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Agrément Certificate
91/2622
Product Sheet 1

SWISH CLADDING SYSTEM

SWISH CELLULAR PVC-U CLADDING SYSTEM

PRODUCT SCOPE AND SUMMARY OF CERTIFICATE

This Certificate relates to the Swish Cellular PVC-U Cladding System comprising PVC-U cladding planks, rigid PVC-U trims and accessories for external use on buildings as a decorative and protective facing fixed either horizontally, vertically or diagonally. The components of the system are available in one shade of white.

AGRÉMENT 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 — when installed in accordance with the requirements of this Certificate, onto battens at 600 mm spacings, the cladding can withstand dynamic wind pressures up to 2650 Pa (see section 5).

Behaviour in relation to fire — when tested to BS 476-6 : 1989, the cladding material achieved a fire propagation index (I) of 14.3 with sub-indices (i_1), (i_2) and (i_3) of 6.5, 6.9 and 0.9, respectively. When tested in accordance with BS 476-7 : 1997, the material achieved a Class 1Y rating. (see section 6).

Durability — the system will retain its decorative qualities for a period in excess of 20 years with only minor changes in surface appearance (see section 10).

The BBA has awarded this Agrément 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

Chris Hunt
Head of Approvals — Physics

Greg Cooper
Chief Executive

Date of First issue: 27 November 2009

Originally certificated on 27 March 1992

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, the Swish Cellular PVC-U Cladding System if used in accordance with the provisions of this Certificate, will meet or contribute to meeting the relevant requirements of the following Building Regulations:



The Building Regulations 2000 (as amended) (England and Wales)

Requirement: A1	Loading
Comment:	The system is acceptable for use as set out in sections 3.2 to 3.4 and 5.1 to 5.5 of this Certificate.
Requirement: B4(1)	External fire spread
Comment:	The cladding has a fire propagation index (I) of 14.3 and its acceptability for use is as set out in sections 6.1 to 6.5 of this Certificate.
Requirement: C2(a)(b)(c)	Resistance to moisture
Comment:	The system does not form a watertight or airtight facing. To achieve a waterproof barrier, a breather membrane must be provided. See sections 7.1 to 7.4 of this Certificate.
Requirement: L1(a)(i)	Conservation of fuel and power
Comment:	The system will make a small reduction in a wall's U value. See section 8 of this Certificate.
Requirement: Regulation 7	Materials and workmanship
Comment:	The system is acceptable. See section 10.1 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 is acceptable. See sections 9.1 to 9.3 and 10.1 and the <i>Installation</i> part of this Certificate.
Regulation: 9	Building standards — construction
Standard: 1.1(a)(b)	Structure
Comment:	The system can contribute to satisfying this Standard, with reference to clause 1.1.1 ⁽¹⁾⁽²⁾ as set out in sections 3.2 to 3.4 and 5.1 to 5.5 of this Certificate.
Standard: 2.4	Cavities
Standard: 2.6	Spread to neighbouring buildings
Standard: 2.7	Spread on external walls
Comment:	The system can contribute to satisfying these Standards, with reference to clauses 2.4.1 ⁽¹⁾⁽²⁾ , 2.4.2 ⁽¹⁾⁽²⁾ , 2.4.6 ⁽¹⁾ , 2.4.7 ⁽¹⁾ , 2.4.8 ⁽²⁾ , 2.4.9 ⁽²⁾ , 2.6.4 ⁽¹⁾⁽²⁾ and 2.7.1 ⁽¹⁾⁽²⁾ respectively as set out in sections 6.1 to 6.3 and 6.6 of this Certificate.
Standard: 3.10	Precipitation
Comment:	The system can contribute to satisfying this Standard, with reference to clause 3.10.1 ⁽¹⁾⁽²⁾ but does not form a watertight or airtight facing. To achieve a weatherproof barrier, a breather membrane must be provided. See sections 7.1 to 7.4 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 ⁽¹⁾ and 3.15.5 ⁽¹⁾ . See sections 3.7 and 7.1 to 7.4 of this Certificate.
Standard: 6.2	Building insulation envelope
Comment:	The system will make a small reduction in a wall's U value, with reference to clause 6.2.1 ⁽¹⁾⁽²⁾ . See section 8 of this Certificate. (1) Technical Handbook (Domestic). (2) Technical Handbook (Non-Domestic).



The Building Regulations (Northern Ireland) 2000 (as amended)

Regulation: B2	Fitness of materials and workmanship
Comment:	The system is acceptable. See section 10.1 and the <i>Installation</i> part of this Certificate.
Regulation: B3(2)	Suitability of certain materials
Comment:	The system is acceptable. See sections 9.1 to 9.3 of this Certificate.
Regulation: C4(b)	Resistance to ground moisture and weather
Comment:	The system does not form a watertight or airtight facing. To achieve a weatherproof barrier, a breather membrane must be provided. See sections 7.1 to 7.4 of this Certificate.
Regulation: D1	Stability
Comment:	The system is acceptable for use as set out in sections 3.2 to 3.4 and 5.1 to 5.5 of this Certificate.
Regulation: E5	External fire spread
Comment:	The system has a fire propagation index (I) of 14.3 and its acceptability for use is as set out in sections 6.1 to 6.5 of this Certificate.
Regulation: F2(a)(i)	Conservation measures
Comment:	The system will make a small reduction in a wall's U value. See section 8 of this Certificate.

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

See sections: 2 *Delivery and site handling* (2.3) and 11 *General* (11.4)

Non-regulatory Information

NHBC Standards 2008

NHBC accepts the use of Swish Cellular PVC-U Cladding System, when installed and used in accordance with this Certificate, in relation to *NHBC Standards*, Chapter 6.1 *External masonry walls* (section D14 – *Cladding*) and Chapter 6.2 *External timber framed walls*.

General

This Certificate relates to the Swish Cellular PVC-U Cladding System for use externally on buildings as a decorative and protective facing fixed either horizontally, vertically or diagonally on the following substrates:

- timber stud walls with or without sheathing
- brick or block masonry walls.

It is essential that the system is installed in accordance with the manufacturer's instructions and the *Design Considerations* and *Installation* parts of this Certificate.

Technical Specification

1 Description

1.1 This Certificate relates to the Swish Cellular PVC-U Cladding System, a protective and decorative white PVC-U cladding plank with matching rigid PVC-U trims for external use (see Figures 1 and 2).

1.2 The planks are composed of a cellular PVC-U core beneath an impact modified, outer weathering PVC-U skin. Both core and skin formulations include a tin-based stabiliser. The trims consist of extrusions in impact modified PVC-U or injection mouldings in acrylate styrene acrylonitrile.

1.3 The planks are available in four designs; Shiplap, Open 'V', Tee Gee and Feather-Edge, with the characteristics given in Table 1.

Table 1 Characteristics of planks

	Shiplap		Open 'V'		Tee Gee	Feather-Edge
	100 mm	150 mm	100 mm	150 mm		
Standard length (m)	5	5	5	5	5	5
Cover width (mm)	100	150	100	150	125	125
Nominal thickness (mm)	6	7	7	7.5	6	6
Nominal thickness of rigid outer surface (mm)	0.6	0.6	0.6	0.6	0.6	0.6
Nominal weight per metre (kg·m ⁻¹)	0.45	0.63	0.53	0.76	0.61	0.60
Average density (kg·m ⁻³)	550	550	550	550	550	550

1.4 The planks are manufactured by co-extruding a high-impact PVC-U compound onto a foamable 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.

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

1.6 Continuous quality control is exercised during manufacture, including checks on the cellular planks for the following:

- appearance
- dimensions
- weight per metre
- heat reversion
- heat ageing
- impact strength.

1.7 A4 (steel No 1.4401, BS EN 10088-2 : 2005) stainless steel, annular ring-shank nails are used to fix cladding planks and extruded trims to timber battens (secret fixing). Nails 25 mm long by 2 mm shank diameter, 33 mm by 2 mm and 50 mm by 3 mm are available for fixing planks and 25 mm by 2 mm for trims.

Figure 1 Swish cellular PVC-U cladding

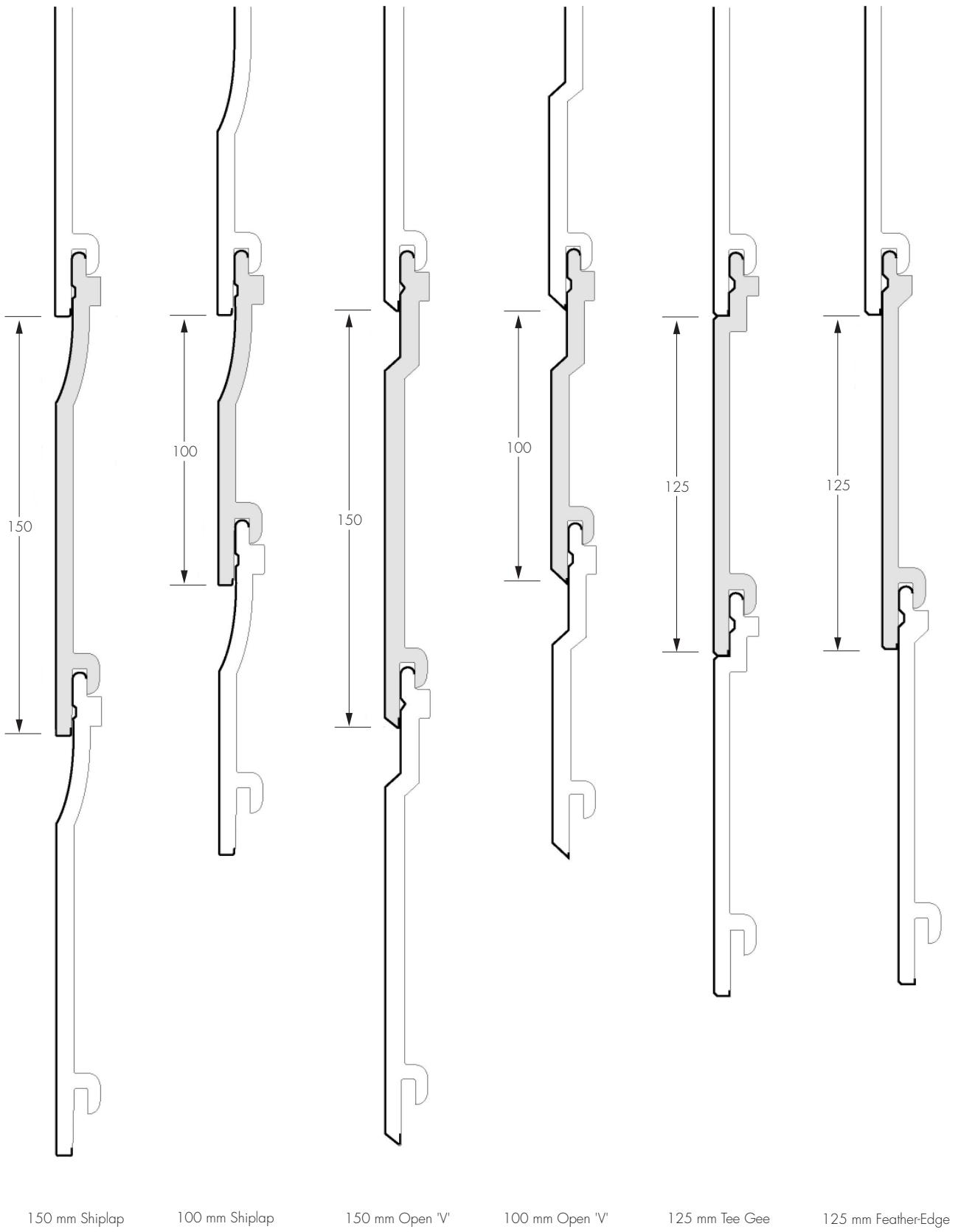
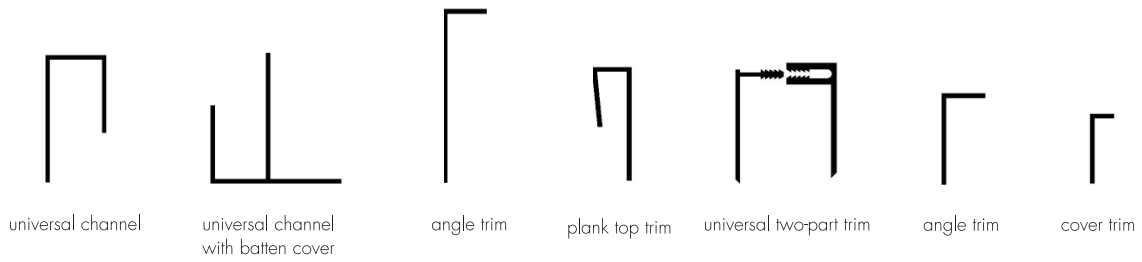


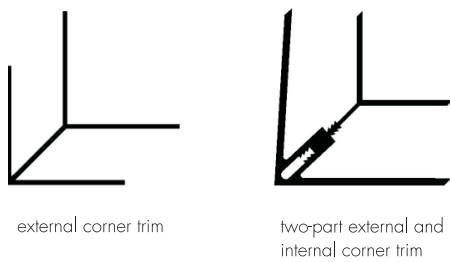
Figure 2 Trims and ancillary items

extruded trims (nominal thickness 1.5 mm)

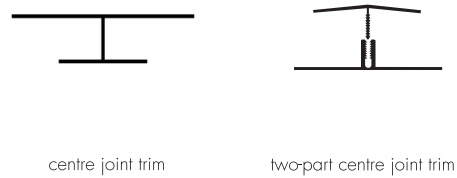
edge trims



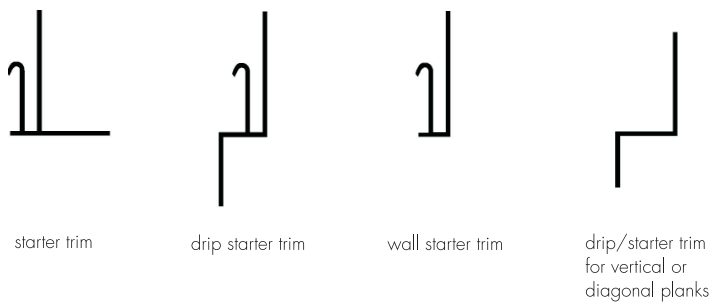
corner trims



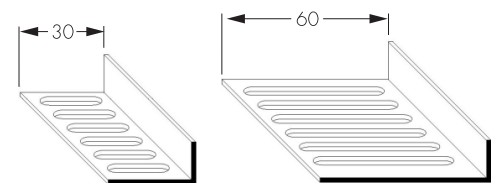
joint trims



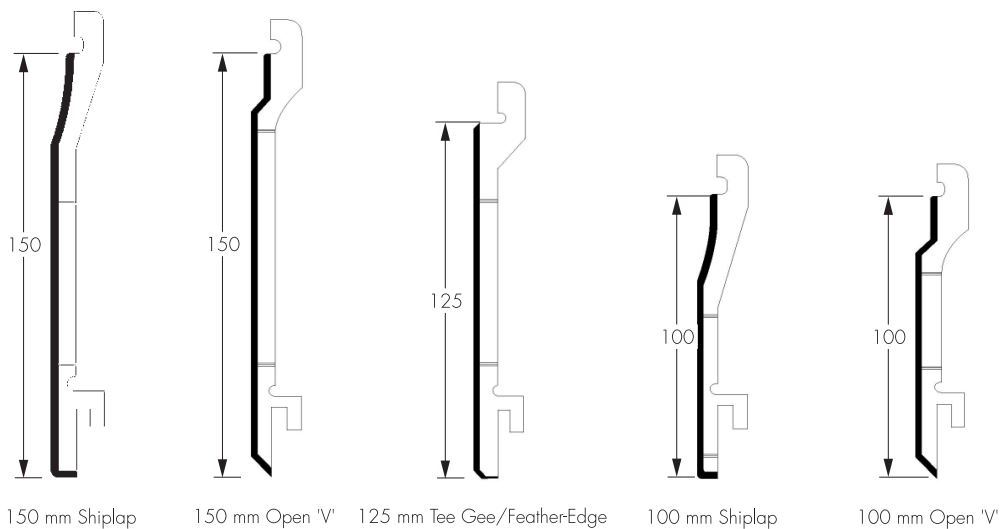
starter trims



angle ventilator trims



butt joint injection-moulded cover trims (nominal thickness 2 mm)



2 Delivery and site handling

2.1 Standard five-metre lengths of the extrusions are delivered to site sealed in polythene sleeves. Pack quantities vary according to profile size.

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

2.3 Unloading should be carried out by hand to avoid damage to the components and 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.

Assessment and Technical Investigations

The following is a summary of the assessment and technical investigations carried out on the Swish Cellular PVC-U Cladding System.

Design Considerations

3 General

3.1 The Swish Cellular PVC-U Cladding System is suitable for horizontal, vertical (Open 'V' and Tee Gee only) and diagonal (Open 'V' and Tee Gee only) fixing, as a decorative and protective external facing over a timber stud or masonry wall.



3.2 The designer should ensure that the strength and integrity of the intended substrate is commensurate with that required of the cladding system (see sections 3.3 and 3.4).

3.3 Brickwork or blockwork walls should be constructed in the conventional manner in accordance with one of the following technical specifications:

- BS 5628-1 : 2005 and BS 5628-3 : 2005
- The Building Regulations 2000 (as amended) (England and Wales), Approved Document A1/2, Part C, Section 1
- *The Small Buildings Guide*, for use in conjunction with, or as an alternative to Mandatory Standard 1.1 (clause 1.1.1) of The Building (Scotland) Regulations 2004 (as amended)
- The Building Regulations (Northern Ireland) 2000 (as amended), Technical Booklet D *Structure*.

3.4 Timber stud walls should be constructed in accordance with BS 5268-2 : 2002 and BS 5268-6.1 : 1996 and preservative treated in accordance with BS 5268-5 : 1989. Studding and framing should be adequately supported by noggings to ensure rigidity.

3.5 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 (measuring not less than 19 mm by 38 mm, 25 mm by 38 mm recommended by the manufacturer) rigidly fixed to the studding (not unsupported sheathing) or masonry substrate at 600 mm centres or closer. Where a CCA⁽¹⁾ (copper/chrome/arsenic) preservative is used, care should be taken to ensure that sufficient time is allowed for the complete fixation of the CCA preservative (approximately seven days) before the cladding is fixed.

(1) CCA products should not be used in domestic applications according to European guidelines.

3.6 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 (i.e. below 5°C or above 25°C) and to allow adequate gaps for expansion (see sections 12.13, 12.17, 12.22 and 12.31).



3.7 In accordance with BS 8200 : 1985, a continuous 10 mm ventilation pathway (25 mm recommended by the manufacturer) must be maintained behind the cladding, with ventilation slots giving a minimum of 5000 mm² per metre run at the top and bottom of the installation. To comply with the NHBC requirement (see *NHBC Standards 2008*, Chapter 6.2, Section D4) a minimum 15 mm drained and vented cavity behind cladding is required when installed over timber sheathing

4 Practicability of installation

4.1 The cladding can be installed easily under normal site conditions provided the work is carried out according to the guidance given in sections 11 and 12 of this Certificate. Care should be taken when installing long lengths of cladding above ground-floor level.

4.2 The components of the system are easy to work using normal woodworking tools for cutting, drilling and shaping. Handsaws should have a fine-toothed blade. 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. When using power tools to cut or shape the components it is recommended that eye protection and a coarse-particle dust mask are used.

5 Strength and Stability

Wind Loading



5.1 Under wind loading the most likely mode of failure of the cladding will be by nail withdrawal under wind suction.

5.2 When installed in accordance with the requirements of this Certificate, onto battens at 600 mm spacings, the cladding can withstand dynamic wind pressures shown in Table 2.

Table 2 Permissible dynamic wind pressures (Pa)

Length of fixing nail (mm)	Plank cover width (mm)		
	100	125	150
25	1750	1400	1150
33	2650	2100	1750

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

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

Resistance to impact

5.5 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.

6 Behaviour in relation to fire



6.1 When tested to BS 476-6 : 1989 the cladding material achieved a fire propagation index (I) of 14.3 with sub-indices (i_1), (i_2) and (i_3) of 6.5, 6.9 and 0.9, respectively.

6.2 When tested in accordance with BS 476-7 : 1997, the co-extruded material has achieved a Class 1Y surface spread of flame rating.

6.3 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 building regulations.



6.4 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 cellular PVC-U cladding is counted as an unprotected area amounting to half the actual area of the cladding.

6.5 Subject to the provisions given in section 6.4 above, the cladding is suitable for use on external walls other than those requiring a Class 0 external surface (eg external walls less than one metre from a relevant boundary).



6.6 Combustible cladding need not be included in the calculation of unprotected area where:

- the combustible cladding 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⁽¹⁾⁽²⁾
- the wall behind the cladding (or the cladding itself) has the appropriate fire resistance duration from the inside.

Otherwise, if this requirement is not met, the cladding must be treated as an unprotected area amounting to 100% opening.

(1) Technical Handbook (Domestic).

(2) Technical Handbook (Non-Domestic).

7 Air and water penetration




7.1 The cladding is not airtight, watertight or water-vapourtight. When used on 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 4016 : 1997 and have a vapour resistance of less than $0.6 \text{ MN}\cdot\text{s}\cdot\text{g}^{-1}$ when calculated from the results of tests carried out at 25°C and a relative humidity of 75%, in accordance with BS 3177 : 1959.

7.2 Where the cladding is used as a decorative facing attached to weathertight masonry walls, a 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.


7.3 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.

7.4 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 shorter trim and top finishing trim in accordance with the manufacturer's guidelines.

8 Thermal insulation

 For the purpose of U value calculations, in accordance with BS EN ISO 6946 : 2007 and BRE 443 : 2006 *Recommendations for U-value calculations*, the cavity between 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 a still air layer, ie a total of 0.13 m²·K·W⁻¹.


9 Maintenance

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

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

9.3 Paints 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. Therefore, painting of the product is not recommended.

10 Durability

 10.1 Accelerated weathering tests and limited natural exposure trials indicate that the cladding is as durable as conventional rigid PVC and will retain adequate impact resistance for a period of 20 years.

10.2 The cladding will retain its decorative function for the service life of the product with only minor changes in surface appearance. However, staining will result from contact with creosote or bitumen.

Installation

11 General

11.1 The substrate for the Swish Cellular PVC-U Cladding System should be checked to ensure that it is as prescribed in section 3.2.

11.2 On non-weatherproof substrates, a vapour permeable water barrier must be installed behind battens and cladding (see sections 7.1 and 7.3).

11.3 Installation should not be carried out in extremes of temperature (between 5°C and 25°C is recommended).

11.4 The components are easy to work using normal woodworking tools for cutting, drilling and shaping. Handsaws should have a fine-toothed blade. 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.

11.5 When using power tools to cut or shape the components, it is recommended that eye protection and a coarse-particle dust mask is used.

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

11.7 Adequate provision should be made for ventilation and drainage behind the cladding (see sections 3.7 and 7.4). For horizontal cladding, horizontal battens are not recommended 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 below 5000 mm² per metre run (see section 3.7).

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

11.9 Window head and other protrusions should be protected by a suitable weatherproof membrane or flashing.

11.10 The system should be installed using the fixings recommended by the manufacturers (see section 1.7).

11.11 Installation must be carried out in accordance with the manufacturer's instructions and the requirements of this Certificate.

12 Procedure

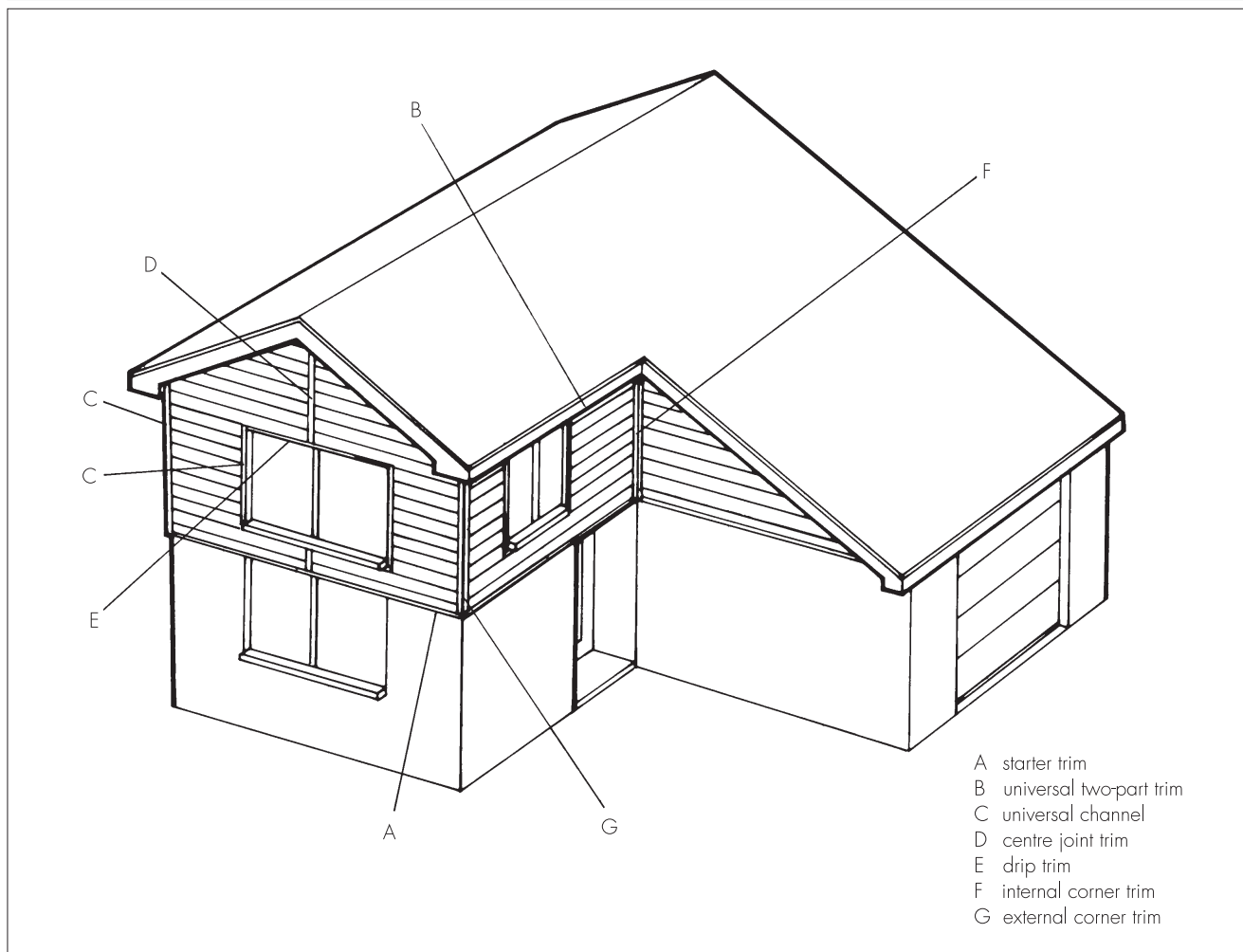
Preparation

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

12.2 A final inspection of the substrate should be made to confirm that it is as prescribed in section 3.2 of this Certificate.

12.3 Appropriate cladding planks and trims should be selected and assembled (see Figures 1, 2 and 3). For vertical and diagonal cladding, only Open 'V' or Tee Gee should be used.

Figure 3 Use of trims



12.4 The appropriate battens (selected and treated in accordance with section 3.5) should be fixed at centres not exceeding 600 mm.

12.5 For horizontal cladding, vertical battens are required at the ends of each section, at the sides of windows and at joins between planks. Horizontal battens are not recommended 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 below 5000 mm² per metre run (see section 3.7).

12.6 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 joins 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 12.22).

12.7 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 12.6.

12.8 On non-weatherproof substrates a vapour-permeable water barrier must be installed behind battens.

12.9 Windowheads and other protrusions should be protected by a suitable weatherproof membrane or flashing.

Horizontal installation (see Figure 4)

12.10 Working from 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.

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

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

12.13 The bottom cladding plank is then 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, nailing 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 boards).

12.14 Where necessary, trims and planks are cut to size and shape with a fine-toothed saw.

12.15 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.

12.16 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.

12.17 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.

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

Vertical installation (see Figure 4)

12.19 Vertical cladding is installed using the principles outlined for horizontal installation.

12.20 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.

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

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

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

12.24 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 it is recommended that the installation is planned so that the width of the starting and finishing planks is the same. That is, that both are either full planks or cut planks of the same width).

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

12.26 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 (see Figure 4)

12.27 Diagonal cladding is installed using the principles outlined for *Vertical installation*.

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

12.29 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.

12.30 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.

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

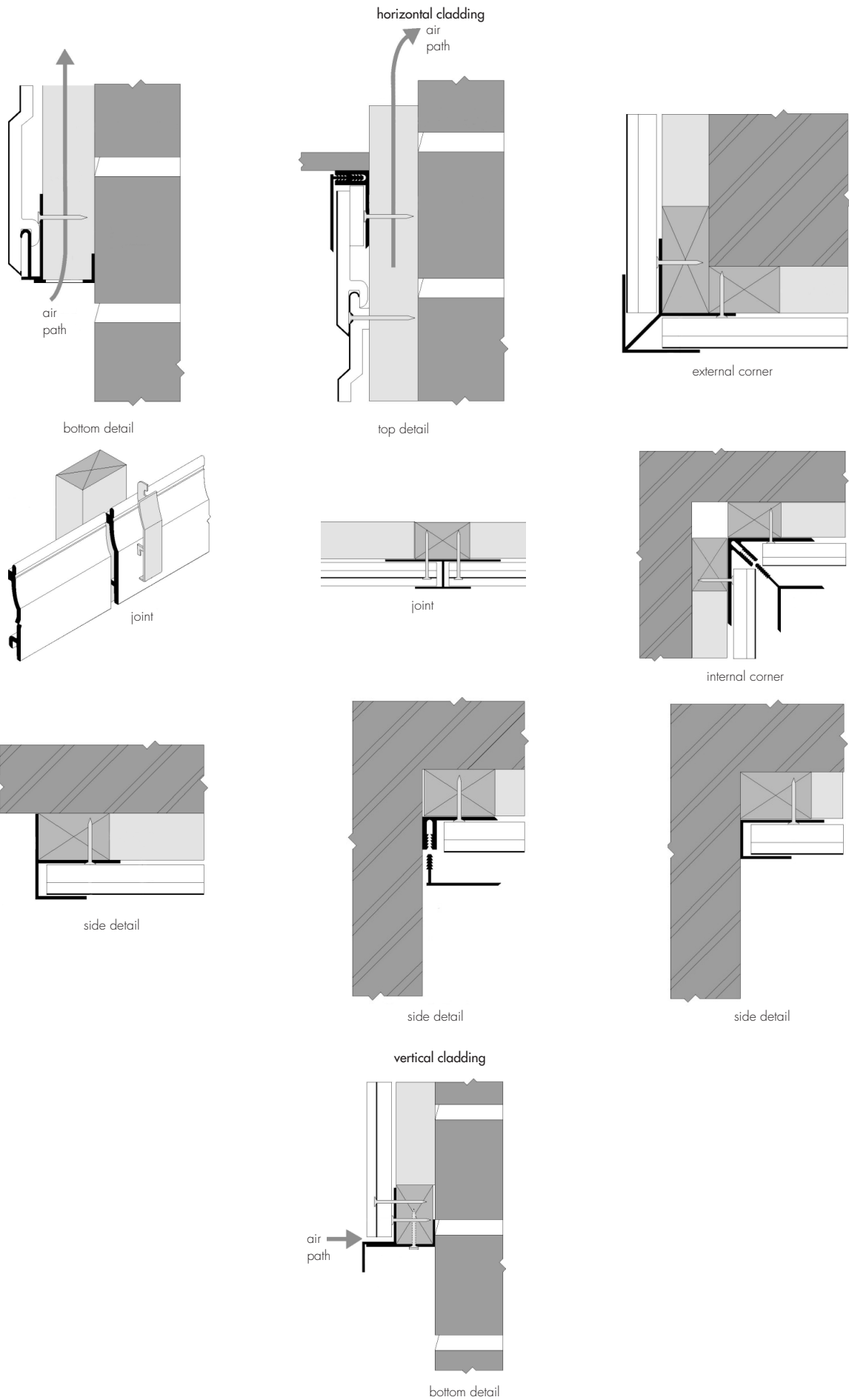
12.32 Subsequent planks are fitted into the preceding planks, ensuring that the tongue-and-groove joint is firmly closed so that the nail heads are concealed by the overlap.

12.33 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.

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

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

Figure 4 Typical installation details



13 Tests

13.1 Tests were carried out on planks to determine impact resistance.

13.2 Tests were carried out on planks and trims to determine:

- Vicat softening temperature
- thickness of layers
- weight per linear metre
- ash content
- Izod impact strength (ISO 180 : 1982)
- 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.

13.3 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.

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

14 Investigations

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

14.2 The dimensions of cladding planks and trims were checked.

14.3 An examination was made of data relating to:

- behaviour of the cladding in fire
- colour stability
- impact resistance before and after UV ageing.

14.4 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.

14.5 The practicability of installation was assessed.

Bibliography

- BS 476-6 : 1989 *Fire tests on building materials and structures — Method of test for fire propagation for products*
- 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 3177 : 1959 *Method for determining the permeability to water vapour of flexible sheet materials used for packaging*
- BS 4016 : 1997 *Specification for flexible building membranes (breather type)*
- BS 5268-2 : 2002 *Structural use of timber — Code of practice for permissible stress design, materials and workmanship*
- BS 5268-5 : 1989 *Structural use of timber — Code of practice for the preservative treatment of structural timber*
- BS 5268-6.1 : 1996 *Structural use of timber — Code of practice for timber frame walls — Dwellings not exceeding four storeys*
- BS 5628-1 : 2005 *Code of practice for the use of masonry — Structural use of unreinforced masonry*
- BS 5628-3 : 2005 *Code of practice for the use of masonry — Materials and components, design and workmanship*
- BS 8200 : 1985 *Code of practice for design of non-loadbearing external vertical enclosures of buildings*
- BS EN 10088-2 : 2005 *Stainless steels — Technical delivery conditions for sheet/plate and strip of corrosion resisting steels for general purposes*
- BS EN ISO 6946 : 2007 *Building components and building elements — Thermal resistance and thermal transmittance — Calculation method*
- ISO 180 : 1982 *Plastics — Determination of Izod impact strength*

15 Conditions

15.1 This Certificate:

- relates only to the product/system that is named and described on the front page
- is granted only to the company, firm or person named on the front page — no other company, firm or person may hold or claim any entitlement to this Certificate
- 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 and documents referred to in this Certificate are those that the BBA deems to be relevant at the date of issue or re-issue of this Certificate and include any: Act of Parliament; Statutory Instrument; Directive; Regulation; British, European or International Standard; Code of Practice; manufacturers' instructions; or any other publication or document similar or related to the aforementioned.

15.3 This Certificate will remain valid for an unlimited period provided that the product/system and the manufacture and/or fabrication including all related and relevant 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 In granting this Certificate, the BBA is not responsible for:

- 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
- individual installations of the product/system, including the nature, design, methods and workmanship of or related to the installation
- the actual works in which the product/system is installed, used and maintained, including the nature, design, methods and workmanship of such works.

15.5 Any information relating to the manufacture, supply, installation, use and maintenance 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 and maintained. It does not purport in any way to restate the requirements of the Health & Safety at Work etc Act 1974, or of any other statutory, common law or other duty which may exist at the date 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. In granting this Certificate, the BBA does not accept responsibility to any person or body for any loss or damage, including personal injury, arising as a direct or indirect result of the manufacture, supply, installation, use and maintenance of this product/system.

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