

## Specialist Building Products Limited

Pioneer House  
Mariner  
Lichfield Road Industrial Estate  
Tarnworth  
Staffordshire B79 7TF



Agrément Certificate  
**02/3898**  
Product Sheet 1

### CONCORD CLADDING SYSTEMS

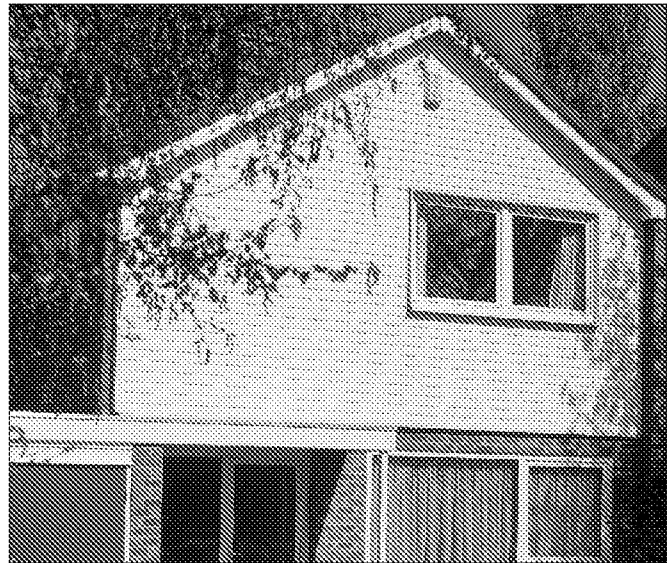
#### CONCORD CO-EXTRUDED PVC-UE CLADDING SYSTEM

This Agrément Certificate Product Sheet<sup>(1)</sup> relates to the Concord Co-extruded PVC-UE Cladding System, comprising white PVC-UE cladding planks and PVC-U rigid trims fixed to timber battens, and used as a cladding system to provide a back-ventilated, decorative and protective facade over masonry and timber frame wall constructions of 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 withstand the dynamic wind pressures shown in Table 2 (see section 6).

**Performance in relation to fire** — the system achieved a reaction to fire classification of D-s3, d2/(AHM and AVM) to BS EN 13501-1 : 2007 (see section 7).

**Air and water penetration** — the design of the vertical and horizontal joints between the planks will minimise water entering the air cavity. Any water collecting in the cavity will be removed by drainage and ventilation (see section 8).

**Durability** — the system will remain effective as a cladding system for a period in excess of 35 years with only minor changes in surface appearance (see section 11).

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: 28 September 2016

Originally certificated on 27 February 2002

John Albon — Head of Approvals  
Construction Products

Claire Curtis-Thomas  
Chief Executive

*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](http://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.*

British Board of Agrément  
Bucknalls Lane  
Walford  
Herts AL9 2J5 9BA

©2016

## Regulations

In the opinion of the BBA, the Concord Co-extruded PVC-UE Cladding 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 for use as set out in section 6 of this Certificate.                                                                                                             |
| Requirement: | B3(2)(4) | Internal fire spread (structure)                                                                                                                                                          |
| Requirement: | B4(1)    | External fire spread                                                                                                                                                                      |
| Comment:     |          | The system achieved a reaction to fire classification* of D-s3, d2/(AHM and AVM) and so its use is restricted under this Requirement. See sections 7.1 to 7.4 of this Certificate.        |
| Requirement: | C2(b)(c) | Resistance to moisture                                                                                                                                                                    |
| Comment:     |          | The system does not form a watertight or airtight facing. To achieve a waterproof barrier on exposed substrates, a breather membrane must be provided. See section 8 of this Certificate. |
| Regulation:  | 7        | Materials and workmanship                                                                                                                                                                 |
| Comment:     |          | The system is acceptable. See section 11.1 and the <i>Installation</i> part of this Certificate.                                                                                          |



### The Building (Scotland) Regulations 2004 (as amended)

|             |           |                                                                                                                                                                                                                                                                                                                    |
|-------------|-----------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Regulation: | 8(1)(2)   | Durability, workmanship and fitness of materials                                                                                                                                                                                                                                                                   |
| Comment:    |           | The system is acceptable. See sections 10 and 11.1 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 can contribute to satisfying this Standard, with reference to clause 1.1.1 <sup>(1)(2)</sup> as set out in section 6 of this Certificate.                                                                                                                                                               |
| Standard:   | 2.4       | Cavities                                                                                                                                                                                                                                                                                                           |
| Standard:   | 2.6       | Spread to neighbouring buildings                                                                                                                                                                                                                                                                                   |
| Standard:   | 2.7       | Spread on external walls                                                                                                                                                                                                                                                                                           |
| Comment:    |           | The system is restricted by these Standards, with reference to clauses 2.4.2 <sup>(1)(2)</sup> , 2.4.4 <sup>(1)</sup> , 2.4.7 <sup>(1)</sup> , 2.4.9 <sup>(2)</sup> , 2.6.2 <sup>(1)(2)</sup> , 2.6.4 <sup>(1)(2)</sup> and 2.7.1 <sup>(1)(2)</sup> as set out in sections 7.1 to 7.3 and 7.5 of this Certificate. |
| Standard:   | 3.10      | Precipitation                                                                                                                                                                                                                                                                                                      |
| Comment:    |           | The system does not form a watertight or airtight facing. To achieve a weatherproof barrier on exposed substrates, a breather membrane must be provided. See section 8 of this Certificate.                                                                                                                        |
| Standard:   | 3.15      | Condensation                                                                                                                                                                                                                                                                                                       |
| Comment:    |           | Provided there is provision for adequate drainage and ventilation behind the cladding, and a breather membrane is incorporated, as required, the system can contribute to satisfying this Standard, with reference to clauses 3.15.4 <sup>(1)</sup> and 3.15.5 <sup>(1)</sup> . See section 8 of this Certificate. |
| Standard:   | 7.1(a)    | Statement of sustainability                                                                                                                                                                                                                                                                                        |
| Comment:    |           | 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: | 12        | Building standards applicable to conversions                                                                                                                                                                                                                                                                       |
| Comment:    |           | All comments given for this system under Regulation 9, Standards 1 to 6, also apply to this Regulation, with reference to clause 0.12.1 <sup>(1)(2)</sup> and Schedule 6 <sup>(1)(2)</sup> .<br>(1) Technical Handbook (Domestic).<br>(2) Technical Handbook (Non-Domestic).                                       |



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

|             |          |                                                                                                                                                                                                                                        |
|-------------|----------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Regulation: | 23       | Fitness of materials and workmanship                                                                                                                                                                                                   |
| Comment:    |          | The system is acceptable. See section 11.1 and the <i>Installation</i> part of this Certificate.                                                                                                                                       |
| Regulation: | 28(b)    | Resistance to moisture and weather                                                                                                                                                                                                     |
| Comment:    |          | The system does not form a watertight or airtight facing. To achieve a weatherproof barrier on exposed substrates, a breather membrane must be provided. See section 8 of this Certificate.                                            |
| Standard:   | 29       | Condensation                                                                                                                                                                                                                           |
| Comment:    |          | Provided there is provision for adequate drainage and ventilation behind the cladding, and a breather membrane is incorporated, as required, the system can contribute to satisfying this Standard. See section 8 of this Certificate. |
| Regulation: | 30       | Stability                                                                                                                                                                                                                              |
| Comment:    |          | The system is acceptable for use as set out in section 6 of this Certificate.                                                                                                                                                          |
| Regulation: | 35(2)(3) | Internal fire spread – Structure                                                                                                                                                                                                       |
| Regulation: | 36(a)    | External fire spread                                                                                                                                                                                                                   |
| Comment:    |          | The system achieved a reaction to fire classification* of D-s3, d2/(AHM and AVM) and so its use is restricted under this Regulation. See sections 7.1 to 7.4 of this Certificate.                                                      |

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* (3.3) and 13 *General* (13.4) of this Certificate.

## Additional Information

### NHBC Standards 2016

NHBC accepts the use of the Concord Co-extruded PVC-UE Cladding System provided it is installed, used and maintained in accordance with this Certificate, in relation to *NHBC Standards, Part 6 Superstructure (excluding roofs)* Chapter 6.1 *External masonry walls* (section 6.1.16 — *Cladding*) and Chapter 6.2 *External timber framed walls*.

### CE marking

The Certificate holder has taken the responsibility of CE marking the system, in accordance with harmonised European Standard BS EN 13245 : 2008. An asterisk (\*) appearing in this Certificate indicates that data shown are given in the manufacturer's Declaration of Performance.

## Technical Specification

### 1 Description

1.1 The Concord Co-extruded PVC-UE Cladding System comprises protective and decorative white PVC-U cladding planks with matching rigid PVC-U trims (see Figures 1 and 2).

1.2 The interlocking planks are available in three designs: Shiplap, Open 'V' and Feather-Edge, with the characteristics given in Table 1. The planks are composed of a cellular PVC-U core beneath a rigid outer weathering impact-modified PVC-U skin. Both core and skin formulations include a tin-based stabiliser.

1.3 The trims consist of extrusions of impact-modified PVC-U or injection mouldings of acrylate styrene acrylonitrile.

*Table 1 Characteristics of planks*

| Characteristics (unit)                                       | Shiplap (mm) |      |      | Open 'V' (mm) |      | Feather-Edge (mm) |
|--------------------------------------------------------------|--------------|------|------|---------------|------|-------------------|
|                                                              | 100          | 150  | 300  | 100           | 150  | 125               |
| Standard length (m)                                          | 5            | 5    | 5    | 5             | 5    | 5                 |
| Cover width (mm)                                             | 100          | 150  | 300  | 100           | 150  | 125               |
| Nominal thickness (mm)                                       | 6            | 7    | 7    | 7             | 7.5  | 6                 |
| Nominal thickness of rigid outer surface (mm) <sup>(1)</sup> | 0.3          | 0.3  | 0.3  | 0.3           | 0.3  | 0.3               |
| Nominal weight per metre (kg·m <sup>-1</sup> )               | 0.45         | 0.63 | 1.15 | 0.53          | 0.76 | 0.60              |
| Average density (kg·m <sup>-3</sup> )                        | 550          | 550  | 550  | 550           | 550  | 550               |

(1) Tolerances +0.0, -0.2 mm.

1.4 Ancillary items specified for use with the system but outside the scope of this Certificate include:

- stainless steel, annular ring-shank nails — A4 (steel Number 1.4401 to BS EN 10088-2 : 2014), used to secret-fix cladding planks and extruded trims to timber battens. Sizes: 25 mm by 2 mm (planks with 19 mm battens and trims), 30 mm by 2 mm (planks with 25 mm battens) and 50 mm by 3 mm (exposed locations)
- breather membrane — for use with the system on non-weathertight substrates
- timber battens — 19 mm by 38 mm, 25 mm by 38 mm or 50 mm by 50 mm preservative-treated battens, to provide support for cladding.

Figure 1 Concord Co-extruded PVC-UE Cladding

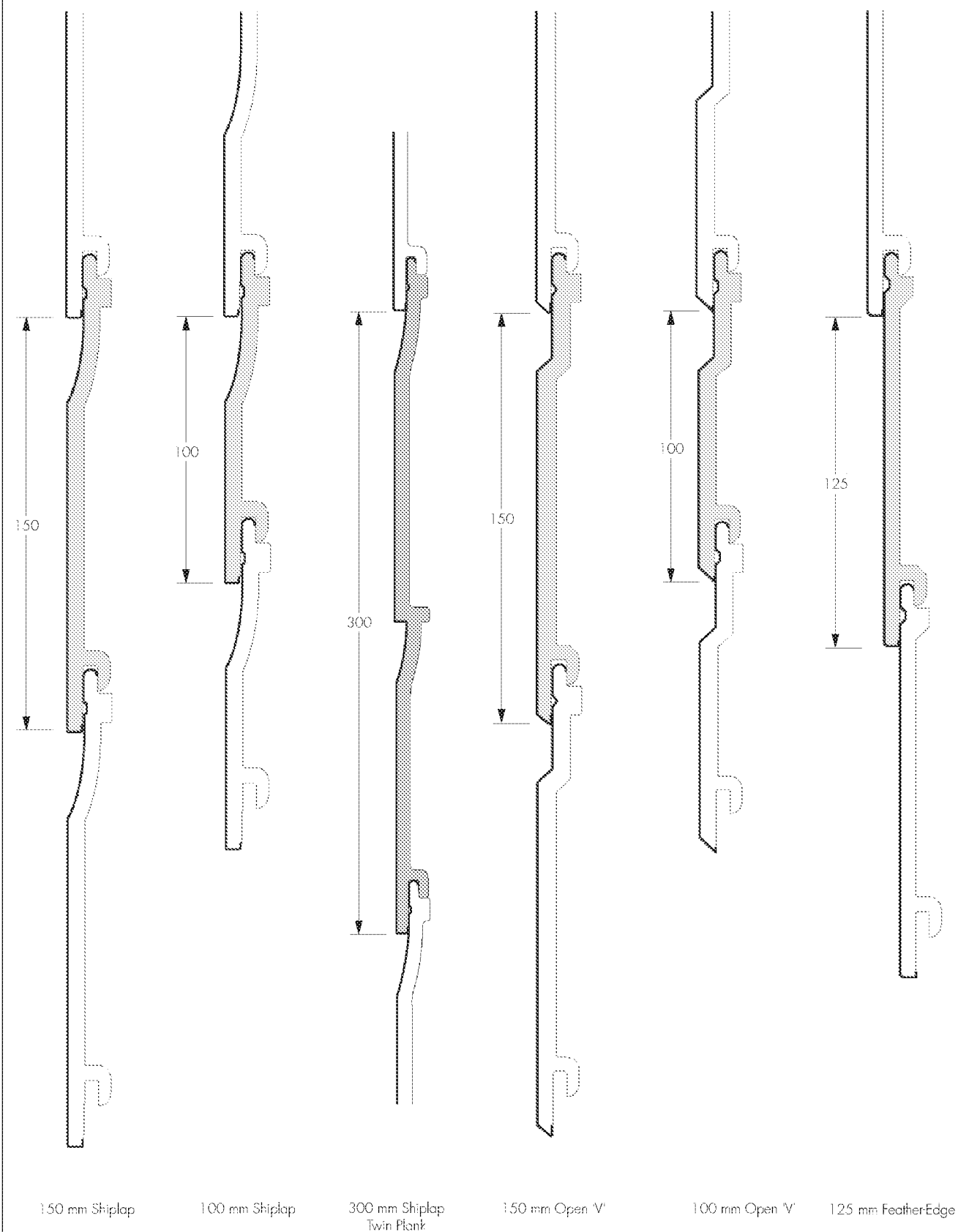
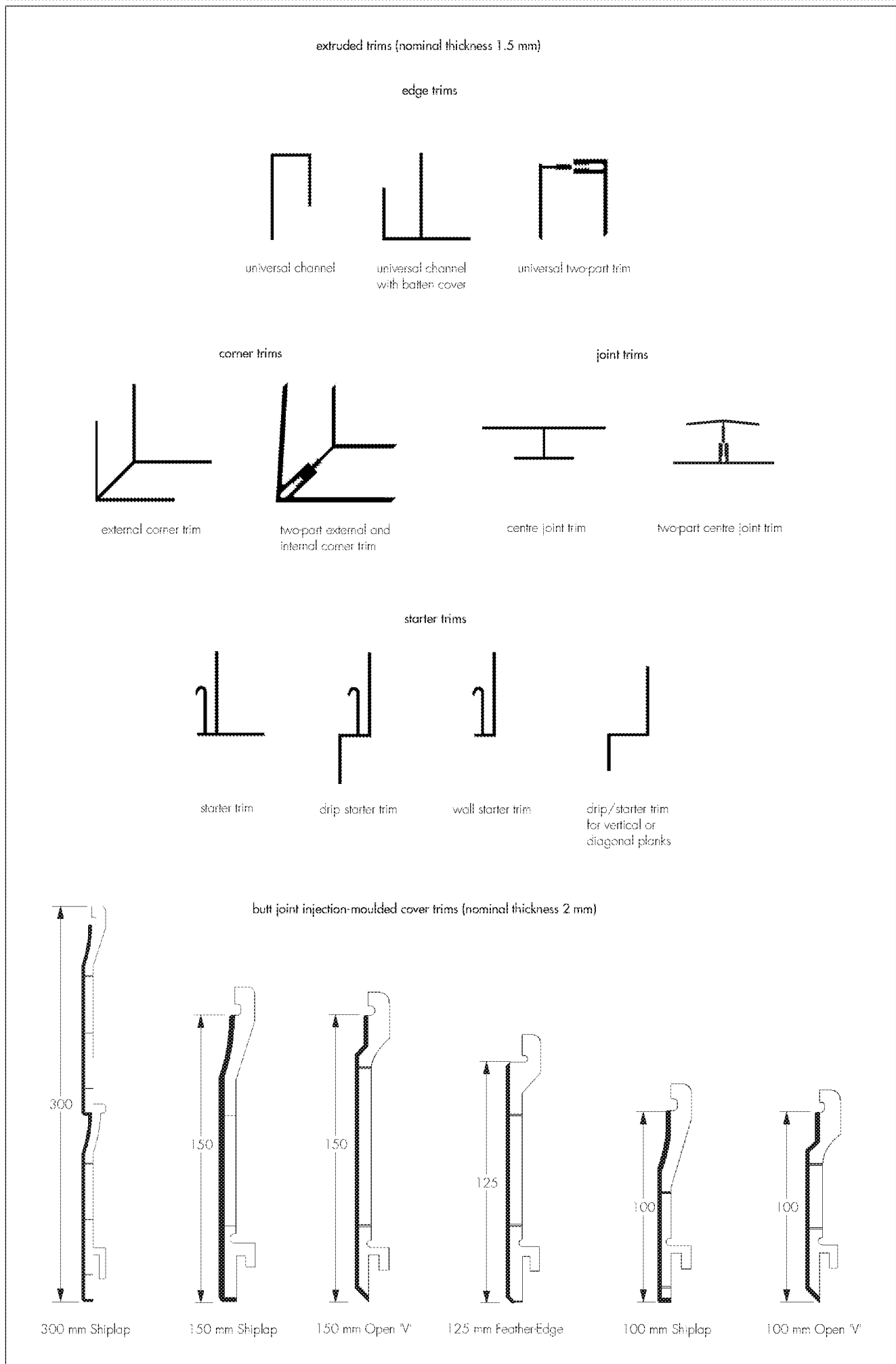


Figure 2 Trims and ancillary items



## 2 Manufacture

2.1 The planks are manufactured by co-extruding a high-impact PVC-U compound (as described in section 1.2 of this Certificate) onto a foam PVC-U compound, cooling and forming to section and finally cutting to length. Cellular PVC-U (PVC-UE) is formed during the process by the evolution of gas from sodium bicarbonate.

2.2 The trims are manufactured using conventional extrusion and injection-moulding techniques.

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 management system of Specialist Building Products Limited has been assessed and registered as meeting the requirements of BS EN ISO 9001 : 2008 (Certificate FM 09180) and ISO 14001 : 2004 (Certificate EMS 513947) by BSI.

## 3 Delivery and site handling

3.1 Standard 5 m lengths of the extrusions are delivered to site sealed in polythene sleeves. Pack quantities vary according to profile size.

3.2 All cladding packs bear the Certificate holder's product marking, description, quantity and the BBA logo incorporating the number of this Certificate.

3.3 Unloading should be carried out by hand to avoid damage to the components and they should be stored flat, in their protective wrapping, on a clean, level surface. Stacks must not exceed one metre in height and should be restrained to prevent collapse. To avoid damage, it is recommended that additional protection is provided when the planks are stored in the open.

3.4 Care must be taken when loading the boards and trims to avoid contact with solvents or materials containing volatile organic components.

## Assessment and Technical Investigations

The following is a summary of the assessment and technical investigations carried out on the Concord Co-extruded PVC-UE Cladding System.

## Design Considerations

## 4 General

4.1 The Concord Co-extruded PVC-UE Cladding System is suitable for horizontal, vertical (Open 'V' only) and diagonal (Open 'V' only) fixing, as a back-ventilated, decorative and protective external facing over timber-frame or masonry wall constructions of new and existing buildings.

4.2 The system is restricted for use in buildings up to four storeys in height for timber-frame constructions and up to 18 m in masonry constructions.

4.3 The wall and the 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 Standards.

4.4 Brickwork or blockwork walls should be constructed in the conventional manner in accordance with the national Building Regulations and BS EN 1996-1-1 : 2005 and BS EN 1996-3 : 2006 and their UK National Annexes.

4.5 Timber stud walls should be designed and constructed in accordance with the UK National Annex to BS EN 1995-1-1 : 2004. Studding and framing should be adequately supported by noggings to ensure rigidity.

4.6 When used over a sheathed timber stud frame or over a masonry substrate, the cladding should be fixed to preservative-treated, good quality timber battens (see section 1.4 of this Certificate) rigidly fixed to the studding (not unsupported sheathing) or masonry substrate at 600 mm centres or closer. Where a CCB (copper/chrome/boron) preservative is used, care should be taken to ensure that sufficient time is allowed for the complete fixation of the preservative (approximately seven days) before the cladding is fixed.

4.7 Cellular PVC-U has a similar coefficient of thermal expansion to that of conventional rigid PVC-U. To avoid distortion in service, care should be taken not to install the cladding in extremes of temperature (ie below 5°C or above 25°C) and to allow adequate gaps for expansion (see the relevant sections of the *Installation* part of this Certificate).

4.8 To comply with the NHBC requirement (see *NHBC Standards* 2016, Chapter 6.9.18) a minimum 38 mm drained and vented cavity behind the cladding is required.

## 5 Practicability of installation

The system is designed to be installed by a competent general builder, or a contractor, experienced with this type of system.

## 6 Strength and stability

### Wind Loading

 6.1 Under wind loading the most likely mode of failure of the cladding will be by nail withdrawal under wind suction. Wind loads should be calculated in accordance with BS EN 1991-1-4 : 2005 and its UK National Annex.

6.2 When installed in accordance with the requirements of this Certificate onto battens at 600 mm spacings, the cladding planks up to 150 mm cover widths can withstand the dynamic wind pressures shown in Table 2. For 300 mm Shiplap twin plank boards, batten spacings must be reduced to 400 mm to withstand wind pressures up to 640 Pa and for wind pressure locations up to 860 Pa, the batten spacings must be further reduced to 300 mm.

Table 2 Permissible dynamic wind pressures (Pa)

| Length of fixing nail (mm) | Plank cover width (mm) |      |      |
|----------------------------|------------------------|------|------|
|                            | 100                    | 125  | 150  |
| 25                         | 1750                   | 1400 | 1150 |
| 30                         | 2650                   | 2100 | 1750 |

6.3 The permissible dynamic wind pressure may be increased by reducing batten spacing. This is particularly recommended at the corners of buildings and in exposed locations. In common with all cladding, the adequacy of a proposed installation should always be checked by a suitably qualified and experienced individual who should include in the check the adequacy of the fixing of battens to the substrate, which is not covered by this Certificate.

6.4 The cladding should not be taken into account when designing a timber stud wall to resist racking forces.

### Resistance to impact

 6.5 The cladding is not recommended for use at ground-floor level where severe impacts may occur. It is suitable for use above ground-floor level in locations where it is unlikely to be subjected to impact from thrown or kicked objects.

## 7 Performance in relation to fire

 7.1 The system achieved a reaction to fire classification\* of D-s3, d2/(AHM and AVM) to BS EN 13501-1 : 2007. It may therefore not be used within 1 m of the relevant boundary and may be further restricted by requirements for unprotected areas.

7.2 Although the spread of flame across the surface of PVC is limited, the material does tend to char and may fall away when exposed to fire. Due consideration should always be given to any combustible materials behind the cladding, which may become exposed in the event of fire. Where necessary, cavity barriers should be incorporated behind the cladding, as required by the relevant national Building Regulations.

7.3 The limits for the extent of the unprotected area of a wall should be calculated in accordance with the methods given in the national Building Regulations.

 7.4 When determining the minimum distance between the sides of a building and the relevant boundary, any area of wall (with the appropriate fire resistance) covered by the system is counted as an unprotected area amounting to half the actual area of the cladding.

 7.5 The system need not be included in the calculation of an unprotected area where:

- it is attached to the structure of the building and the external wall contains no openings other than the small openings described in clause 2.6.2b<sup>(1)(2)</sup> and
- the wall behind the system has the appropriate fire resistance duration from the inside. Otherwise, if this requirement is not met, the system must be treated as an unprotected area amounting to 100% opening.

(1) Technical Handbook (Domestic).

(2) Technical Handbook (Non-Domestic).

## 8 Air and water penetration

 8.1 The cladding is not airtight, watertight or water-vapour tight. When used on exposed substrates, such as timber stud walls, the system must be backed by a breather membrane acting as a vapour-permeable water barrier, incorporated behind the cladding under the supporting battens. This barrier must meet the requirements of BS 5250 : 2011 and have a vapour resistance of less than 0.6 MN·s·g<sup>-1</sup>.

8.2 Where the cladding is used as a decorative facing attached to weathertight masonry walls, a vapour-permeable water 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.

8.3 If the cladding is used in the renovation of a masonry wall which is structurally sound but not fully weathertight, the use of a vapour-permeable water barrier is advisable.

8.4 Provision must always be made to allow water that has penetrated behind the cladding to drain away. Ventilation and drainage is achieved by drilling through the starter trim and top finishing trim in accordance with the Certificate holder's guidelines.

## 9 Thermal insulation

For the purpose of U value calculations, in accordance with BS EN ISO 6946 : 2007 and BRE Report BR 443 : 2006, the cavity between the system and the wall should be treated as a 'well ventilated' air layer, and the thermal insulating value of the cavity and everything between it and the external environment should be taken as equivalent to an internal boundary layer (ie a total of 0.13 m<sup>2</sup>·K·W<sup>-1</sup>).

## 10 Maintenance



10.1 The cladding can be washed with water and detergent. Solvent-based cleaners should not be used.

10.2 Replacement of a damaged section can be carried out but may require the temporary removal of undamaged planks above the damaged area.

10.3 Paint should not be applied as it can cause premature embrittlement of PVC-U products and the application of dark colours to PVC-U cladding could lead to a risk of thermal distortion.

## 11 Durability



11.1 The system will remain effective as a cladding system for a period in excess of 35 years.

11.2 The cladding will retain its decorative function with only minor changes in surface appearance. However, staining will result from contact with certain materials or substances (eg creosote or bitumen).

## 12 Reuse and recyclability

The PVC-U profile material can be recycled.

## Installation

### 13 General

13.1 The substrate for the Concord Co-extruded PVC-UE Cladding System should be checked to ensure that it is as prescribed in section 4.3 of this Certificate. Installation must be carried out in accordance with the Certificate holder's instructions and the requirements of this Certificate.

13.2 Installation should not be carried out in extremes of temperature. For installation, a temperature range of between 5°C and 25°C is recommended by the Certificate holder.

13.3 The components can be worked using normal woodworking tools for cutting, drilling and shaping. Hand-held and bench-mounted power tools with a carbide-tipped blade should be run at speeds similar to, or higher than, those normally used for timber.

13.4 Where necessary, trims and planks are cut to size and shape with a fine-toothed saw. When using power tools to cut or shape the components, eye protection and a coarse-particle dust mask should be used.

13.5 Expansion gaps of 5 mm should be provided at the ends of each 5 m plank.

13.6 Adequate provision should be made for ventilation and drainage behind the cladding (see sections 4.8 and 8.4 of this Certificate).

13.7 Where butt joints are made between planks, the ends of both planks should be fixed to battens.

### 14 Procedure

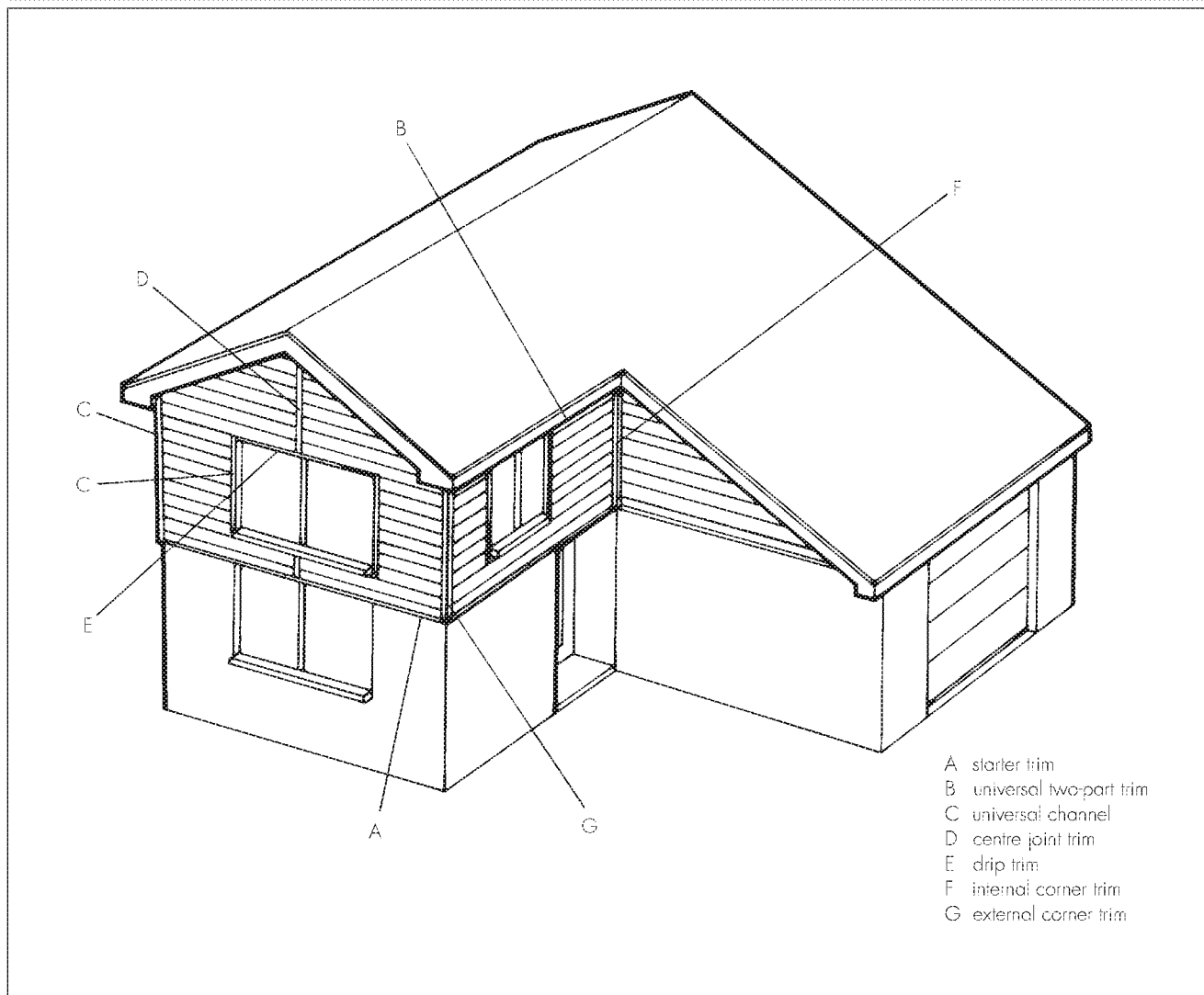
#### Preparation

14.1 Before installation commences, the cladding operation should be thoroughly planned and prepared.

14.2 A final inspection of the substrate should be made to confirm that it is as prescribed in section 4.3 of this Certificate.

14.3 Appropriate cladding planks and trims should be selected and assembled (see Figure 3). For vertical and diagonal cladding, only Open 'V' should be used.

Figure 3 Use of trims



14.4 The appropriate battens (selected and treated in accordance with section 4.6 of this Certificate) should be fixed at centres not exceeding 600 mm.

14.5 For horizontal cladding, vertical battens are required at the ends of each section, at the sides of windows and at joints between planks. Horizontal battens should not be used at the top/bottom of either the installation or window/door openings, where they may restrict ventilation and drainage. Similarly, the use of horizontal trims at the base of the cladding must not reduce the ventilation opening (see section 4.8 of this Certificate).

14.6 For vertical cladding, horizontal battens are required at the top and bottom of each section, at the top and bottom of each window, and at any joints between planks. In this application, ventilation and drainage is provided for by ensuring a 5 mm clearance between plank and trims at each end (see section 14.21 of this Certificate).

14.7 For diagonal cladding, battens are required around the whole area to be clad and around openings. Adequate drainage holes must be provided as described in section 14.6 of this Certificate.

14.8 On non-weatherproof substrates (eg timber frame walls) a vapour-permeable water barrier must be installed behind battens.

14.9 Window heads and other protrusions should be protected by a suitable weatherproof membrane or flashing.

#### Horizontal installation (see Figure 4)

14.10 Working from the base to a level line, a starter trim is fixed to timber battens. Care should be taken to ensure that the starter trim does not obstruct the opening required for drainage and ventilation at the base of the cladding.

14.11 All vertical trims, followed by top trims, are fixed to perimeter battens (including battens around windows).

14.12 Where two-part trims are required, only the back half is fixed at this stage.

14.13 The bottom cladding plank is located firmly in the starter trim and vertical trims, and fixed into place using the specified stainless steel nails, starting at one end or working from the centre outward, fixing one nail into each batten in turn. Nails should be inserted only along the marked line in each plank. At the end of each plank a 5 mm gap should be allowed for expansion (ie 10 mm between two board ends).

14.14 Subsequent planks are fitted into the preceding planks, ensuring that the tongue-and-groove joint is firmly closed, and nail heads are concealed by the overlap.

14.15 If necessary, the top plank is cut to fit the remaining space. Where this occurs, packing pieces taken from cladding offcuts should be placed behind the cut plank at each fixing centre.

14.16 Where sections longer than 5 m are to be clad, butt joints of adjacent cladding planks should be concealed by either a butt joint cover or centre joint trim; a 10 mm expansion gap should be allowed between the planks, both ends of which should be securely fixed to battens. Butt joint trims should be fitted at least two fixing centres away from a panel edge and with continuous boards immediately above and below the joint.

14.17 Where two-part trims have been used, the installation is completed by fastening the front part of the trim.

#### **Vertical installation (see Figure 4)**

14.18 Vertical cladding is installed using the principles outlined in *Horizontal installation*.

14.19 The appropriate trims are fitted to the perimeter of the elevation to be clad, and around window and door openings. A drip trim is used at the base of the cladding.

14.20 Starting from one edge, the plank is positioned, using a plumb line, and nailed at the fixing centres.

14.21 To ensure that cladding remains flat, all nailing should be undertaken progressively, from the centre of the plank working outward. All plank ends must be secret-nailed into the trims, allowing 5 mm clearance for ventilation, drainage and expansion at each end.

14.22 Subsequent planks are fitted over the preceding planks, ensuring that the tongue-and-groove joint is firmly closed so that nail heads are concealed by the overlap.

14.23 The finishing plank should be cut to include the groove and fitted onto the tongue of the penultimate plank. It should be nailed through packing at every fixing centre along the cut edge. For aesthetic reasons the installation should be planned so that the width of the starting and finishing planks are the same, ie both are either full planks or cut planks of the same width.

14.24 Care must be taken to ensure that the nails through the cut planks are positioned so that the trim sections cover the nail heads.

14.25 Where two-part trims have been used, the installation is completed by fastening the front part of the trim to the rear part.

#### **Diagonal installation**

14.26 Diagonal cladding is installed using the principles outlined in *Vertical installation*.

14.27 Horizontal battens are fixed to the substrate at set spacings to give a 600 mm distance between fixing centres on the diagonal cladding.

14.28 The appropriate trims are fixed to battens; use of two-part trims facilitates the installation. Only the back half of these trims is fixed at this stage.

14.29 The cladding planks are cut to size and fixed across the section at the required angle, starting with the smallest plank at the bottom corner.

14.30 To ensure that cladding remains flat, all nailing should be undertaken progressively, from the centre of each plank working outwards. All plank ends must be secret-nailed into the trims, allowing 5 mm clearance for expansion at each end.

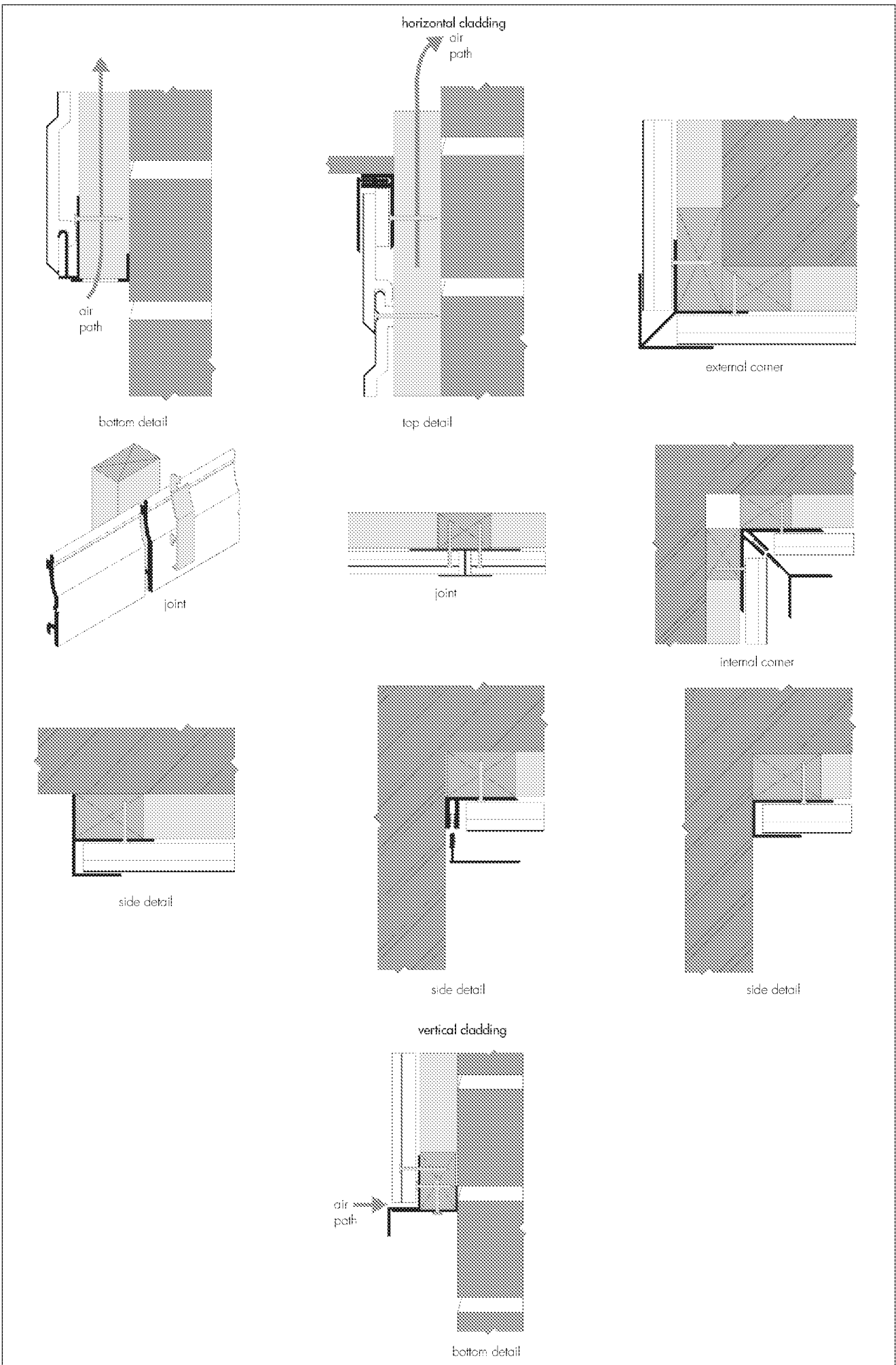
14.31 Subsequent planks are fitted into the preceding planks, ensuring that the tongue-and-groove joint is firmly closed so that nail heads are concealed by the overlap.

14.32 The finishing plank should be cut to include the groove and fitted onto the tongue of the penultimate plank. It should be nailed through packing onto perimeter battens.

14.33 Care must be taken to ensure that the nails through the cut planks are positioned so that the trim sections cover the nail heads.

14.34 Where two-part trims have been used, the installation is completed by fastening the front part of the trim.

Figure 4 Typical installation details



### 15 Tests

15.1 Tests were carried out on the planks to determine impact resistance.

15.2 Tests were carried out on the planks and trims to determine:

- Vicat softening temperature
- thickness of layers
- weight per linear metre
- ash content
- Izod impact strength
- impact resistance (cladding panel)
- dimensional stability
- tensile strength/elongation
- modulus of elasticity
- Izod impact strength and appearance after UV ageing
- Izod impact strength and appearance after heat ageing
- nail pull-through
- heat reversion
- acetone resistance
- stress relief.

15.3 Tests were carried out on extruded trims to determine:

- impact strength/DHC (dehydrochlorination)/appearance after UV ageing
- impact strength/DHC/appearance after heat ageing
- impact strength/DHC/appearance after water soak.

15.4 Performance tests were carried out on panels clad with cellular cladding to investigate weathertightness and air pressure leakage of the installation.

### 16 Investigations

16.1 Permissible dynamic wind pressures were calculated from nail pull-through and withdrawal data.

16.2 The dimensions of cladding planks and trims were checked.

16.3 An examination was made of data relating to:

- performance of the cladding to fire
- colour stability
- impact resistance before and after UV ageing.

16.4 The manufacturing process was examined, including the methods adopted for quality control, and details were obtained of the quality and composition of the materials used.

16.5 The practicability of installation was assessed.

## Bibliography

BS 5250 : 2011 + A1 : 2016 *Code of practice for control of condensation in buildings*

BS EN 1991-1-4 : 2005 + A1 : 2010 *Eurocode 1 : Actions on structures — General actions — Wind actions*

NA to BS EN 1991-1-4 : 2005 + A1 : 2010 *UK National Annex to Eurocode 1 : Actions on structures — General actions — Densities, self-weight, imposed loads for buildings*

NA to BS EN 1995-1-1 : 2004 + A1 : 2008 *UK National Annex to Eurocode 5 : Design of timber structures — General — Common rules and rules for buildings*

BS EN 1996-1-1 : 2005 + A1 : 2012 *Eurocode 6 : Design of masonry structures — General rules for reinforced and unreinforced masonry structures*

NA to BS EN 1996-1-1 : 2005 + A1 : 2012 *UK National Annex to Eurocode 6 : Design of masonry structures — General rules for reinforced and unreinforced masonry structures*

BS EN 1996-3 : 2006 *Eurocode 6 : Design of masonry structures — Simplified calculation methods for unreinforced masonry structures*

NA to : 2014 to BS EN 1996-3 : 2006 *UK National Annex to Eurocode 6 : Design of masonry structures — Simplified calculation methods for reinforced and unreinforced masonry structures*

BS EN 10088-2 : 2014 *Stainless steels — Technical delivery conditions for sheet/plate and strip of corrosion resisting steels for general purposes*

BS EN 13245 : 2008 *Plastics — Unplasticized poly(vinyl chloride) (PVC-U) profiles for building applications — PVC-U profiles and PVC-UE profiles for internal and external wall and ceiling finishes*

BS EN 13501-1 : 2007 + A1 : 2009 *Fire classification of construction products and building elements — Classification using test data from reaction to fire tests*

BS EN ISO 6946 : 2007 *Building components and building elements — Thermal resistance and thermal transmittance — Calculation method*

BS EN ISO 9001 : 2008 *Quality management systems — Requirements*

ISO 14001 : 2004 *Environmental management systems*

BRE Report BR 443 : 2006 *Conventions for U-value calculations — Requirements with guidance for use*

## Conditions of Certification

### 17 Conditions

17.1 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.

17.2 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.

17.3 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.

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

17.5 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.

17.6 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.