chief Executive Officer

The BBA is a UKAS accredited certification body – Number 113.
The schedule of the current scope of accreditation for product certification is available in pdf format via the UKAS link on the BBA website at www.bbacerts.co.uk
Readers MUST check the validity and latest issue number of this Agrément Certificate by either referring to the BBA website or contacting the BBA directly.
Any photographs are for illustrative purposes only, do not constitute advice and should not be relied upon.

Regulations

In the opinion of the BBA, the Porcelain Panels Ventilated Façade System, if installed, used and maintained in accordance with this Certificate, can satisfy or contribute to satisfying the relevant requirements of the following Building Regulations (the presence of a UK map indicates that the subject is related to the Building Regulations in the region or regions of the UK depicted):

The Building Regulations 2010 (England and Wales) (as amended)

Requirement:	**A1**	**Loading**
Comment:		The system is acceptable. See sections 6.4 and 6.5 of this Certificate.
Requirement:	**B3(4)**	**Internal fire spread**
Comment:		The system can contribute to satisfying this Requirement. See sections 7.1 and 7.4 of this Certificate.
Requirement:	**B4(1)**	**External fire spread**
Comment:		The system can be unrestricted by this Requirement. See sections 7.1 and 7.2 of this Certificate.
Requirement:	**C2(b)**	**Resistance to moisture**
Comment:		The system will contribute to satisfying this Requirement. See sections 8.1 to 8.5 of this Certificate.
Regulation:	**7(1)**	**Materials and workmanship**
Comment:		The system is acceptable. See sections 10.1 to 10.3 and the *Installation* part of this Certificate.
Regulation:	**7(2)**	**Materials and workmanship**
Comment:		The system can be unrestricted by this Regulation. See sections 7.1 and 7.2 of this Certificate.

The Building (Scotland) Regulations 2004 (as amended)

Regulation:	**8(1)(2)**	**Durability, workmanship and fitness of materials**
Comment:		The system can contribute to a construction satisfying this Regulation. See sections 9 and 10.1 to 10.3 and the *Installation* part of this Certificate.
Regulation:	**9**	**Building standards applicable to construction**
Standard:	1.1(a)(b)	Structure
Comment:		The system is acceptable, with reference to clause 1.1.1[(1)(2)] of this Standard. See sections 6.4 and 6.5 of this Certificate.
Standard:	2.4	Cavities
Comment:		The system can contribute to satisfying this Standard, with reference to clause 2.4.2[(1)(2)]. See sections 7.1 and 7.4 of this Certificate.
Standard:	2.6	Spread to neighbouring buildings
Comment:		The system is unrestricted by this Standard, with reference to clauses 2.6.4[(1)(2)], 2.6.5[(1)] and 2.6.6[(2)]. See sections 7.1 and 7.2 of this Certificate.
Standard:	2.7	Spread on external walls
Comment:		The system is unrestricted by this Standard, with reference to clause 2.7.1[(1)(2)]. See sections 7.1 and 7.2 of this Certificate.

Standard: Comment:	3.10	Precipitation The system can contribute to satisfying this Standard, with reference to clauses 3.10.1[(1)(2)] to 3.10.3[(1)(2)], 3.10.5[(1)(2)] and 3.10.6[(1)(2)]. See sections 8.1 to 8.5 of this Certificate.
Standard: Comment:	7.1(a)	Statement of sustainability The system can contribute to satisfying the relevant requirements of Regulation 9, Standards 1 to 6 and therefore will contribute to a construction meeting a bronze level of sustainability as defined in this Standard.
Regulation: Comment:	**12**	**Building standards applicable to conversions** All comments given for the system under Regulation 9, Standards 1 to 6 also apply to this Regulation, with reference to clause 0.12.1[(1)(2)] and Schedule 6[(1)(2)].

(1) Technical Handbook (Domestic).
(2) Technical Handbook (Non-Domestic).

The Building Regulations (Northern Ireland) 2012 (as amended)

Regulation: Comment:	**23(a)(i)(iii)(b)(i)**	**Fitness of materials and workmanship** The system is acceptable. See sections 10.1 to 10.3 and the *Installation* part of this Certificate.
Regulation: Comment:	**28(b)**	**Resistance to moisture and weather** The system can contribute to satisfying this Regulation. The system is not watertight but will resist the passage of rainwater to the supporting structure. See sections 8.1 to 8.5 of this Certificate.
Regulation: Comment:	**30**	**Stability** The system is acceptable. See sections 6.4 and 6.5 of this Certificate.
Regulation: Comment:	**35(4)**	**Internal fire spread – Structure** The system can contribute to satisfying this Regulation. See sections 7.1 to 7.4 of this Certificate.
Regulation: Comment:	**36(a)**	**External fire spread** The system is unrestricted by this Regulation. See sections 7.1 to 7.4 of this Certificate.

Construction (Design and Management) Regulations 2015
Construction (Design and Management) Regulations (Northern Ireland) 2016

Information in this Certificate may assist the client, designer (including Principal Designer) and contractor (including Principal Contractor) to address their obligations under these Regulations.

See sections: 3 *Delivery and site handling* (3.4, 3.5 and 3.8), 9 *Maintenance* (9.3) and 12 *General* (12.4) of this Certificate.

Additional Information

CE marking

The Certificate holder has taken the responsibility of CE marking the tiles, in accordance with harmonised European Standard BS EN 14411 : 2016.

1 Description

1.1 The Porcelain Panels Ventilated Façade System comprises:

- porcelain ceramic tiles incorporating a glass fibre safety mesh glued to the back face
- stainless steel clips for visible- and invisible-fix
- aluminium support frame including vertical L and T profiles, horizontal omega profiles and angle brackets
- fixings.

Porcelain ceramic tiles

1.2 The ceramic tiles are dry-pressed, glazed or unglazed, fully vitrified and conform to BS EN 14411 : 2016, with low water absorption group BI_a (< 0.5%). They are fixed to the support frame with stainless clips using either a visible- or invisible-fix method (see Figures 1 and 2). With invisible-fix, tiles with grooves formed on the edge at the fixing points during the manufacturing process are used. The tiles are available in sizes given in Table 1:

Table 1 Ceramic tiles

Format (cm)	Length (mm)	Width (mm)	Thickness (mm)	Weight (kg)
100 x 100	1000	1000	10.0	24
59.9 x 120	1200	599	10.0	17.2
59.6 x 59.6	596	596	10.3	8.5
58.6 x 58.6	586	586	10.3	8.2
29.4 x 59.6	596	294	10.3	4.1
19.3 x 59.6	596	193	10.3	2.7
100 x 100	1000	1000	10.3	24
59.6 x 59.6	596	596	10.4	8.3
29.7 x 59.6	596	297	10.4	4.1
45 x 90	450	900	10.5	10.3
59.6 x 59.6	596	596	10.5	8.7
39.7 x 79.7	797	397	10.5	7.8
43.5 x 65.9	658	434.6	10.5	7
44 x 66	660	440	10.5	7
19.3 x 120	1200	193	10.5	6.6
22 x 90	900	220	10.5	4.8
33 x 66	660	330	10.5	4.6
21.5 x 65.9	658	215	10.5	3.4
21.9 x 66	660	219	10.5	3.3

Table 1 Ceramic tiles (continued)

Format (cm)	Length (mm)	Width (mm)	Thickness (mm)	Weight (kg)
14.3 x 90	900	143	10.5	3.1
45 x 90	900	450	10.7	9.9
22 x 90	900	220	10.7	5
14.3 x 90	900	143	10.7	3.2
59.6 x 120	1200	596	11.0	19.5
80 x 80	800	800	11.0	15.8
25 x 150	1500	250	11.0	10
79.2 x 79.2	792	792	11.1	16.6
80 x 80	800	800	11.1	16.5
80 x 80	800	800	11.1	16.1
59.4. x 59.6	596	594	11.2	8.8
29.6 x 59.4	594	296	11.2	4.4
120 x 120	1200	1200	11.5	38
59.6 x 180	1800	596	11.5	29.3
58.6 x 118.7	1187	586	11.5	19
59.6 x 120	1200	596	11.5	19
59.6 x 120	1200	596	11.5	18.7
29.4 x 180	1800	294	11.5	14.5
29.4 x 120	1200	294	11.5	9.6
19.3 x 180	1800	193	11.5	9.5
19.3 x 120	1200	193	11.5	6.3
119 x 119	1190	1190	12.0	38.9
59.4 x 119	1190	594	12.0	19.1
29.6 x 59.4	594	296	12.0	14.8
59.4 x 59.4	594	594	12.0	9.7

Figure 1 Fixing systems with angle brackets, L and T profiles and fixing clips

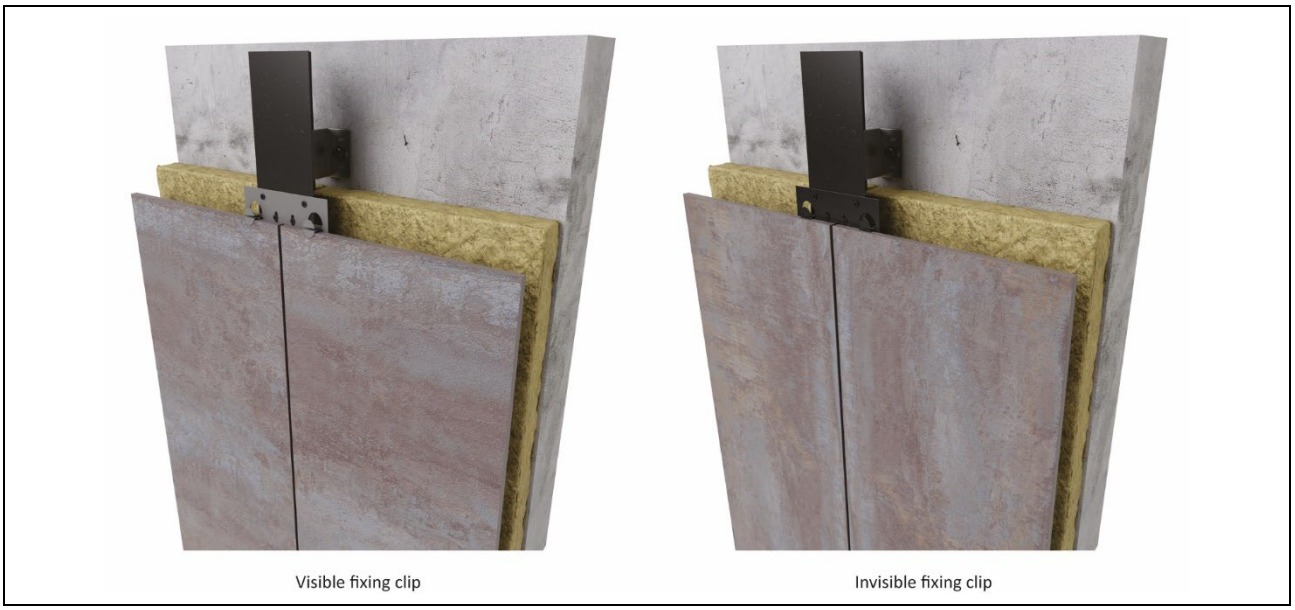
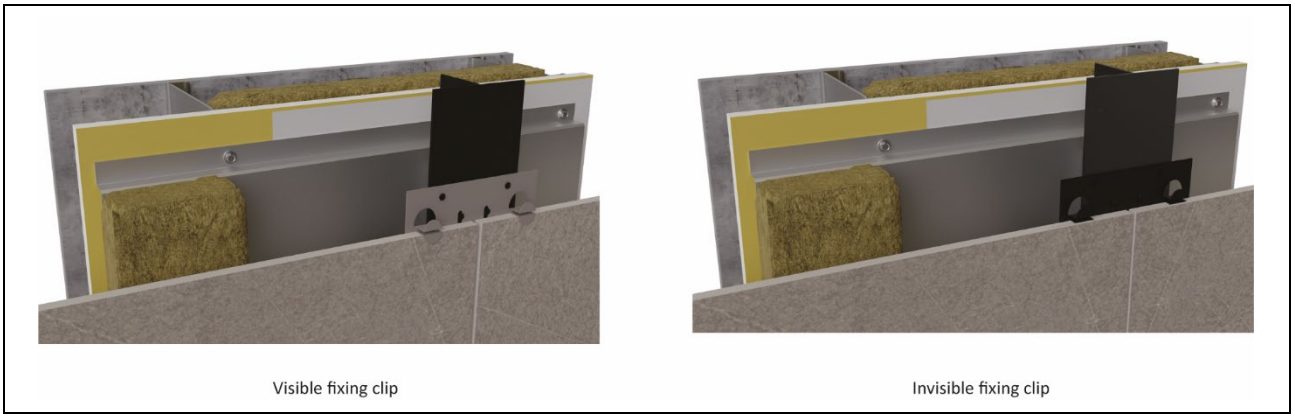


Figure 2 Fixing systems with Omega profiles, angle brackets, L and T profiles and fixing clips



1.3 The tiles have the characteristics of:

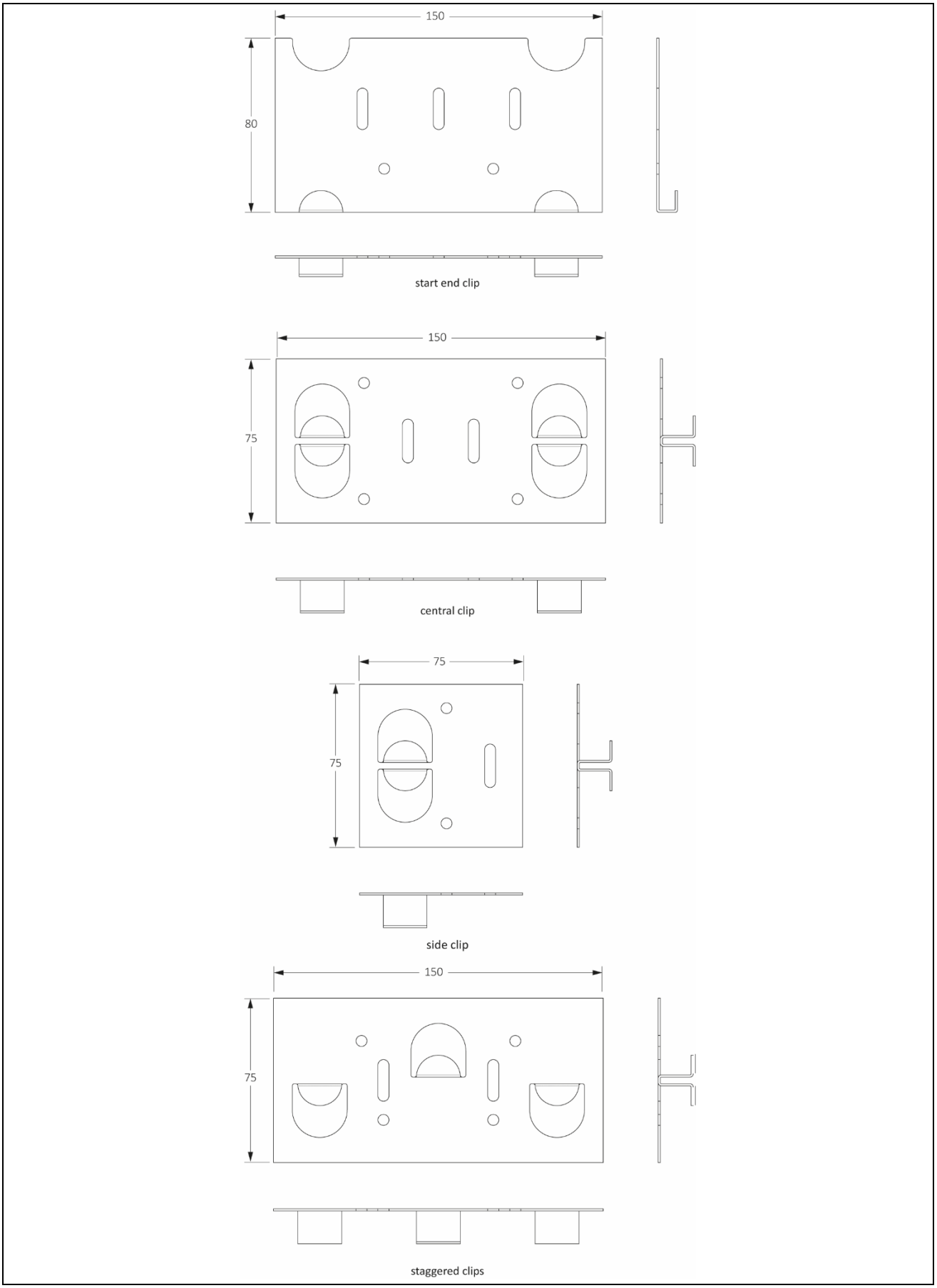
- apparent density 2400 kg·m^{-3}
- bending strength >35 MPa
- breaking strength >1300 N
- water absorption <0.5% (by mass).

1.4 To improve impact resistance, the reverse side of the tiles is faced with a 12.5 by 11.8 mm glass fibre safety mesh with a unit weight of 98 g·m^{-2} bonded with 130 g·m^{-2} polyurethane adhesive.

Fixing clips

1.5 Clips are of stainless steel grade 1.4301 (X5CrNi18-10) to BS EN 10088-2 : 2014 and have a nominal thickness of 1 mm. The lugs on clips for visible-fix accommodate the full thickness of the tile, and those for invisible-fix (black polyester coated (100 to 130 microns) are located in the slots in the tile edge. Clips are available for different locations (see Figure 3). Central clips are used to achieve an inline joint pattern, while staggered clips are used to achieve a staggered joint pattern.

Figure 3 Fixing clips

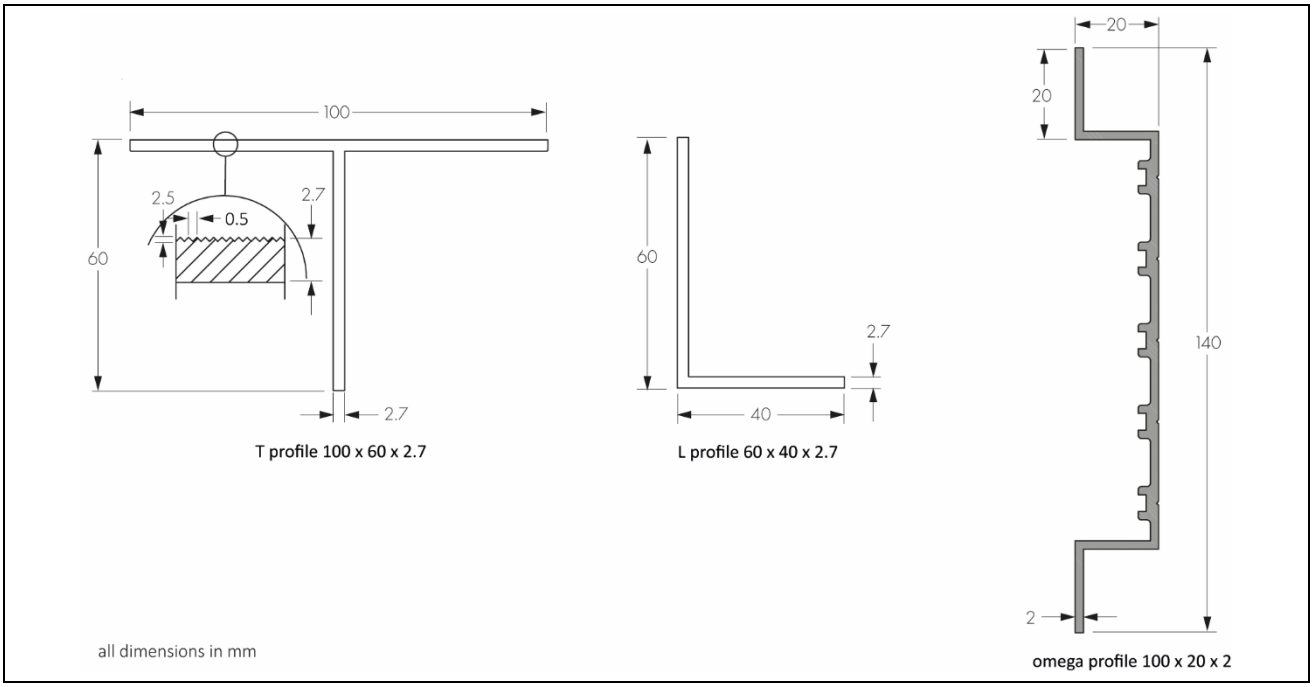


Support frame

L and T profiles

1.6 Vertical T-profiles (T100.60.2.7) for central parts and L-profiles (L60.40.2.7) for external corners and window sills are extruded from magnesium-silicon-aluminium alloy grade EN AW-6005A, temper T6 [Al SiMg(A)] to BS EN 755-2 : 2016 and BS EN 12020-1 : 2008 and are available in lengths up to 3 m (see Figure 4 and Table 2). They are used when installing the cladding system on concrete, masonry, steel-frame or timber-frame substrate walls. They are installed vertically at maximum centres of 660 mm.

Figure 4 Support profiles



Omega profiles

1.7 Horizontal Omega profiles (O140.20.2) are extruded from magnesium-silicon-aluminium alloy grade EN AW-6005A, temper T6 [Al SiMg(A)] to BS EN 755-2 : 2016 and BS EN 12020-1 : 2008 and are available in lengths up to 3 m (see Figure 4 and Table 2). They are used when installing the cladding system on steel- and timber-frame substrate walls. Their maximum vertical centres are fixed at 750 mm.

Table 2 Properties of support profiles

Profile	Cross-sectional area (mm^2)	Moment of inertia about x_c I_{xc} (cm^4)	Moment of inertia about y_c I_{yc} (cm^4)
T100.60.2.7	424.70	13.10	22.50
L60.40.2.7	262.60	2.06	11.56
O140.20.2	428.75	2.29	68.92

Angle brackets

1.8 Angle brackets are used to attach the vertical profiles to the substrate wall or the vertical profiles to the horizontal omega profile when used. The angle brackets are extruded from magnesium-silicon-aluminium alloy grade EN AW-6005A, temper T6 [Al SiMg(A)] to BS EN 755-2 : 2016 and BS EN 12020-1 : 2008. They are available in two lengths: the shorter has two holes (one round and the other slotted to allow movement) and the longer has five holes (two round and three slotted) (see Figure 5). They are available in the sizes shown in Table 3.

Figure 5 Angle brackets

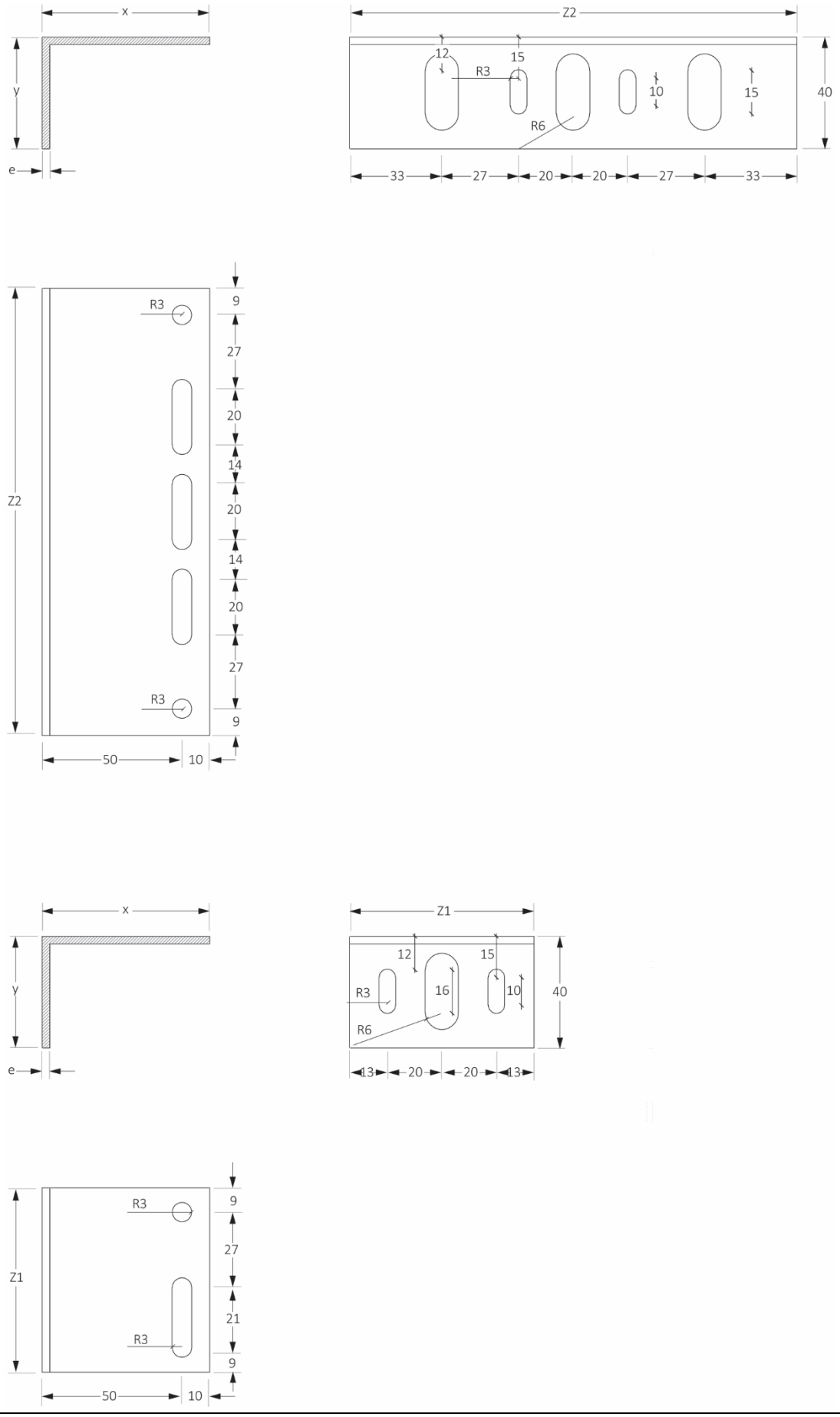


Table 3 Angle brackets – Dimensions (mm)(1)

X	Y	Z1	Z2	e
40	40	66	160	2.7
60	40	66	160	2.7
80	40	66	160	2.7
100	40	66	160	2.7
120	40	66	160	3.2
140	40	66	160	3.2
160	40	66	160	3.2

(1) Table 3 to be read in conjunction with Figure 5.

Fixings

1.9 Self-drilling 4.2 mm diameter by 14 mm long stainless steel (steel designation number 1.4301 to BS EN 10088-2 : 2014) screws, with a property class of 50 to BS EN ISO 3506-1 : 2020 are used to attach the fixing clips to the vertical aluminium profiles.

1.10 Self-drilling 5.5 mm diameter by 22 mm long stainless steel (steel designation number 1.4301 to BS EN 10088-2 : 2014) hexagonal head or cylindrical head screws to BS EN ISO 15480 : 2019 and BS EN ISO 15481 : 1999, with a property class of 60 to BS EN ISO 3506-1 : 2020 are used to attach the vertical aluminium profiles to the angle brackets and the angle brackets to the omega rail, when the latter is used.

1.11 Ancillary items used with the system, but outside the scope of this Certificate include:

- substrate wall — masonry, concrete, steel-frame and timber-frame
- wall angle bracket or omega profile anchors — used to fix angle bracket or omega profile to the substrate wall
- breather membrane
- a bead of polyurethane mastic (type p-404) — applied between the vertical T- or L-profile and the ceramic tiles to prevent the tiles from moving
- insulation — where specified
- cavity barriers.

2 Manufacture

2.1 The tiles are dry-pressed, cut and then fired using an automated kiln.

2.2 The support frame, clips and fixings are bought-in to agreed specifications from approved suppliers.

2.3 As part of the assessment and ongoing surveillance of product quality, the BBA has:

- agreed with the manufacturer the quality control procedures and product testing to be undertaken
- assessed and agreed the quality control operated over batches of incoming materials
- monitored the production process and verified that it is in accordance with the documented process
- evaluated the process for management of nonconformities
- checked that equipment has been properly tested and calibrated
- undertaken to carry out the above measures on a regular basis through a surveillance process, to verify that the specifications and quality control operated by the manufacturer are being maintained.

2.4 The system is manufactured in Spain and is marketed and distributed in the UK by the Certificate holder. The management system for the tiles is covered by Porcelanosa Grupo AIE, which has been assessed and registered as meeting the requirements of BS EN ISO 9001 : 2015 by SGS (Certificate ES05/1884). The cladding support system (metal components) is covered by Butech Building Technology SAU, which has been assessed and registered as meeting the requirements of BS EN ISO 9001 : 2015 by Bureau Veritas (Certificate ES101947-2).

3 Delivery and site handling

3.1 Tiles are supplied in cardboard boxes, shrink-wrapped in groups, depending on the tile size. They are delivered to site polythene wrapped and stored on wooden pallets, which are also protected. Pallets should be stored on level ground and not stacked.

3.2 Each pallet of tiles bears a label showing product details such as type, size, nominal thickness, quantity and date of manufacture. Each tile is additionally marked with an identification code including manufacturing references and colour.

3.3 Tiles must be packed to ensure they are protected from movements that could cause damage during transit.

3.4 Tiles should be unloaded as close as possible to the point of use to avoid unnecessary movements. To avoid surface damage, tiles should be lifted individually and must not be slid across each other.

3.5 Tiles should be handled with care to avoid damage or breakage. Care is also required when handling long lengths of aluminium profiles, particularly at height.

3.6 Support frames are supplied in cardboard boxes each with an identification label.

3.7 Packs of aluminium profiles should be stacked horizontally on sufficient bearers to prevent distortion, to a maximum height of 1 m. Other components should be stored safely until ready for use in separate cardboard boxes.

3.8 Care should be exercised when handling rails to avoid injury from sharp edges. Protective clothing should be worn and all health and safety rules should be observed.

Assessment and Technical Investigations

The following is a summary of the assessment and technical investigations carried out on the Porcelain Panels Ventilated Façade System.

Design Considerations

4 Use

4.1 The Porcelain Panels Ventilated Façade System is satisfactory for use on masonry, concrete, steel-frame or timber-frame substrate walls of new and existing buildings above the damp-proof course (dpc) level, to provide an open-jointed, back-ventilated protective façade.

4.2 Ventilation and drainage must be provided behind the cladding. As the rainscreen cladding tiles are open-jointed, the clear cavity between the back of the tile and the substrate wall (or insulation if installed on the substrate wall) must be at least 50 mm wide, and ensure that a minimum ventilation opening of 5000 mm^2 per metre run is provided at the building base point and at the roof edge (see section 8.5). The ventilation openings around the periphery of the system should be suitably protected with mesh, or a perforated sheet or similar, to prevent the ingress of birds, vermin and insects.

4.3 The substrate wall to which the system is to be fixed must be structurally sound, and designed and constructed in accordance with the requirements of the relevant national Building Regulations and Standards:

- timber-frame walls must be designed and constructed in accordance with PD 6693-1 : 2019, BS EN 1995-1-1 : 2004 and BS EN 1995-1-2 : 2004 and their UK National Annexes, with workmanship in accordance with BS 8000-5 : 1990 and preservative-treated in accordance with BS EN 351-1 : 2007 and BS 8417 : 2011
- steel-frame walls must be structurally sound, and designed and constructed in accordance with BS EN 1993-1-1 : 2005, BS EN 1993-1-2 : 2005 and BS EN 1993-1-3 : 2006, and their UK National Annexes
- masonry walls must be designed and constructed in accordance with the relevant recommendations of BS EN 1996-1-1 : 2005, BS EN 1996-1-2 : 2005, BS EN 1996-2 : 2006 and BS EN 1996-3 : 2006, and their UK National Annexes, and BS 8000-0 : 2014 and BS 8000-3 : 2020
- concrete walls must be designed and constructed in accordance with BS EN 1992-1-1 : 2004 and BS EN 1992-1-2 : 2004, and their UK National Annexes.

4.4 As the rainscreen system is open-jointed, any insulation installed behind the cladding must be suitably fixed to the supporting wall to resist the forces of wind suction and insulation self-weight. Insulation should be of a rigid or semi-rigid type (eg boards) and, where its performance could be diminished by moisture, a breather membrane should be provided over its outer face. The ventilation pathway behind the cladding must not be allowed to become blocked nor the insulation dislodged where it may be vulnerable to wetting.

4.5 To allow for thermal expansion, a gap of 15 mm must be provided between adjacent longitudinal support profiles; tiles must not straddle this gap. Open joints between tiles must be sufficient to allow thermal expansion.

4.6 It is important for designers, planners, contractors and/or installers to ensure that the installation of the system is in accordance with the Certificate holder's instructions and the information given in this Certificate. All design aspects, including structural, fire and hygro-thermal design, should be checked by a suitably qualified engineer or other appropriately qualified person in accordance with the requirements of the relevant national Building Regulations and Standards.

5 Practicability of installation

The system must only be installed by installers who have been trained and approved by the Certificate holder.

6 Strength and stability

Wind loading

6.1 Design wind actions should be calculated in accordance with BS EN 1991-1-4 : 2005 and its UK National Annex. Due consideration should be given to locations with higher pressure coefficients as recommended in this Standard. In accordance with BS EN 1990 : 2002, it is recommended that a partial load factor of 1.5 is applied to determine the design wind load to be resisted by the system.

6.2 The supporting substrate wall must have sufficient strength to resist on its own the loads imparted directly by the cladding system and wind actions normally experienced in the UK, as well as any in plane force effects. No contribution from the cladding system may be assumed in this respect.

6.3 The designer should ensure that:

- the design of the sub-frame is in accordance with the relevant Regulations and Standards, and such as to limit mid-span deflections of the vertical aluminium profiles to span/200 and cantilever deflection to span/150 if the conditions given in section 6.4 are satisfied
- the tiles are fixed to the wall brackets using the specified fixing mechanisms (see sections 1.5 to 1.10)
- the design value of tensile pull-out resistance of fixings attaching the support brackets or omega profile to the substrate wall will depend on the substrate wall and must be determined for each project using a minimum recommended safety factor of 3 on the characteristic pull-out strength (outside the scope of this Certificate) calculated from pull-out test results in accordance with the guidance given in BS EN 1990 : 2002. It must also be ensured these fixings have adequate corrosion resistance
- fixings attaching the clips to the vertical L or T profiles have adequate tensile pull-out resistance to the actions impacted on the cladding system

6.4 The design resistances against wind actions (dynamic wind uplift) for a range of tile sizes are given in Tables 4 and 5, for visible and invisible clips, respectively.

Table 4 Design resistance against wind loads – visible clips

Sub-frame construction [1]	Tile size (height x width x thickness) (mm)	Horizontal centres of visible clips (mm)	Number of clips per tile	Maximum distance between the vertical profiles (mm)	Design wind resistance [2] (Pa)
Brackets (100 x 40 x 2.7) at 750 mm centres, L/T profiles, visible clips	≤ 373 x 659 x 9.6	660	4	664	2200
	≤ 659 x 373 x 9.6	373	4	380	2200
	≤ 605 x 605 x 10.7	605	4	610	1520
	≤ 1200 x 596 x 12	596	4	600	900
	≤ 596 x 1200 x 12	600	6	601	1350
	800 x 800 x 11.1	400	6	405	1086
	1800 x 596 x 11.5	600	8	601	657
	596 x 1800 x 11.5	600	8	601	862
	596 x 1800 x 11.5	600 (L profile intermediate)	8	601	1153
	1500 x 500 x 11	500	8	505	1306
	500 x 1500 x 11	500	8	505	1263
	500 x 1500 x 11	500 (L profile intermediate)	8	505	1722
	1200 x 1200 x 12	600	8	605	628
	1000 x 1000 x 12	500	8	505	1308

(1) The subframe constructions described in Table 4 are without the p404 polyurethane bead application on the vertical profiles. The same design wind resistances in Table 4 also apply to constructions with the p404 polyurethane bead.

(2) Values are calculated with a material partial factor of 3.5 for visible clips, considering a maximum distance of 668 mm between the vertical profiles, a maximum distance of 900 mm between the angle brackets and using fixings described in sections 1.9 and 1.10.

Table 5 Design resistance against wind loads – invisible clips

Sub-frame construction (1)	Tile size (height x width x thickness) (mm)	Horizontal centres of invisible clips (mm)	Number of clips per tile	Maximum distance between the vertical profiles (mm)	Design wind resistance (2) (Pa)
Brackets (100 x 40 x 2.7) at 750 mm centres, L/T profiles, invisible clips	≤ 373 x 659 x 9.6	660	4	664	1050
	≤ 659 x 373 x 9.6	378	4	378	1050
	≤ 605 x 605 x 10.7	610	4	610	750
	≤ 1200 x 596 x 12	600	4	601	530
	≤ 596 x 1200 x 12	600	6	601	600
	800 x 800 x 11.1	405	6	405	600
	596 x 1800 x 11.5	600	8	601	492
	1800 x 596 x 11.5	600	8	601	566
	1200 x 1200 x 12	600	8	601	377
	1000 x 1000 x 12	500	8	505	484
	500 x 1500 x 11	500	8	505	711
	1500 x 500 x 11	500	8	505	826
Horizontal Omega rails on masonry wall at approx. 750 mm centres, angle brackets 40 x 80 x 2.7 mm and L/T rails, at both 600 mm centres horizontally, invisible clips, p404 (130g/m3) was applied in the L/T profiles	596 x 1800 x 11.5	600	8	601	1125

(1) The subframe constructions described in Table 5 are without the p404 polyurethane bead application on the vertical profiles. The same design wind resistances in Table 4 also apply to constructions with the p404 polyurethane bead.

(2) Values are calculated with a partial factor for material properties of 4 for invisible clips, considering a maximum distance of 668 mm between the vertical profiles, a maximum distance of 900 mm between the angle brackets and using fixings described in sections 1.9 and 1.10.

Impact

6.5 The cladding system range as described in section 1 was evaluated for resistance to hard and soft body impact and found to have adequate resistance for use in impact Category IV as defined in EAD 090062-00-0404, Table G.2 (an extract from which is shown in Table 6 of this Certificate).

Table 6 Definition of Use Categories (reproduced from EAD 090062-00-0404, Table G.2)

Use Category	Description
I	A zone readily accessible at ground level to the public and vulnerable to hard body impacts but not subjected to abnormally rough use
II	A zone liable to impacts from thrown or kicked objects, but in public locations where the height of the kit will limit the size of the impact; or at lower levels where access to the building is primarily to those with some incentive to exercise care
III	A zone not likely to be damaged by normal impacts caused by people or by thrown or kicked object
IV	A zone out of reach from ground level

Note: Use Categories I, II and III are shown for reference purposes only and are not suitable for this system.

7 Behaviour in relation to fire

7.1 The tiles on an aluminium frame achieved the reaction to fire classifications in Table 7. These classifications may not be achieved by other thicknesses or other constructions, which should therefore be confirmed in accordance with the requirements of the documents supporting the national Building Regulations and any consequent restrictions imposed by those documents, on a case-by-case basis.

Table 7 Reaction to fire classifications

Classification	Product	Construction	Method/report reference
A2-s1, d0	Ceramic tiles thickness of 10 mm (all colours)	• Tile joint width ≤ 8 mm • Invisible stainless steel fixing clips (polyester coated) • Tiles are glued to the metal profile with 0.13 $kg \cdot m^{-2}$ of variable colour, section polyurethane putty (usually black) with a density of 1160 $kg \cdot m^{-3}$ • Steel, aluminium subframe • Air cavity ≥ 40 mm • Substrate of A1, 50 mm thickness double density rock wool and, rigid outer face 100 $kg \cdot m^{-3}$ and flexible inner face 40 $kg \cdot m^{-3}$	EN 13501-1: 2007 Classification Report no: 251.W.1711.070.EN.03(1), AIDIMME – Instituto Technologico
Not declared	Ceramic tiles (reverse surface) facing into a cavity	-	-
A1	Aluminium subframe, stainless steel visible clips and fixings	-	national Building Regulations

(1) Copies available from the Certificate holder.

7.2 The construction achieving A2-s1, d0 in Table 7 is unrestricted in terms of building height and proximity to a boundary.

7.3 In Northern Ireland, the tiles should not be used less than 1 m from a boundary or above 18 m. Restrictions apply on some assembly and recreation buildings.

7.4 Cavity barriers should be placed in accordance with the documents supporting the national Building Regulations and should not impede drainage and ventilation pathways.

7.5 Designers should refer to the relevant national Building Regulation guidance for detailed conditions of use, particularly in respect of requirements for substrate fire performance, service penetrations and combustibility limitations for other materials and components used in the overall wall construction, for example thermal insulation.

7.6 Where a wall incorporating the system is subject to fire-resistance requirements, an appropriate test or assessment must be carried out by a laboratory accredited for the test concerned by the United Kingdom Accreditation Service (UKAS), or equivalent accreditation body, or an assessment made by a suitably qualified and experienced individual.

8 Air and water penetration

8.1 The system is not watertight, but intentionally open-jointed, back ventilated and drained.

8.2 The supporting wall must be weathertight and reasonably airtight to satisfy the requirements of the relevant national Building Regulations and Standards.

8.3 The vertical joints (minimum 4 mm wide), coinciding with the vertical sub-frame profile, and the horizontal joints (from 5 to 8 mm wide) should minimise water penetration into the cavity. Any water collecting in the cavity due to rain or condensation will be removed by ventilation and drainage.

8.4 To protect the supporting wall or insulation from wind-driven rain, a UV-resistant, vapour permeable membrane, conforming to BS EN 13859-1 : 2014, should be applied (outside the scope of this Certificate).

8.5 The width of the cavity behind the cladding tiles must be a minimum of 50 mm for open jointed cladding in accordance with the requirements of *NHBC Standards* 2022, Chapter 6.9. In addition, a minimum 1500 $mm^{2}{\cdot}m^{-1}$ ventilation (openings to outside air) per metre wall length must be provided, in accordance with BS 5250 : 2021 and BS EN ISO 6946 : 2017.

8.6 Where the panels are attached to weathertight masonry walls, a vapour permeable barrier is not necessary as the amount of water that will penetrate the cladding will be small and will not have an adverse effect on the wall.

8.7 If the panels are installed on existing masonry walls that are structurally sound but not fully weathertight, the use of a vapour-permeable barrier is advisable.

8.8 When the panels are used on steel- or timber-frame substrate walls, the sheathing layer must have a UV-resistant wall breather membrane installed on the external face.

8.9 Provision must always be made to allow water that has penetrated behind the cladding to drain away.

9 Maintenance

9.1 Cleaning at regular intervals should be undertaken. For normal soiling, the surface may be cleaned using a hot water/household detergent mixture, applied with a suitable cleaning pad or sponge. For more difficult chemical soiling, the manufacturer's specialist advice must be sought.

9.2 Annual maintenance inspections should be carried out to ensure that all drainage channels are in good order and that the tiles, flashings and seals are in place and are secure.

9.3 Damaged tiles should be replaced as soon as practicable following the manufacturer's instructions and observing all necessary Health and Safety regulations. Individual tiles can be replaced without disturbing adjacent tiles.

10 Durability

10.1 When tested for water absorption, breaking strength and frost resistance, the tiles satisfied the requirements of BS EN 14411 : 2016, Annex G. When tested for resistance to heating and saturation and drying, the tiles retained their bending strength.

10.2 In normal UK exposure conditions, the tiles will have a service life of at least 35 years.

10.3 The aluminium profiles/brackets and the stainless steel clips and fixings will have a service life commensurate with that of the tiles they are supporting.

10.4 After natural weathering, a slight colour change in the tiles may occur. However, this is not likely to be progressive.

11 Reuse and recyclability

The tiles, aluminium profile and bracket components can be recycled.

Installation

12 General

12.1 The Porcelain Panels Ventilated Façade System must be installed and fixed in accordance with the Certificate holder's recommendations, the requirements of this Certificate and specifications laid down by the consulting engineer.

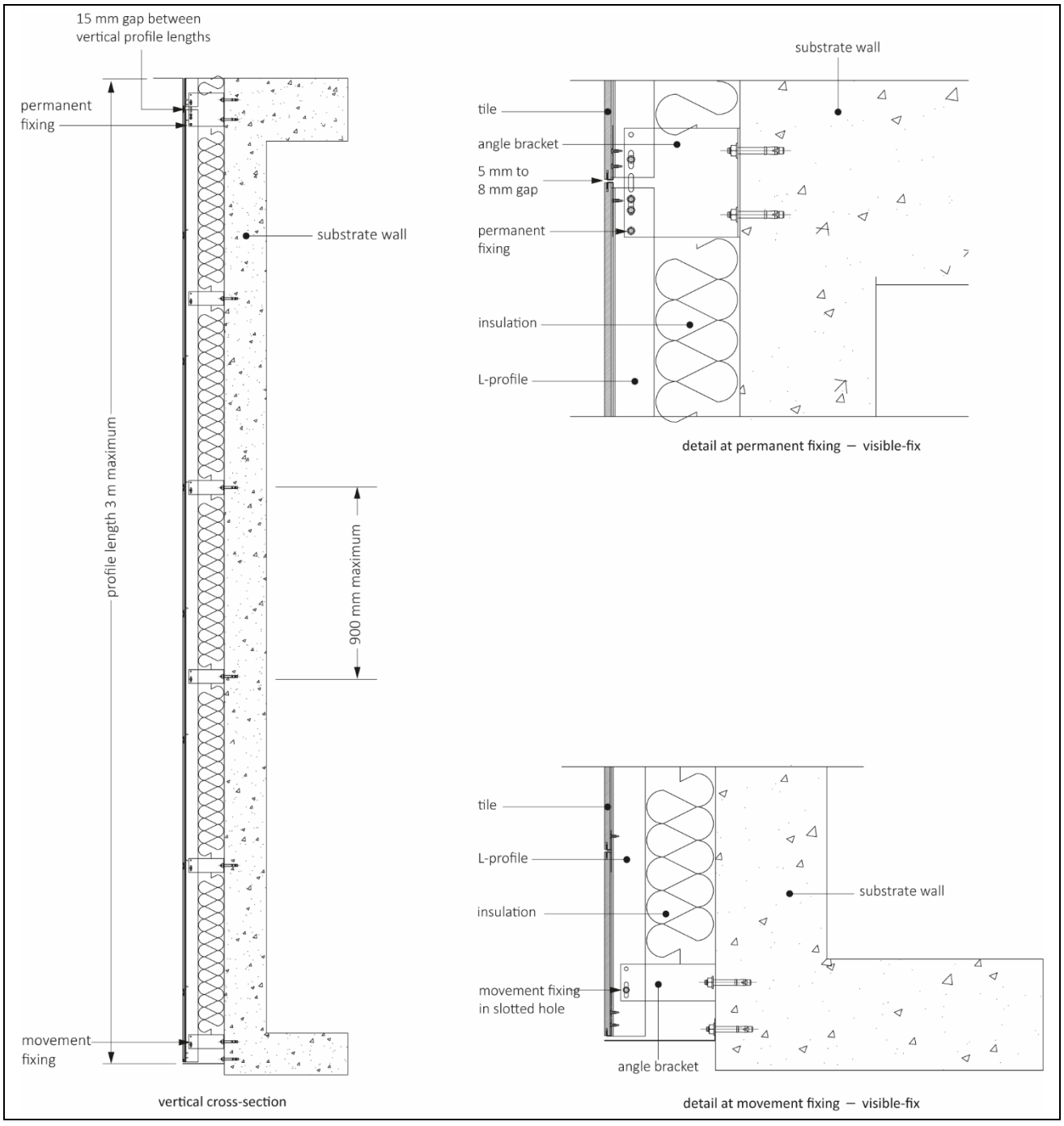
12.2 Installers must be trained and approved by the Certificate holder who can provide technical assistance at the design stage and at the start of the installation.

12.3 If significant colour variations between batches are likely, it may be necessary to mix the tiles from different pallets to obtain a uniform shade over the façade.

12.4 Tiles can be cut on a wet table saw using a blade for ceramic material with the appropriate protective clothing and eyewear used.

12.5 Typical installation details are shown in Figure 6.

Figure 6 Typical installation details



13 Procedure

13.1 Based on a preliminary survey of the wall and architectural/structural design, a grid layout for the supporting frame is first prepared. Accurate grid positioning and installation of the supporting frame is essential.

13.2 Where the substrate wall is steel- or timber-frame, the omega profile is used and is installed spaced at not greater than 750 mm centres. Angle brackets are fixed on the omega profiles depending on the width of the tile. Then the profile L and T rails are installed as described in section 13.4.

13.3 Angle brackets are secured to the substrate wall (concrete or masonry) or floor beams and/or floor slab edges using suitable fixing anchors (outside the scope of the Certificate). The brackets are aligned vertically. The vertical distance between the brackets depends on the type and condition of the substrate wall and the load to be transmitted but it will not be greater than 900 mm.

13.4 The vertical T- or L-profiles, spaced at not greater than 660 mm centres, are fixed to the angle brackets using the screws described in section 1.10. The profiles are fixed permanently to the top bracket and through slotted holes at the lower brackets to allow for linear thermal expansion. A gap of 15 mm must be provided between the adjacent 3-metre-long vertical profiles.

13.5 After the vertical profiles are installed, if required, the substrate wall can be covered by insulation and/or a breather membrane.

13.6 A bead of polyurethane mastic (see section 1.11) is applied to the vertical T- or L-profiles in the area in contact with the ceramic tiles. The tiles must be dry and clean to provide adequate adhesion. The clips (for visible- or invisible-fix) are installed using the screws described in section 1.9, starting at the bottom, with a distance between each clip depending on the size and position of the ceramic tiles used.

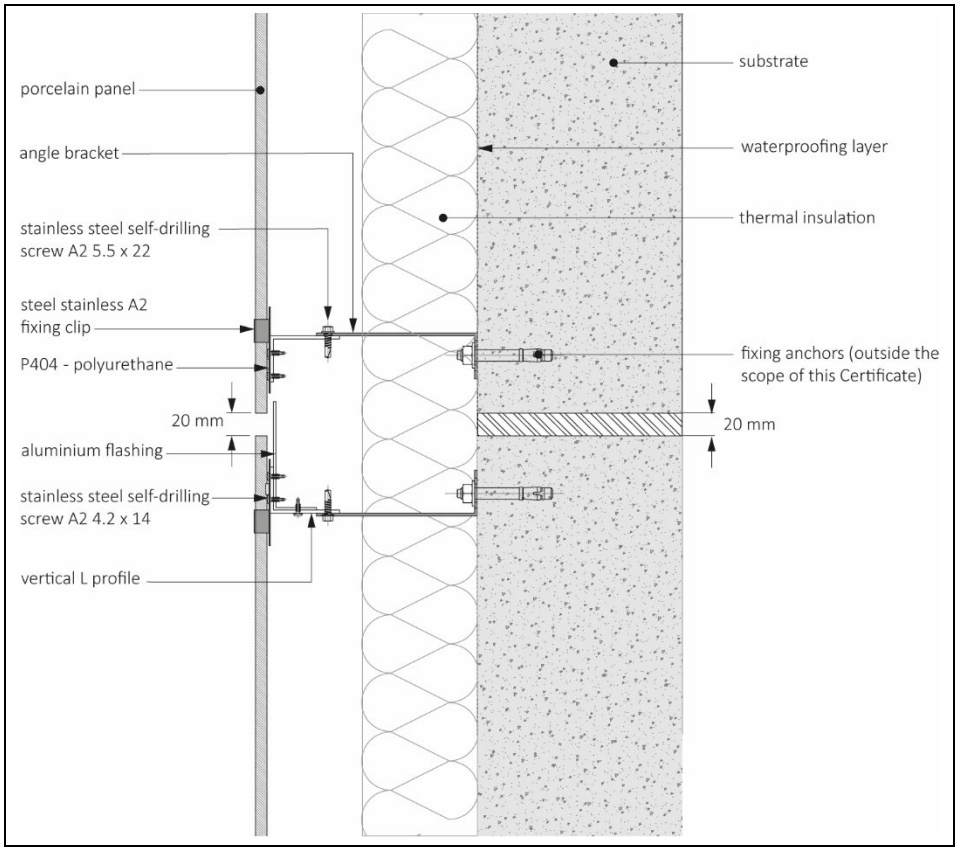
13.7 With invisible-fix, the ceramic tiles are supplied with locating grooves on the edges; grooves must not be made on site. The tile is fitted over the lower clips to engage the lugs effortlessly into the lower grooves on the tile. The upper clips are installed by fitting them into the upper grooves on the tile.

13.8 With visible-fix, the ceramic tile is placed onto the lugs of the clips. The upper clips are positioned so that the lower lugs fit perfectly onto the upper edge of the ceramic tiles.

13.9 Tiles with a length up to 680 mm are fixed to clips at all four corners. Tiles with a length between 680 and 1200 mm are fixed to clips at all four corners and at the midpoint of their horizontal edges using two additional clips fixed to an intermediate vertical profile.

13.10 Joints between tiles must always be open. Vertical joints must not be less than 4 mm wide, and horizontal joints must be between 5 and 8 mm wide. Expansion joints in the substrate wall must always coincide with the vertical joints in the façade system, using two vertical profiles (see Figure 7). Similarly, tiles must not cover expansion joints in the building nor horizontal joints in the vertical aluminium frame.

Figure 7 Vertical expansion joint



13.11 Vertical and horizontal sections for cladding systems with visible and invisible clips, but also with T or L and Omega profiles are shown in Figures 8 to 11. The installation steps are shown in Figures 12 and 13. The typical details for window head, window sill, window jamb, eaves and base are shown in Figures 14 to 18.

Figure 8 Vertical cross section details with visible clip

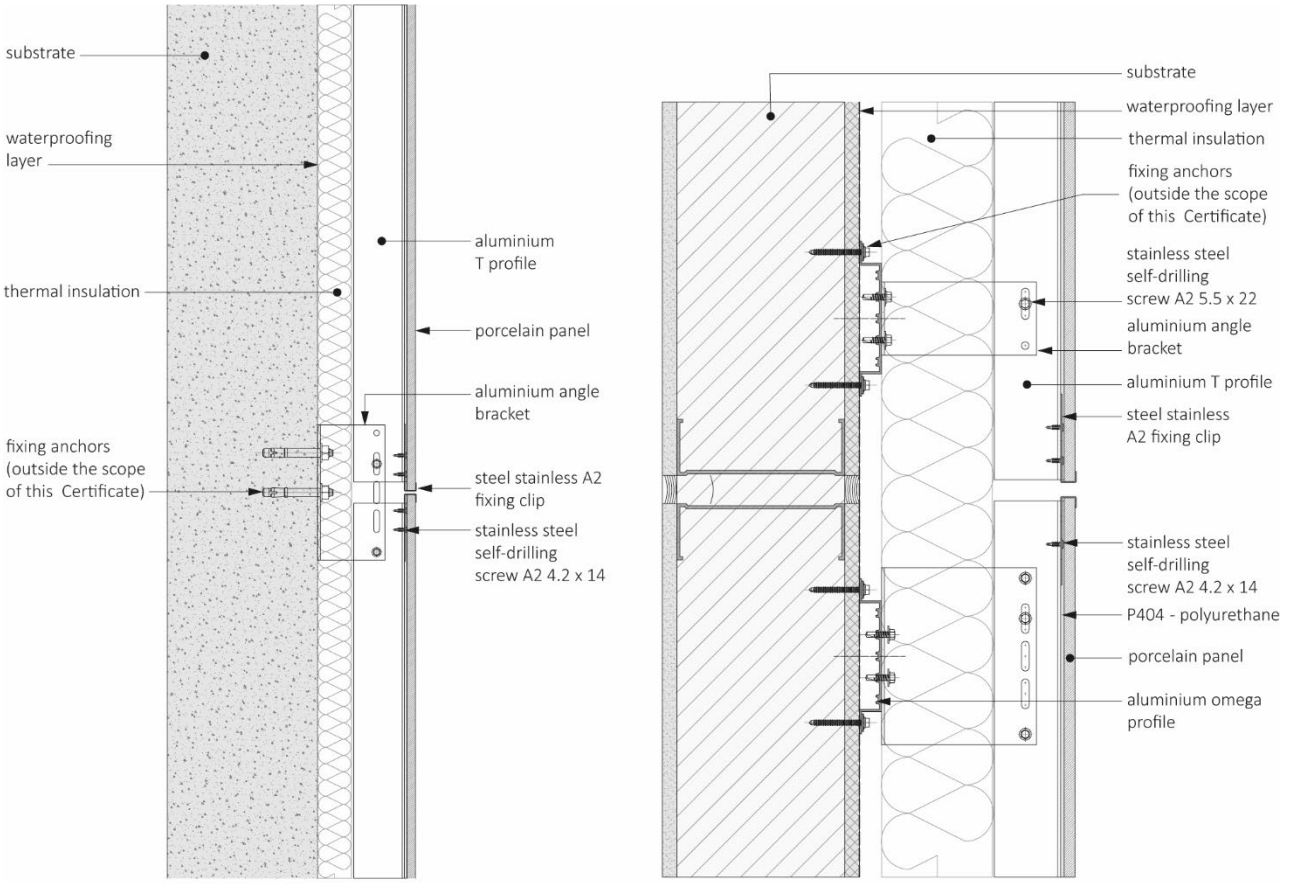


Figure 9 Vertical cross section details with invisible clip

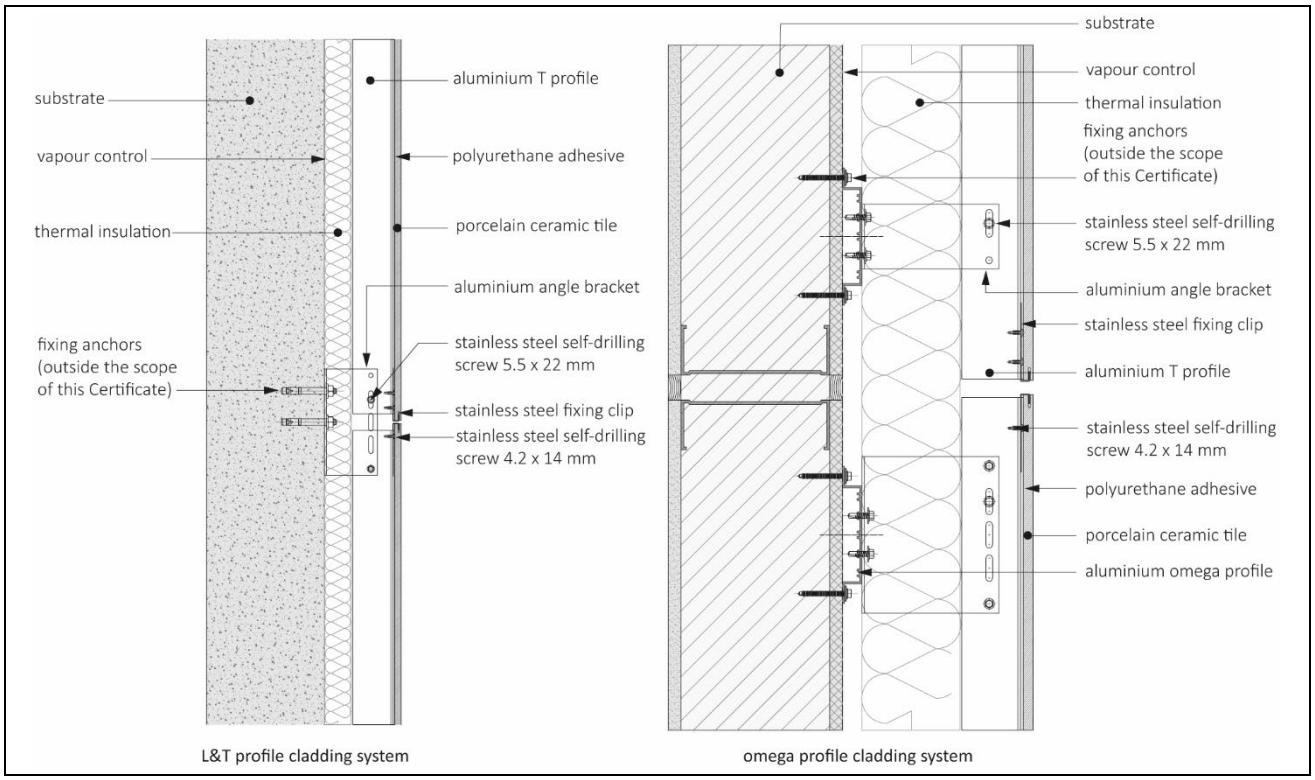


Figure 10 Horizontal cross section details with visible clip

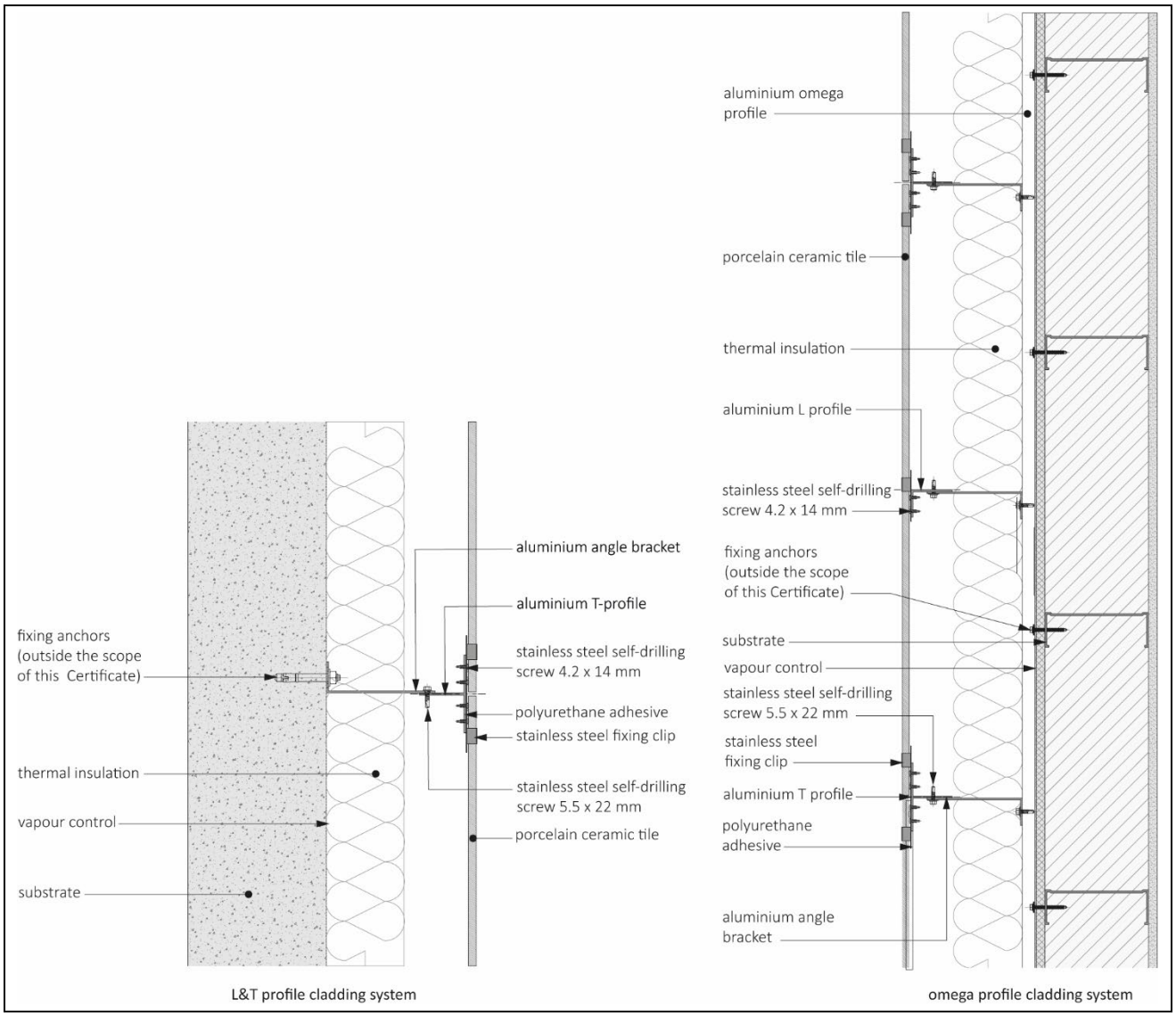


Figure 11 Horizontal cross section details with invisible clip

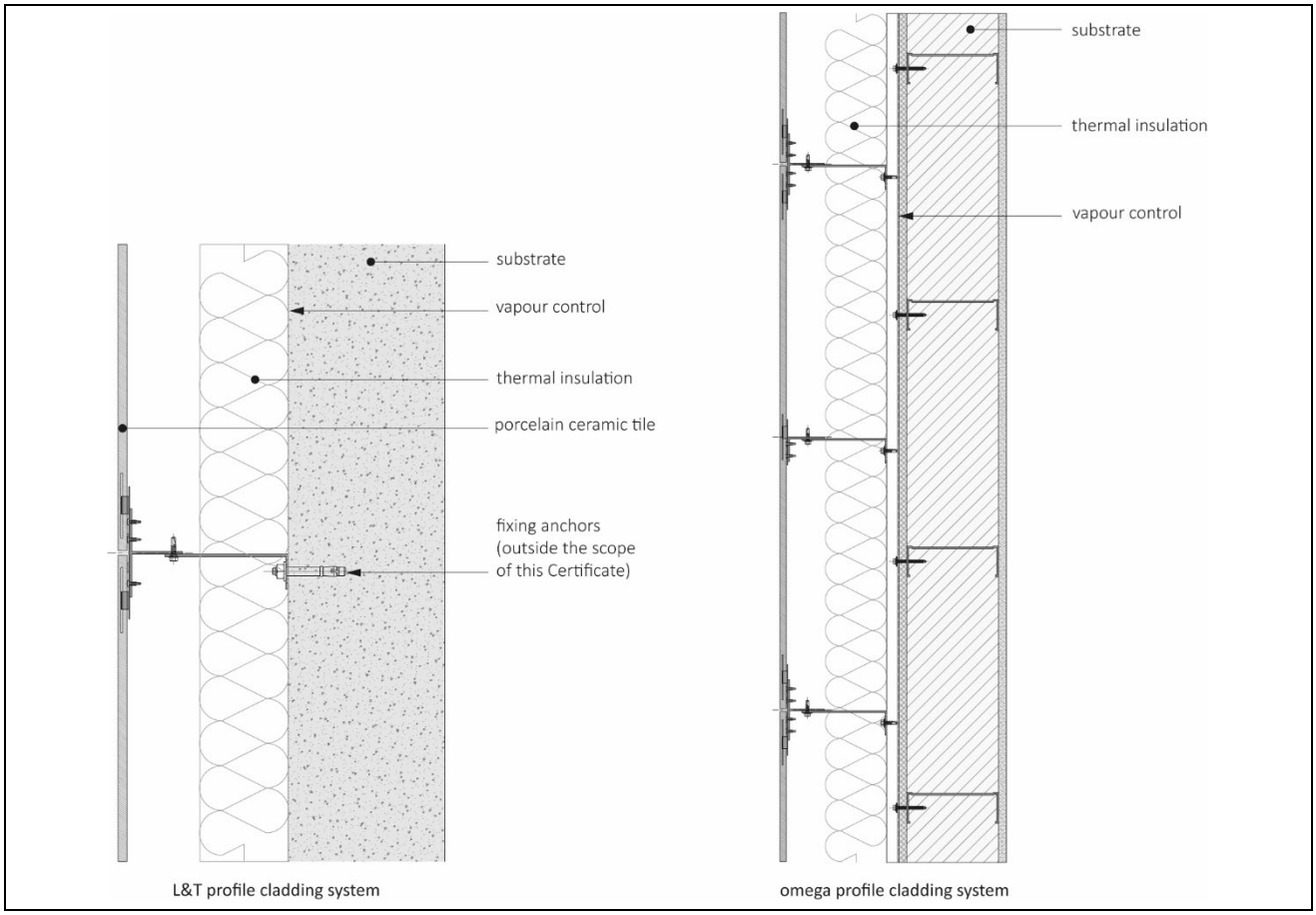


Figure 12 Installation steps with visible clip (T/L profile and omega profile)

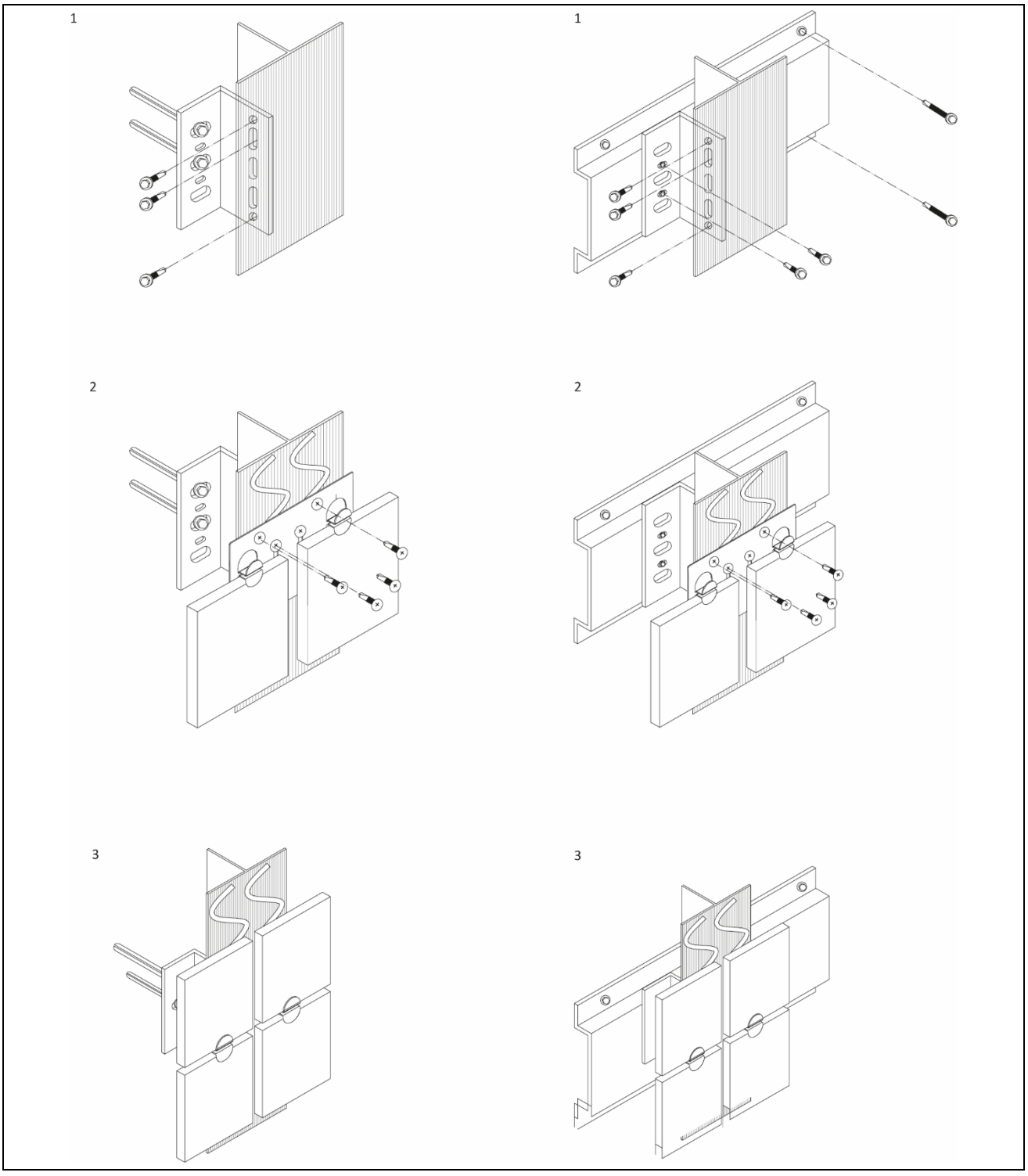


Figure 13 Installation steps with invisible clip (T/L profile and omega profile)

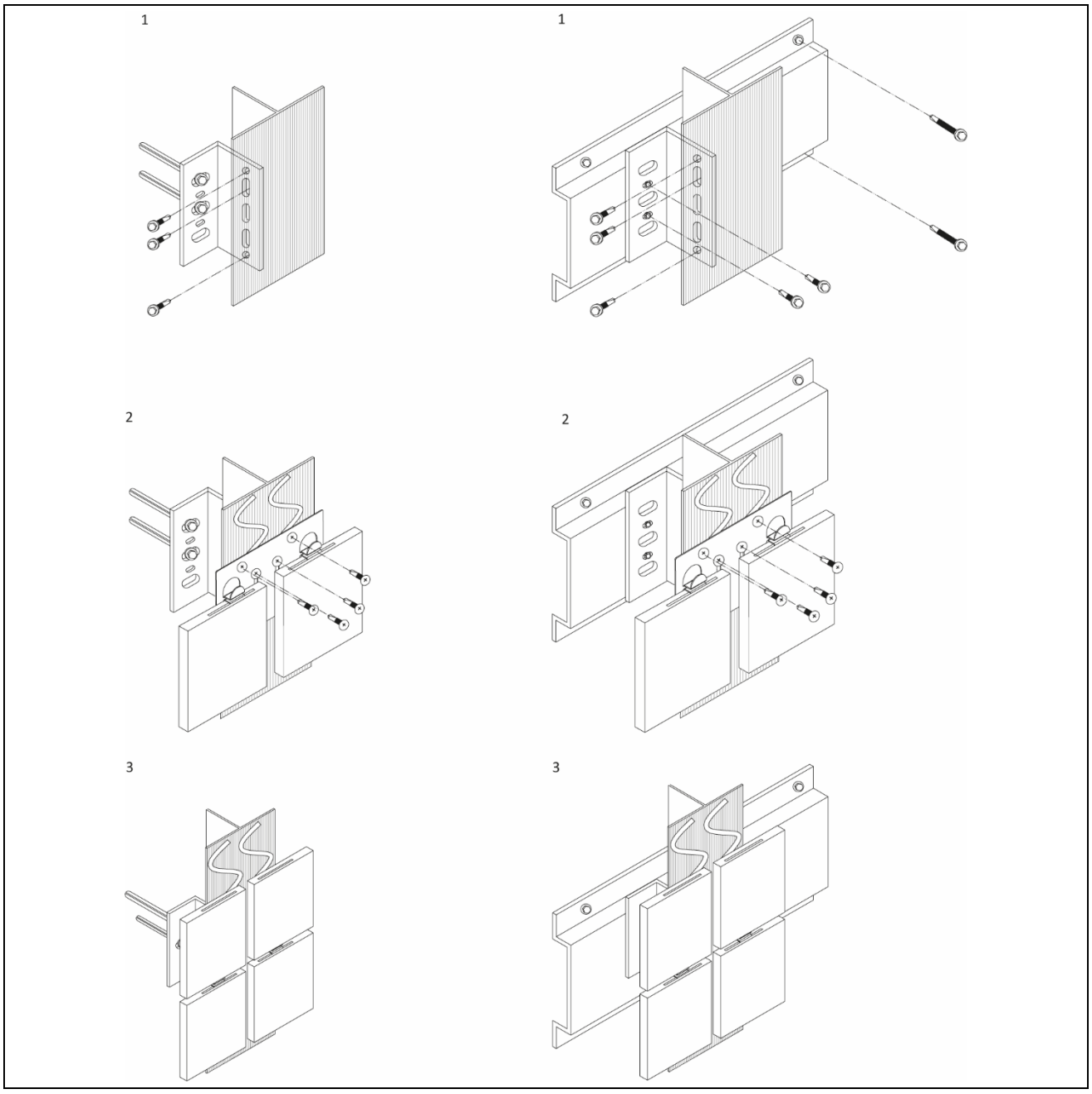


Figure 14 Window head typical cross section detail

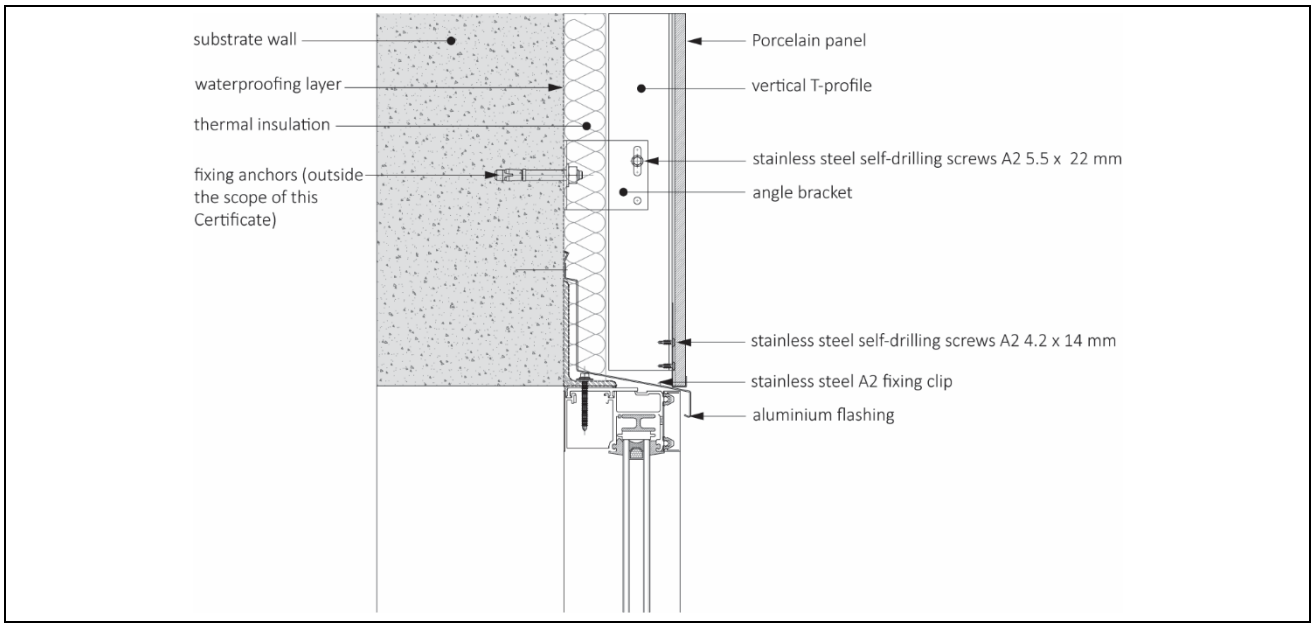


Figure 15 Window sill typical cross section detail

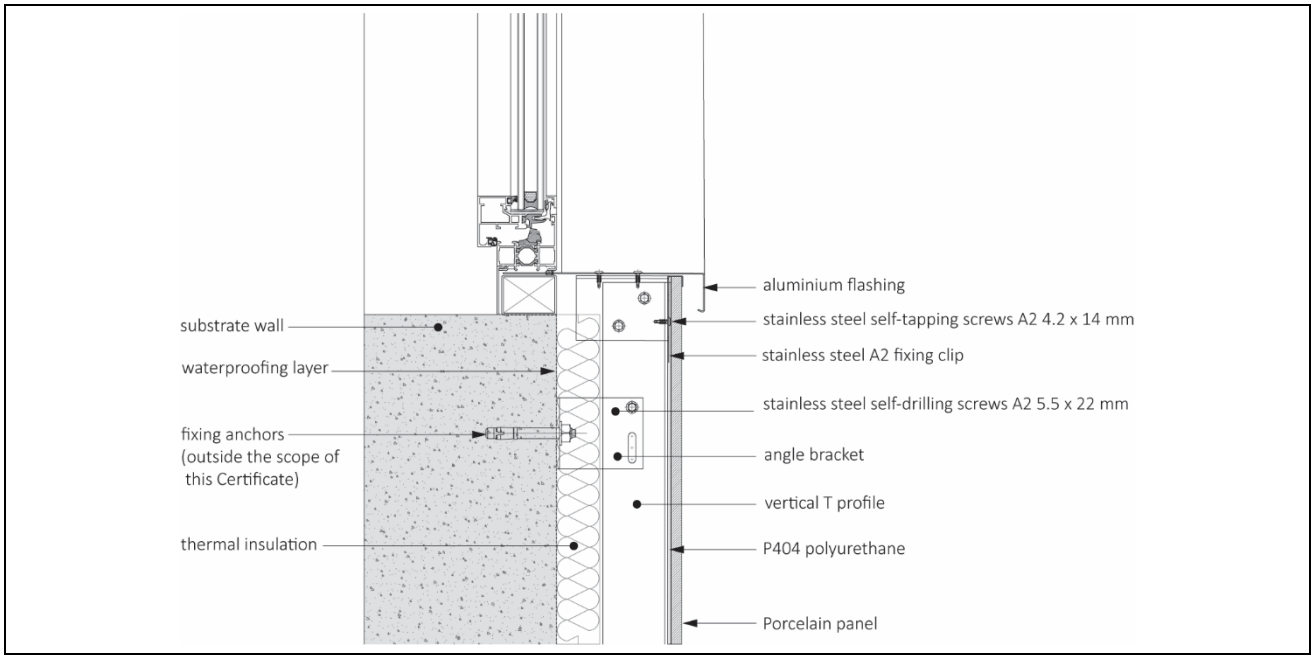


Figure 16 Window jamb typical cross section detail

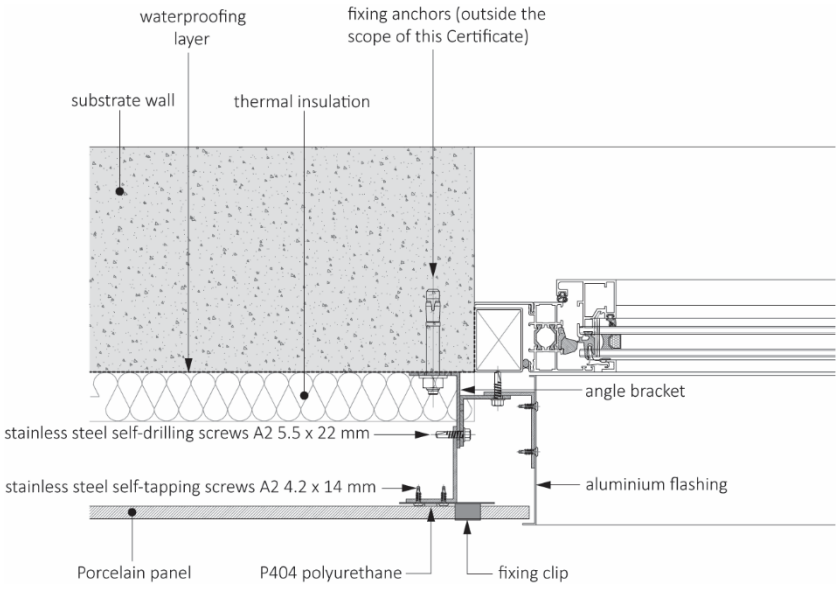


Figure 17 Base typical cross section detail

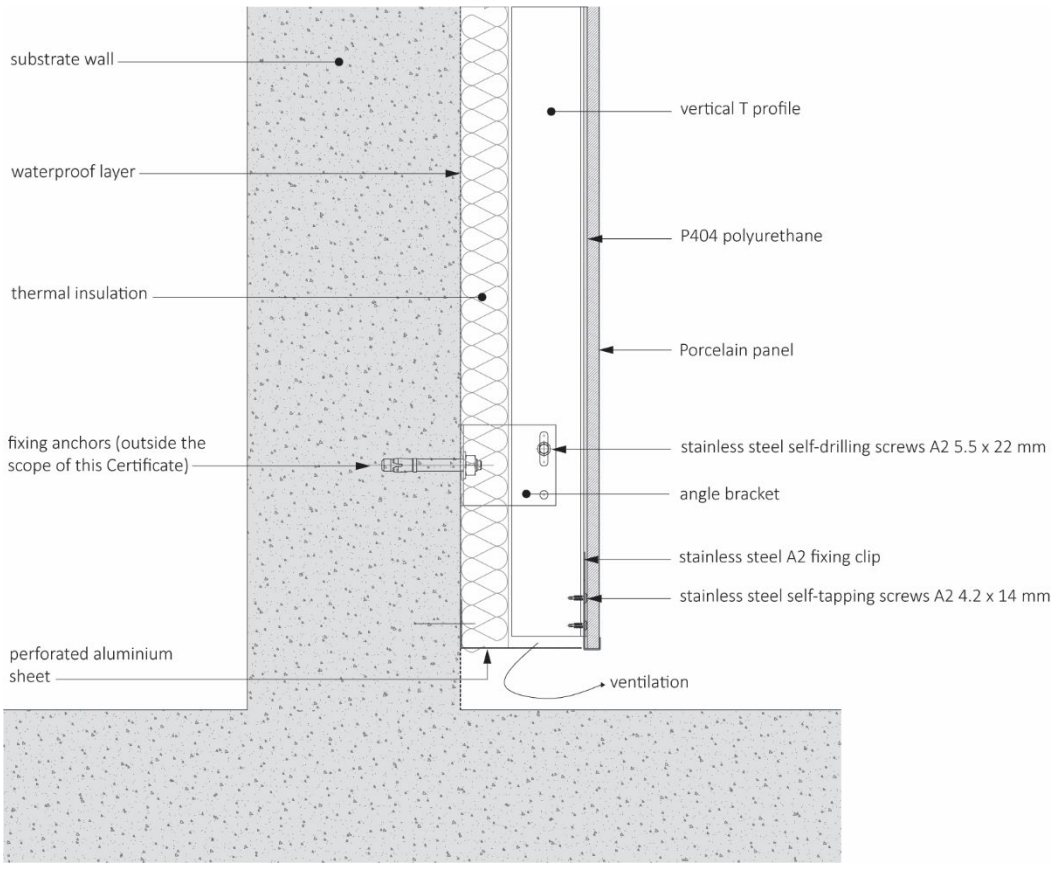
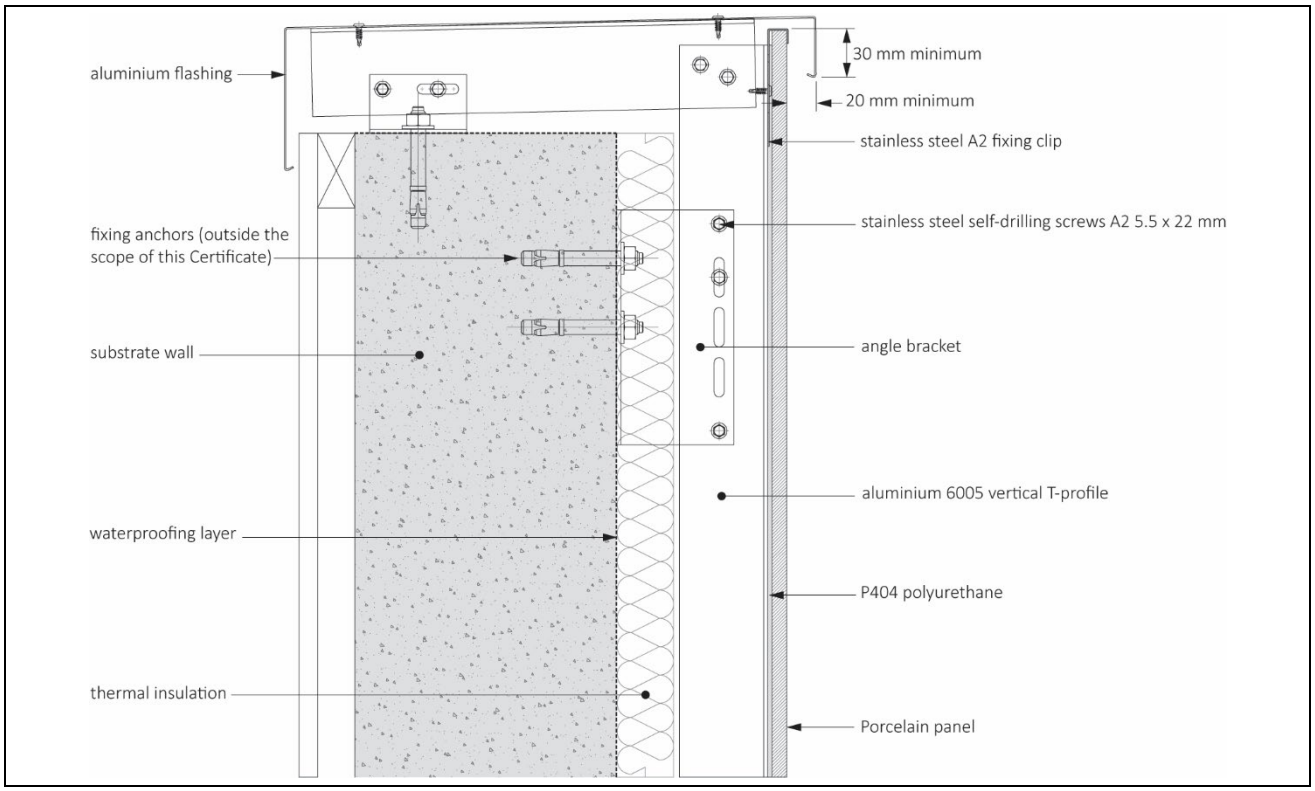


Figure 18 Eaves typical cross section detail



Technical Investigations

14 Tests

An assessment was made of tests that were carried out to determine:

- hard and soft body impact resistance
- wind load resistance
- reaction to fire
- resistance of metal clips
- pull-through of the fixings
- bending strength of the tiles.

15 Investigations

15.1 Based on the Spanish and French Agrément Certificates and related tests, an assessment of the system was made in relation to resistance to wind and impact loading, durability, the production method and associated quality control procedures.

15.2 The manufacturing process was evaluated, including the methods adopted for quality control, and details were obtained of the quality and compositions of materials used.

15.3 An evaluation was made of existing data in relation to reaction to fire tests and classification to EN 13501-1 : 2007.

15.4 Based on a user survey, an assessment was made of the system's practicability of installation and its performance in use.

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16 Conditions

16.1 This Certificate:

- relates only to the product/system that is named and described on the front page
- is issued only to the company, firm, organisation or person named on the front page – no other company, firm, organisation or person may hold or claim that this Certificate has been issued to them
- is valid only within the UK
- has to be read, considered and used as a whole document – it may be misleading and will be incomplete to be selective
- is copyright of the BBA
- is subject to English Law.

16.2 Publications, documents, specifications, legislation, regulations, standards and the like referenced in this Certificate are those that were current and/or deemed relevant by the BBA at the date of issue or reissue of this Certificate.

16.3 This Certificate will remain valid for an unlimited period provided that the product/system and its manufacture and/or fabrication, including all related and relevant parts and processes thereof:

- are maintained at or above the levels which have been assessed and found to be satisfactory by the BBA
- continue to be checked as and when deemed appropriate by the BBA under arrangements that it will determine
- are reviewed by the BBA as and when it considers appropriate.

16.4 The BBA has used due skill, care and diligence in preparing this Certificate, but no warranty is provided.

16.5 In issuing this Certificate the BBA is not responsible and is excluded from any liability to any company, firm, organisation or person, for any matters arising directly or indirectly from:

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- actual installations of the product/system, including their nature, design, methods, performance, workmanship and maintenance
- any works and constructions in which the product/system is installed, including their nature, design, methods, performance, workmanship and maintenance
- any loss or damage, including personal injury, howsoever caused by the product/system, including its manufacture, supply, installation, use, maintenance and removal
- any claims by the manufacturer relating to CE marking.

16.6 Any information relating to the manufacture, supply, installation, use, maintenance and removal of this product/system which is contained or referred to in this Certificate is the minimum required to be met when the product/system is manufactured, supplied, installed, used, maintained and removed. It does not purport in any way to restate the requirements of the Health and Safety at Work etc. Act 1974, or of any other statutory, common law or other duty which may exist at the date of issue or reissue of this Certificate; nor is conformity with such information to be taken as satisfying the requirements of the 1974 Act or of any statutory, common law or other duty of care.