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Agrément Certificate
06/4298
Product Sheet 1

TERREAL CLADDING SYSTEMS

ZEPHIR CLADDING SYSTEM

This Agrément Certificate Product Sheet⁽¹⁾ relates to the Zephir Cladding System, comprising terracotta tiles hung on aluminium support rails to provide an open-jointed, back ventilated and drained protective cladding finish for use on timber and metal framework fixed to new and existing 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 loads normally encountered in the UK (see section 6).

Behaviour in relation to fire — the tile and rail components of the system are non-combustible (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 — when used in normal exposure conditions, the tiles can have a life in excess of 35 years and the supporting components a lifetime at least commensurate with the tiles (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

A handwritten signature in black ink that reads 'B Chamberlain'.

Brian Chamberlain

Head of Approvals — Engineering

A handwritten signature in black ink that reads 'Claire'.

Claire Curtis-Thomas

Chief Executive

Date of First issue: 15 November 2013

Originally certified on 26 January 2006

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 are advised to check the validity and latest issue number of this Agrément Certificate by either referring to the BBA website or contacting the BBA direct.

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Regulations

In the opinion of the BBA, Zephyr Cladding System, if installed, used and maintained in accordance with this Certificate, will meet or contribute to meeting 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 for use as set out in sections 4.4 and 6.1 to 6.6 of this Certificate.
Requirement:	B4(1)	External fire spread
Comment:		The system is judged to meet the Class 0 requirements. See sections 7.1 to 7.5 of this Certificate.
Requirement:	C2(b)(c)	Resistance to moisture
Comment:		The system is not watertight but will resist the passage of rainwater to the supporting structure. See sections 8.1 to 8.7 of this Certificate.
Regulation	7	Materials and workmanship
Comment:		The system is acceptable. See sections 10.1 to 10.3 and the <i>Installation</i> part of this Certificate.



The Building (Scotland) Regulations 2004 (as amended)

Regulation:	8(1)(2)	Fitness and durability of materials and workmanship
Comment:		The system can contribute to a construction satisfying this Regulation. See sections 9.1 to 9.3, 10.1 to 10.3 and the <i>Installation</i> 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⁾ . See sections 4.4 and 6.1 to 6.6 of this Certificate.
Standard:	2.4	Cavities
Comment:		The system, when used in conjunction with fire-resistant materials, can meet this Standard, with reference to clauses 2.4.1 ⁽¹⁾⁽²⁾ , 2.4.2 ⁽¹⁾⁽²⁾ and 2.4.9 ⁽¹⁾⁽²⁾ . See sections 4.4 and 7.5 of this Certificate.
Standard:	2.6	Spread on neighbouring buildings
Standard:	2.7	Spread on external buildings
Comment:		The system can contribute to satisfying these Standards with reference to clause 2.6.4 ⁽¹⁾⁽²⁾ and 2.7.1 ⁽¹⁾⁽²⁾ respectively. See sections 7.1 to 7.5 of this Certificate.
Standard:	3.10	Precipitation
Comment:		The system is not watertight but will resist the passage of rainwater on the supporting structure, with reference to clauses 3.10.1 ⁽¹⁾⁽²⁾ to 3.10.3 ⁽¹⁾⁽²⁾ . See sections 8.1 to 8.7 of this Certificate.
Standard:	7(a)(b)	Statement of sustainability
Comment:		The system can contribute to meeting 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. (1) Technical Handbook (Domestic). (2) Technical Handbook (Non-Domestic).



The Building Regulations (Northern Ireland) 2012

Regulation:	23	Fitness of materials and workmanship
Comment:		The system is acceptable. See sections 10.1 to 10.3 and the <i>Installation</i> part of this Certificate.
Regulation:	28	Resistance to moisture and weather
Comment:		The system is not watertight but will resist the passage of rainwater to the supporting structure. See sections 8.1 to 8.7 of this Certificate.
Regulation:	30	Stability
Comment:		The system is acceptable as set in sections 4.4 and 6.1 to 6.6 of this Certificate.
Regulation:	36(a)	External fire spread
Comment:		The system is judged to meet the Class 0 requirements. See sections 7.1 to 7.5 of this Certificate.

Construction (Design and Management) Regulations 2007

Construction (Design and Management) Regulations (Northern Ireland) 2007

Information in this Certificate may assist the client, CDM co-ordinator, designer and contractors to address their obligations under these Regulations.

See section: 3 *Delivery and site handling* (3.1, 3.3, 3.5 and 3.6) of this Certificate.

1 Description

1.1 The Zephyr Cladding System comprises single -wall terracotta tiles, hung on horizontal aluminium support rails attached to brackets fixed to the timber and metal sub-frame.

Tiles

1.2 The tiles (see Figure 1) are manufactured from a single blend of clay and available in a range of colours with a smooth, sanded or ridge finish. On the reverse side, the tiles have integrated horizontal profiled support lugs. The nominal characteristics are given in Table 1.

Figure 1 Tile profile detail

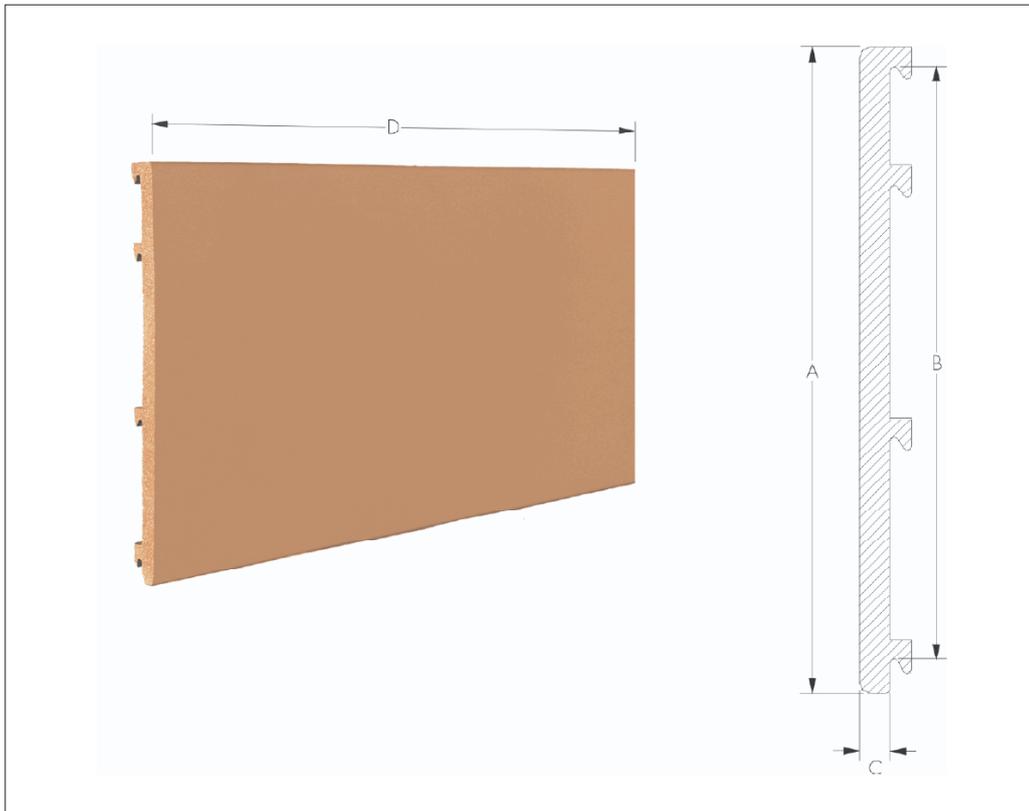


Table 1 Tile dimensions

Label	Dimension (mm)	Tolerance (mm)
A	245, 295, 300	±1.5
B	220, 210, 275	±1.5
C	14	+1/-0.5
D	300 or 605	±2.0

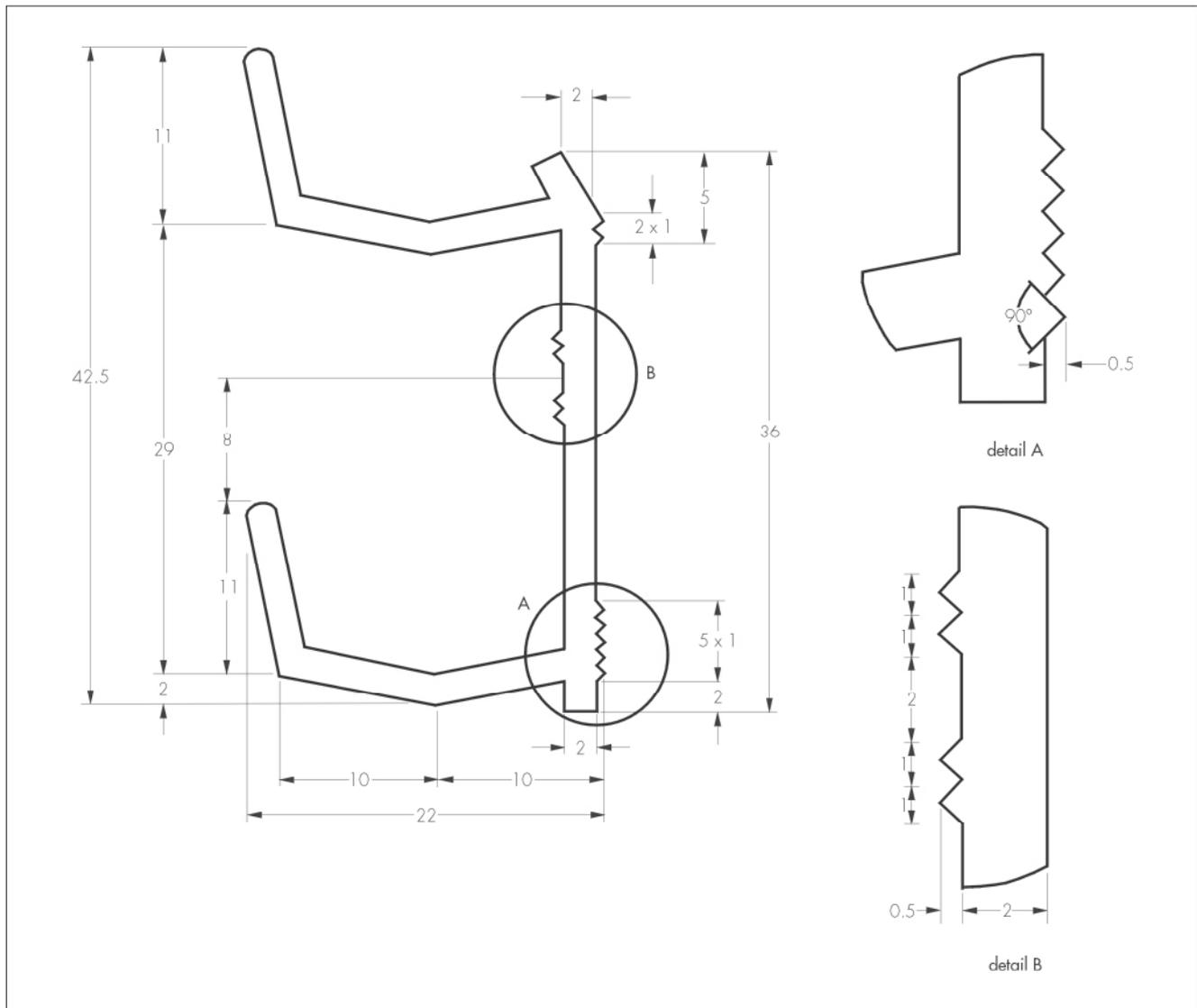
Support rail

1.3 The horizontal support rail is manufactured from 2 mm thick extruded aluminium alloy 6060 (to BS EN 573-3 : 2009) R20 section. The rails support the tiles on the top and bottom lugs with additional intermediate rails used between tiles in areas that are more susceptible to impact damage (ie ground level).

Table 2 Horizontal support rail dimensions

Rail dimensions (mm) Height x depth x length	Horizontal tile gap (mm)	Tolerance (mm)	Vertical tile gap (mm)	Tolerance (mm)
36 x 22 x 3000	5	+2/-1	5	±1.5
44 x 22 x 3000	15	+2/-1	5	±2

Figure 2 Horizontal support rail (36 mm rail) (all dimensions in mm)



1.4 Stainless steel screws type A2 5.5 mm in diameter by 55 mm in length for timber framework and 5.5 mm in diameter by 16 mm to 25 mm in length for metal framework are used to fix the support rails.

1.5 Ancillary items used but outside the scope of this Certificate include:

Timber or metal sub-frame, support bracket and fixings

joint mastic sealant — polyurethane (eg Sikaflex 11FC) used to fix the tile to the base rail

Insulation — rigid or semi-rigid non-combustible insulation boards

Breather membrane

cavity barriers

substrate support fixings.

2 Manufacture

2.1 Clay is ground down to an appropriate grain size and wetted for shaping. The clay blend is then extruded and cut to size before entering a drying chamber. Once dried, the tiles are fired in a kiln and surface treated.

2.2 To ensure product quality is consistently maintained to the required specification, the BBA has:

- agreed with the Certificate holder/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 non-conformities
- checked that equipment has been properly tested and calibrated
- undertaken to carry out the above measures on a regular basis as part of a surveillance process to ensure that standards are maintained and that the product or system remains as Certificated.

2.3 The tiles are manufactured in France and are marketed/distributed in the UK by the Certificate holder.

3 Delivery and site handling

3.1 Tiles are delivered to site wrapped in polythene and banded on wooden pallets. 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 production. Each tile is additionally marked with an identification code including manufacturing references and colour.

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

3.4 Rails are delivered to site banded onto a wooden pallet with any ancillary items in separate cardboard boxes.

3.5 Packs of rails should be stacked horizontally on sufficient bearers to prevent distortion, to a maximum height of 1 m. Other components should be stored in a safe weatherproof store.

3.6 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 Zephyr Cladding System.

Design Considerations

4 General

4.1 The Zephyr Cladding System is suitable for use on timber and metal framework, of new and existing buildings to provide an open-jointed, back-ventilated protective cladding finish.

4.2 All design aspects, including structural, fire and hygrothermal design, should be checked by a suitably qualified and experienced individual in accordance with the requirements of the relevant Building Regulations and Standards.

4.3 Ventilation and drainage must be provided behind the cladding. The ventilation openings should be suitably protected, or baffled, to prevent the ingress of birds, vermin and rain.



4.4 The wall and sub-frame to which the cladding is fixed should be structurally sound and constructed in accordance with the requirements of the relevant national Building Regulations and national Standards.

4.5 The substrate to which the cladding is fixed should be fire rated. No contribution from the cladding system should be assumed in this regard.

4.6 The substrate to which the cladding is fixed should be watertight and resistant to the transmission of sound.

4.7 As the rainscreen is open-jointed, any insulation installed behind the cladding needs to be suitably fixed to the supporting wall and protected to resist the forces of wind suction. 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. Air gap between insulation and tiles back face should be a minimum of 50 mm.

4.8 To allow for thermal expansion and water run-off, a gap of 10 mm to 15 mm between the ends of adjacent aluminium support rails should be provided. The joints between tiles must be sufficient to allow thermal expansion.

5 Practicability of installation

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

6 Strength and stability

Wind loading



6.1 The characteristic wind action should be calculated in accordance with BS EN 1991-1-4 : 2005 and its National Annex.

6.2 When calculating wind loads, attention should be paid to higher pressure coefficients applicable to corners of the building, as recommended in the appropriate Standard.

6.3 Wind load resistance values for various support conditions are given in Table 3.

Table 3 Wind load resistance

Sub-frame spacing (mm)	Horizontal aluminium rails	Wind load resistance ⁽¹⁾ (Pa)
900	2	740
300 and 600	2	1253
900	3	1030
600	3	2208

(1) The values are the lesser of the ultimate resistance obtained from test data/calculations divided by 4.0 or deflection under service load limited to span L/200.

6.4 As the cladding is open-jointed, the supporting wall must be able to take the full wind as well as any racking loads on its own. No contribution from the cladding system should be assumed in this regard.

Impact

6.5 When tested for hard and soft body impacts, the Zephir Cladding System with the clips at 600 mm centres, achieved adequate resistance to impact. Therefore, the system may be considered suitable for use in Categories II, III and IV as defined in ETAG 034, Part I (see Table 4).

Table 4 Definition of Use Categories (from ETAG 034, Part I, 6.4.4. Table 4)

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 objects.
IV	A zone out of reach from ground level

6.6 The level of safety may be increased to Category I (given in Table 4) by the use of an additional horizontal rail and vertical support stud at 300 mm centres.

7 Behaviour in relation to fire



7.1 The tiles and aluminium support rails are non-combustible and as such have a Class 0 or 'low risk' fire rating.

7.2 If timber studding is used to support the horizontal rails, this will reduce the overall fire performance of the cladding.

7.3 As a consequence of statements given in sections 7.1 and 7.2, the system may be regarded as suitable for installations where a Class 1 surface spread of flame is specified in accordance with BS 476-7 : 1997.

7.4 The incorporation of combustible material behind the cladding should be avoided wherever possible (i.e any insulation must be non-combustible).

7.5 Cavity barriers must be incorporated behind the cladding as required under the national Building Regulations, for example, by use of intumescent cavity barriers or overhanging non-combustible breaks at each floor level. These must not block essential ventilation pathways.

8 Air and water penetration



8.1 The tiles have a mean water absorption value between 7% and 13% to BS EN ISO 10545-3 : 1997.

8.2 The cladding is not airtight or watertight, but intentionally open-jointed, back ventilated and drained.

8.3 The supporting wall for the cladding must be watertight and reasonably airtight.

8.4 The minimum gap formed between the back face of the tiles and the substrate wall, or insulation should be 50 mm.

8.5 To minimise water penetration and risk of damage to the inner wall, the gap between the tiles should be kept at 5 mm or 15 mm throughout, depending on the rail used.

8.6 The vertical joints between panels should, as far as possible, coincide with the centre line of vertical studding to minimise precipitation into the cavity, or insulation, due to wind driven rain. Any water collecting in the cavity due to rain or condensation will be removed by ventilation and drainage.

8.7 In exposed conditions, with frequent wind driven rain, consideration should be given to providing a vapour permeable membrane to protect the inner wall, or insulation, from precipitation. In such cases, the Certificate holder's advice should be sought.

9 Maintenance



9.1 The tiles are generally self-cleaning. However, where necessary, the tiles may be cleaned using warm water without additional detergents, solvents or brushes. For the removal of efflorescence, graffiti and other persistent stains, the Certificate holder's advice should be sought.

9.2 Checks should be carried out periodically to ensure that ventilation and drainage pathways remain clear. During the lifetime of the cladding, it will also be necessary to reapply the mastic sealant at regular intervals to minimise movements.

9.3 Damaged tiles should be replaced as soon as practicable following the Certificate holder's instructions (see section 13.6).

10 Durability



10.1 Freeze-thaw tests on similar clay products indicate that there will be no significant change in the physical properties of the tiles on ageing.

10.2 The tiles have a life equivalent to known, good quality, clay tiles, when used in normal exposure conditions in the United Kingdom and will exceed a life of 35 years, provided regular checks and a maintenance regime is carried out (see section 9.2) and the tiles remain properly fixed with the mastic sealant in place.

10.3 The aluminium rails and brackets will have a lifetime at least commensurate with the tiles they are supporting.

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

11 Re-use and recyclability

The aluminium rail and bracket components can be fully recycled.

Installation

12 General

12.1 The Zephir Cladding System must be installed in accordance with the Certificate holder's recommendations, the requirements of this Certificate and the specification laid down by the consulting engineer.

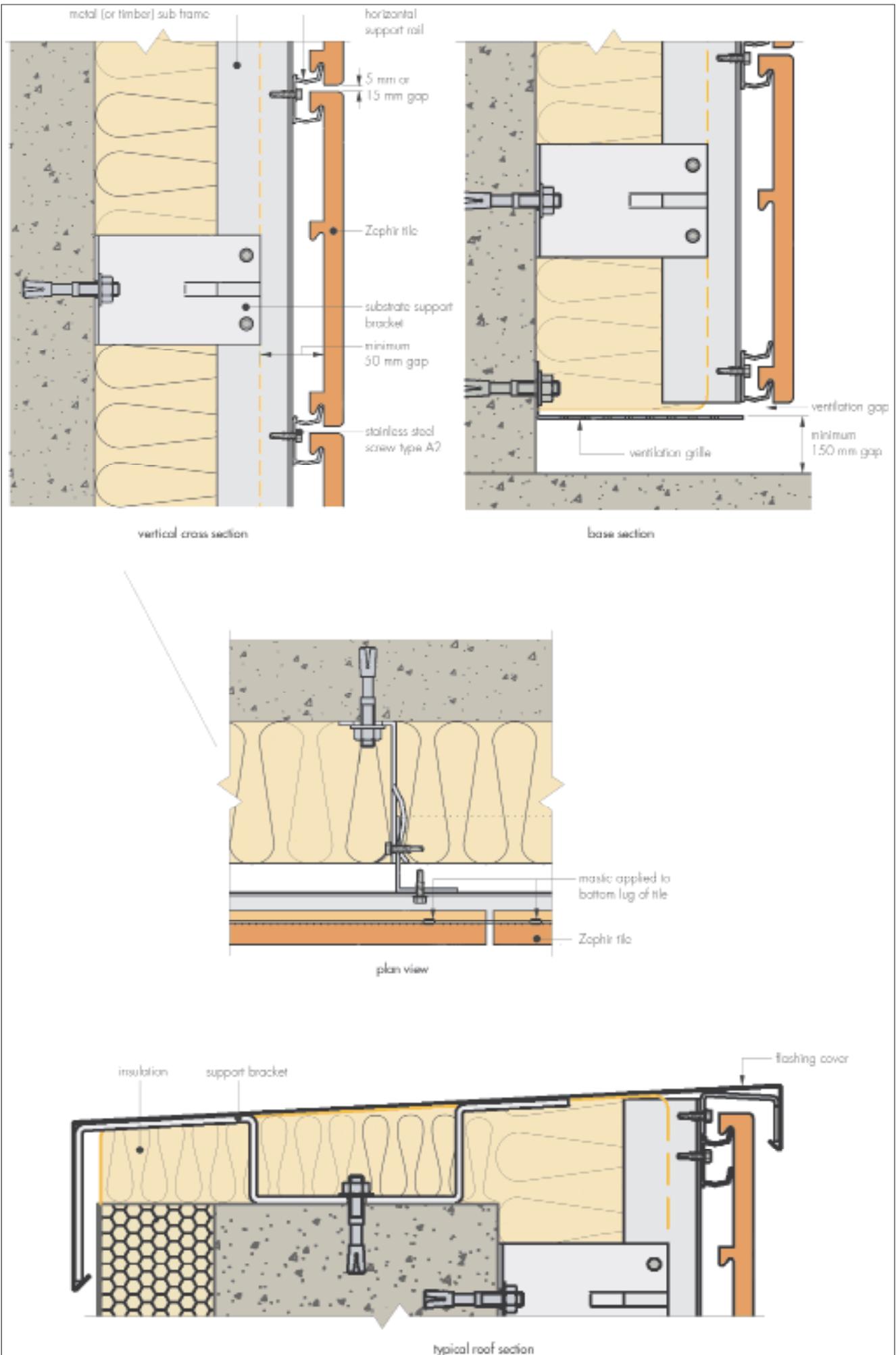
12.2 Installers must be trained and approved by the Certificate holder who can provide technical assistance at the design stage and at the start of installation.

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

12.4 Due to manufacturing tolerances, some unevenness on the façade surface may occur, but this is not normally excessive or obtrusive. However, to minimise this 'sailing' effect, installation quality should be carefully monitored.

12.5 Typical installation details are given in Figure 3.

Figure 3 Typical installation



13 Procedure

13.1 A grid layout should be prepared and the sub-frame installed accordingly.

13.2 Using the grid layout, horizontal rails are fixed to the sub-frame using A2 stainless steel screws (see section 1.4) of appropriate type and size. A gauge may be used to facilitate accurate and consistent positioning of the rails. In areas more susceptible to impact damage, eg at ground level, an intermediate horizontal rail and sub-frame member may be used.

13.3 Working from the bottom upwards, the tiles are fixed onto the rails using the appropriate back ribs. To prevent rattles and dislodgment of broken tiles, two dabs of mastic should be applied at the bottom rib in contact with the rail. It is recommended the tiles are laid in a straight formation.

13.4 To minimise the risk of precipitation onto the inner wall due to wind driven rain, the gap and associated tolerances between tiles (as specified in Table 2) should be maintained.

Corner detail

13.5 Ribs at tile edges can be removed on site to allow corner details to be formed.

Repair

13.6 After removal of the damaged tile, two dabs of mastic should be applied at the bottom rib in contact with the rail. The new tile is hung onto both top and bottom support rails, pushed downwards towards the bottom rail for the mastic to make contact.

Technical Investigations

14 Investigations

14.1 An assessment was made of the manufacturing process, associated quality control procedures, and the system's history of use.

14.2 From test data, an assessment was made of the claddings for:

- wind resistance
- impact resistance.

14.3 The Certificate holder's technical literature and drawings were examined for any inconsistencies and general content.

Bibliography

BS 476-7 : 1997 *Fire tests on building materials and structures — Method of test to determine the classification of the surface spread of flame of products*

BS EN 1991-1-4 : 2005 *Eurocode 1 : Actions on structures — General actions — Wind actions*

BS EN ISO 10545-3 : 1997 *Ceramic tiles — Determination of water absorption, apparent porosity, apparent relative density and bulk density*

BS EN 573-3 : 2009 *Aluminium and aluminium alloys — Chemical composition and form of wrought products — Chemical composition and form of products*

ETAG 034, Part I : 2012 *Guideline for European Technical Approval of Kits for External Wall Claddings*

15 Conditions

15.1 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.

15.2 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.

15.3 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.

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

15.5 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:

- the presence or absence of any patent, intellectual property or similar rights subsisting in the product/system or any other product/system
- the right of the Certificate holder to manufacture, supply, install, maintain or market the product/system
- 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.

15.6 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.