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Agrément Certificate

14/5154

Product Sheet 5

EUROCELL PVC-U WINDOW SYSTEMS

MODUS OUTWARD OPENING AND TILT AND TURN SYSTEMS

This Agrément Certificate Product Sheet⁽¹⁾ relates to Modus Outward Opening and Tilt and Turn Systems in white, cream or woodgrain finish, for use in replacement and new-build applications in dwellings, light commercial premises or similar habitable applications.

(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

Thermal properties — the thermal transmittance value (U value) of both an outward opening and tilt and turn window from within the range was calculated as $1.2 \text{ W}\cdot\text{m}^{-2}\cdot\text{K}^{-1}$ (see section 6).

Weathertightness — the systems can be used in the exposure situations described in this Certificate (see section 7).

Ventilation — opening lights can provide rapid ventilation (see section 8).

Unauthorised access — windows from within this range can contribute to preventing unauthorised access to dwellings and similar habitable applications (see section 9).

Durability — the PVC-U extruded profiles will continue to function satisfactorily for a period in excess of 35 years (see section 16).

The BBA has awarded this Certificate to the company named above for the systems described herein. These systems have been assessed by the BBA as being fit for their intended use provided they are installed, used and maintained as set out in this Certificate.

On behalf of the British Board of Agrément

A stylized, handwritten signature in black ink, appearing to read 'John Albon'.

Date of First issue: 12 April 2016

John Albon – Head of Approvals
Construction Products

A handwritten signature in black ink, appearing to read 'Claire Curtis-Thomas'.

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
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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In the opinion of the BBA, Modus Outward Opening and Tilt and Turn Systems, 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:	B1	Means of warning and escape
Comment:		Windows of an appropriate size can be used as an escape route from floors not more than 4.5 m above ground level. See section 11 of this Certificate.
Requirement:	C2(b)	Resistance to moisture
Comment:		The systems have adequate resistance to the ingress of rain and wind-driven spray and so can contribute towards the wall satisfying this Requirement. See Table 3 (section 7) of this Certificate.
Requirement:	C2(c)	Resistance to moisture
Comment:		The systems will not constitute a significant condensation risk and so can contribute towards the wall satisfying this Requirement. See section 12.1 of this Certificate.
Requirement:	F1(1)	Means of ventilation
Comment:		In assessing the contribution of the systems to natural purge ventilation, the area of opening should be calculated in accordance with section 8.1 in this Certificate and related to floor area as set out in Approved Document F.
Requirement:	K5.3	Safe opening and closing of windows etc (applicable to England only)
Comment:		Windows which can be opened by people in or about the building should be constructed or equipped so that they can be opened, closed or adjusted safely. See sections 13.3 and 13.4 of this Certificate.
Requirement:	K5.4	Safe access for cleaning windows etc (applicable to England only)
Comment:		This Requirement can be satisfied. See sections 13.1 and 13.2 of this Certificate.
Requirement:	L1(a)(i)	Conservation of fuel and power
Comment:		The systems can contribute to satisfying this Requirement. See sections 6.1, 6.2 and 6.3 of this Certificate.
Requirement:	N3	Safe opening and closing of windows, etc (applicable to Wales only)
Comment:		Windows which can be opened by people in or about the building should be constructed or equipped so that they can be opened, closed or adjusted safely. See sections 13.3 and 13.4 of this Certificate.
Requirement:	N4	Safe access for cleaning windows etc (applicable to Wales only)
Comment:		This Requirement can be satisfied when opening lights can be safely cleaned from inside the building. See sections 13.1 and 13.2 of this Certificate.
Requirement:	Q1	Unauthorised access (applicable to England only)
Comment:		The windows, as described in the additional Enhanced Security Sheet (ES5) for Product Sheet 5, can satisfy this Requirement for new dwellings (see section 9.1 of this Certificate).
Regulation:	7	Materials and workmanship
Comment:		The system is acceptable. See sections 16.1 and 16.2 and the <i>Installation</i> part of this Certificate.

Regulation:	26	CO₂ emission rates for new buildings
Regulation:	26A	Fabric energy efficiency rates for new dwellings (applicable to England only)
Regulation:	26A	Primary energy consumption rates for new buildings (applicable to Wales only)
Regulation:	26B	Fabric performance values for new dwellings (applicable to Wales only)
Comment:		The systems can contribute to satisfying these Regulations. See sections 6.1, 6.2 and 6.3 of this Certificate.



The Building (Scotland) Regulations 2004 (as amended)

Regulation:	8(1)(2)	Durability, workmanship and fitness of materials
Comment:		The systems satisfy this Regulation. See sections 15.1, 15.2, 15.3, 15.4, 16.1 and 16.2 and the <i>Installation</i> part of this Certificate.
Regulation:	9	Building standards applicable to construction
Standard:	2.9	Escape
Comment:		Windows of an appropriate size can be used as an escape route from an apartment on an upper storey at a height of not more than 4.5 m above ground level. See section 11 of this Certificate.
Standard:	3.10	Precipitation
Comment:		The systems have adequate resistance to the ingress of rain and wind-driven spray and so can contribute towards the wall satisfying this Standard, with reference to clause 3.10.1 ⁽¹⁾⁽²⁾ . See Table 3 (section 7) of this Certificate.
Standard:	3.14	Ventilation
Comment:		In calculating the contribution of the systems to natural ventilation with reference to clauses 3.14.2 ⁽¹⁾⁽²⁾ and 3.14.3 ⁽¹⁾ of this Standard, the area of opening can be calculated in accordance with section 8.1 of this Certificate.
Standard:	3.15	Condensation
Comment:		The systems will not constitute a significant condensation risk and so can contribute towards the wall satisfying this Standard, with reference to clauses 3.15.1 ⁽¹⁾ and 3.15.4 ⁽¹⁾ . See section 12.1 of this Certificate.
Standard:	3.16	Natural lighting
Comment:		In calculating the contribution of the systems to natural lighting, with reference to clauses 3.16.1 ⁽¹⁾ and 3.16.3 ⁽¹⁾ of this Standard, the area of glazing can be calculated in accordance with section 10 of this Certificate.
Standard:	4.8(c)	Danger from accidents
Comment:		Opening lights that can be safely cleaned from inside the building can satisfy this Standard, with reference to clause 4.8.3 ⁽¹⁾⁽²⁾ . See sections 13.1 and 13.2 of this Certificate.
Standard:	4.8(e)	Danger from accidents
Comment:		Windows which can be opened by people in or about the building constructed or equipped so that they can be opened, closed or adjusted safely can satisfy this Standard, with reference to clause 4.8.5 ⁽¹⁾⁽²⁾ . See section 13.3 of this Certificate.
Standard:	4.13	Security
Comment:		The windows, as described in the additional Enhanced Security Sheet (ES5) for Product Sheet 5, can satisfy this Standard with reference to clause 4.13.1 (c) ⁽¹⁾ . See section 9.1 of this Certificate.
Standard:	6.1(b)	Carbon dioxide emissions
Standards:	6.2	Building insulation envelope
Comment:		The systems can contribute to satisfying these Standards, with reference to clauses 6.1.1 ⁽¹⁾ , 6.1.2 ⁽¹⁾ , 6.1.4 ⁽²⁾ , 6.1.6 ⁽¹⁾ , 6.1.7 ⁽¹⁾ , 6.2.1 ⁽¹⁾⁽²⁾ , 6.2.4 ⁽²⁾ , 6.2.6 ⁽¹⁾ , 6.2.7 ⁽¹⁾ , 6.2.8 ⁽²⁾ , 6.2.9 ⁽¹⁾⁽²⁾ , 6.2.11 ⁽¹⁾⁽²⁾ and 6.2.13 ⁽¹⁾⁽²⁾ . See sections 6.1, 6.2 and 6.3 of this Certificate.

Standard:	7.1(a)	Statement of sustainability
Comment:		The systems 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. In addition, the systems can contribute to a construction meeting a higher level of sustainability as defined in this Standard, with reference to clauses 7.1.4 ⁽¹⁾⁽²⁾ [Aspects 1 ⁽¹⁾⁽²⁾ and 2 ⁽¹⁾], 7.1.6 ⁽¹⁾⁽²⁾ [Aspects 1 ⁽¹⁾⁽²⁾ and 2 ⁽¹⁾] and 7.1.7 ⁽¹⁾⁽²⁾ [Aspect 1 ⁽¹⁾⁽²⁾]. See sections 6.1, 6.2 and 6.3 of this Certificate.
Regulation:	12	Building standards applicable to conversions
Comment:		Comments in relation to the product under Regulation 9, Standards 1 to 6, also apply to this Regulation, with reference to clause 0.12.1 ⁽¹⁾⁽²⁾ and Schedule 6 ⁽¹⁾⁽²⁾ .
		(1) Technical Handbook (Domestic). (2) Technical Handbook (Non-Domestic).



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

Regulation:	23	Fitness of materials and workmanship
Comment:		The systems are acceptable. See sections 16.1 and 16.2 and the <i>Installation</i> part of this Certificate.
Regulation:	28(b)	Resistance to moisture and weather
Comment:		The systems have adequate resistance to the ingress of rain and wind driven spray and so can contribute towards the wall satisfying this Regulation. See Table 3 (section 7) of this Certificate.
Regulation:	33(c)	Means of escape
Comment:		Windows of an appropriate size can be used as an escape route in dwellings. See section 11 of this Certificate.
Regulation:	39(a)(i)	Conservation measures
Regulation:	40(2)	Target carbon dioxide emission rate
Comment:		The systems can contribute to satisfying these Regulations. See sections 6.1, 6.2 and 6.3 of this Certificate.
Regulation:	65(1)	Means of ventilation
Comment:		When calculating the area of window openings for ventilation purposes, see section 8.1 of this Certificate.
Regulation:	98	Safe opening and closing of windows, skylights and ventilators
Comment:		The requirements of this Regulation shall be deemed to be satisfied if the window complies with Technical Booklet V, Section 4. See sections 13.3 and 13.4 of this Certificate.
Regulation:	99	Safe means of access for cleaning glazing
Comment:		Opening lights that can be safely cleaned from inside the building can satisfy this Regulation. See sections 13.1 and 13.2 of this Certificate.

Construction (Design and Management) Regulations 2015

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

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

See sections: 3 *Delivery and site handling* (3.3) and 13 *Safety* (13.9) of this Certificate.

Additional Information

NHBC Standards 2016

NHBC accepts the use of Modus Outward Opening and Tilt and Turn Systems, provided they are installed, used and maintained in accordance with this Certificate, in relation to *NHBC Standards*, Chapter 6.7 *Doors, windows and glazing*.

General

The Certificate holder is a system supplier, supplying bar length of window profile. The window systems detailed within this Certificate are manufactured by BBA-approved window fabricators. Details of currently approved window fabricators can be found on the BBA website.

Technical Specification

1 Description

1.1 Modus Outward Opening and Tilt and Turn Systems comprise single top-hung, side-hung and tilt and turn windows and multilight windows, including opening lights and fixed lights, all framed in white, cream or woodgrain finish unplasticised polyvinyl chloride (PVC-U) profiles complying with BS EN 12608 : 2003 and glazed internally with sealed double-glazed units⁽¹⁾. The inner core sections of the PVC-U profiles are extruded from RM_b⁽²⁾ recycled PVC-U and have virgin PVC-U external and internal faces.

(1) Outside the scope of this Certificate.

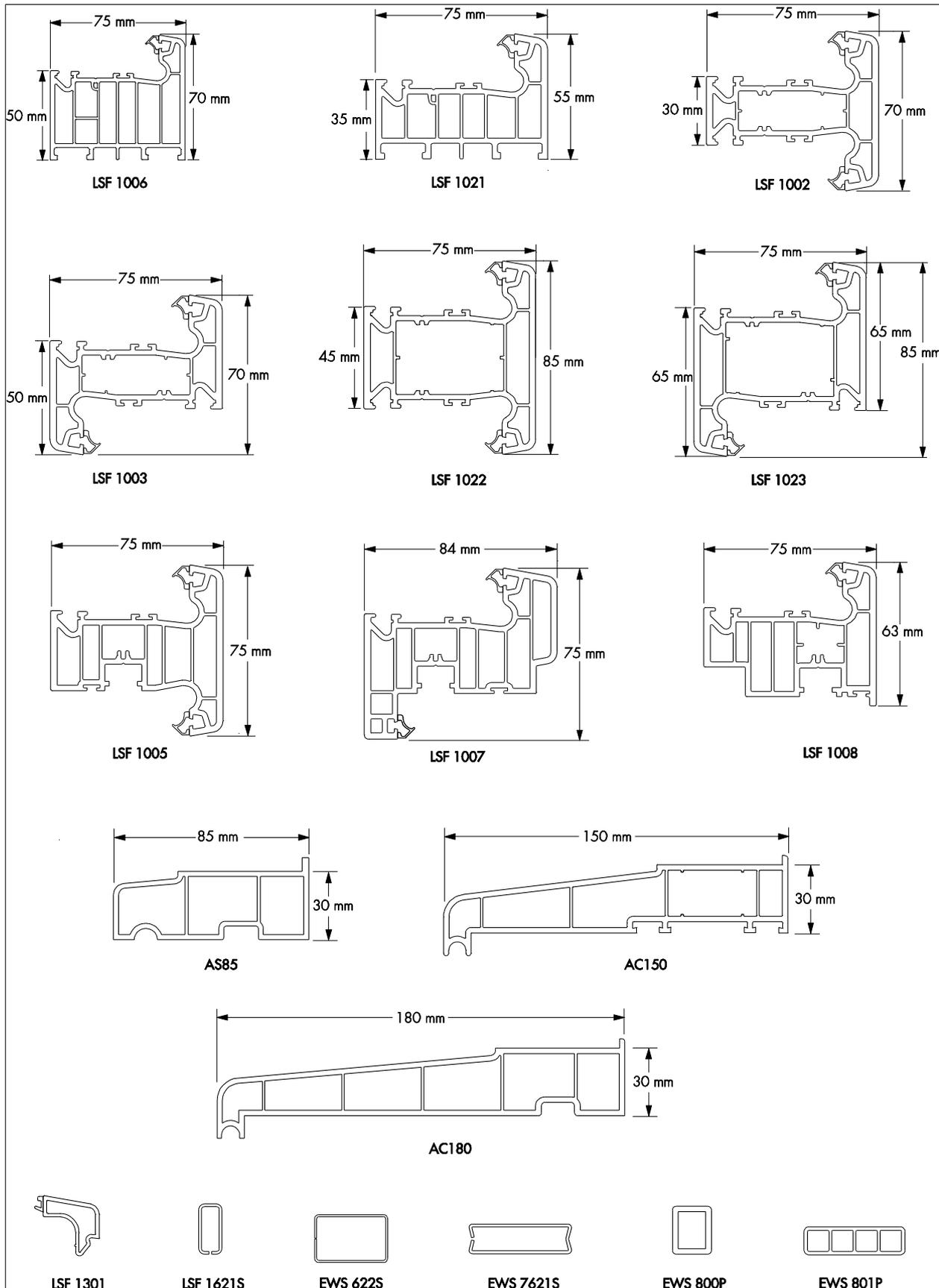
(2) Material made from used PVC-U products other than window profiles or a mixture of PVC-U products with PVC-U window profiles.

1.2 Woodgrain profiles are surface-covered with PVC which incorporates a clear acrylic protective lacquer. Profiles are available with the foil applied to both visible faces of a brown or tan PVC-U substrate, or to the exterior face only of a white or cream PVC-U substrate. The profiles covered by this Certificate (listed in Table 1 and shown in Figure 1) are supplied with integral gaskets made from black plasticised PVC-U material, thus eliminating the need for separate weatherseals and glazing gaskets.

Table 1 Profiles

Manufacturer's designation	Profile type	Application	Outward Opening	Tilt and Turn
LSF 1006	L-section	outer frame (70 mm)	✓	✓
LSF 1021	L-section	outer frame (55 mm)	✓	✓
LSF 1002	T-section	mullion/transom (70 mm)	✓	✓
LSF 1003	Z-section	mullion/transom (70 mm)	✓	—
LSF 1022	T-section	mullion/transom (85 mm)	✓	✓
LSF 1023	Z-section	mullion/transom (85 mm)	✓	—
LSF 1005	T-section	opening light frame	✓	—
LSF 1007	Z-section	opening light frame	—	✓
LSF 1008		opening light frame (flush sash)	✓	—
AS85	—	sill (85 mm)	✓	✓
AC150	—	sill (150 mm)	✓	✓
AC180	—	sill (180 mm)	✓	✓
LSF 1301	—	co-extruded glazing bead (28 mm)	✓	✓
LSF 1621S	—	galvanized steel reinforcement (LSF 1021, LSF 1003)	✓	✓
EWS 622S	—	galvanized steel reinforcement (LSF 1022, LSF 1023)	✓	✓
EWS 7621S	—	galvanized steel reinforcement (LSF 1002, LSF 1003)	✓	✓
EWS 800P	—	PVC-U thermal reinforcement (LSF 1006, LSF 1021, LSF 1005, LSF 1007, LSF 1008)	✓	✓
EWS 801P	—	PVC-U thermal reinforcement (LSF 1002, LSF 1003)	✓	✓

Figure 1 Profiles (all dimensions in mm)



1.3 The Certificate holder must adhere to the methods of selection, machining and assembly of frame components as detailed in the fabrication instructions and this Certificate.

1.4 Multilight windows incorporate mullions and transoms connected to the outer frame and, where relevant, to each other by means of welded joints.

1.5 Drainage is provided by a series of slots (5 mm by 30 mm) and holes, positioned in accordance with the fabrication instructions. In general on multilight units, each element is treated as a separate window and drainage slots cut accordingly, to retain symmetry where possible. Woodgrain sills are vented, as described in the fabrication instructions, to prevent pressure changes causing distortion.

Reinforcement

1.6 Outer frame members are not normally reinforced unless specifically required in accordance with the fabrication instructions, where galvanized mild steel or PVC-U reinforcing is used.

1.7 Opening light frame members are not normally reinforced unless specifically required, using PVC-U reinforcing.

1.8 Mullions and transoms can be reinforced with galvanized mild steel or PVC-U reinforcing.

1.9 Galvanized steel reinforcement is roll-formed from material with a Z275N coating complying with BS EN 10346 : 2009.

1.10 PVC-U reinforcing is extruded from $ERM_a^{(1)}$ or $RM_a^{(2)}$ material as defined in BS EN 12608 : 2003.

(1) Material free from contamination and degradation, made from unused PVC-U window profiles, including off cuts, which has been originally processed by a manufacturer other than that carrying out the reprocessing.

(2) Material made from used PVC-U window profiles which is free from contamination.

Size range

1.11 This Certificate covers Modus outward opening top-hung, side-hung and tilt and turn and fixed-light windows and combinations of these within the limitations shown in Table 2.

Table 2 Size restrictions

	Dimension (mm)
Outward opening windows	
Maximum overall width or height of any outer frame	1800
Maximum perimeter	6600
Maximum length of mullions or transoms	
unreinforced	1500
reinforced with metal reinforcing	1500
<i>Top-hung opening lights</i>	
Maximum size of top-hung opening light ⁽¹⁾ (separately or in a multilight)	1200 wide x 1345 high
<i>Side-hung opening lights</i>	
Maximum size of top-hung opening light ⁽¹⁾⁽²⁾ (separately or in a multilight)	750 wide x 1500 high
Tilt and turn windows	
Maximum overall width or height of any outer frame	1800
Maximum perimeter	6600
Maximum length of mullions or transoms	
unreinforced	1500
reinforced with metal reinforcing	1500
<i>Tilt and turn opening lights</i>	
Maximum size of tilt and turn opening light ⁽¹⁾⁽²⁾	1500 wide x 1500 high
Fixed windows	
Maximum overall width or height of any outer frame	2100
Maximum perimeter	7200

(1) Opening light sizes refer to outer frame to outer frame, or outer frame to mullion/transom centre line dimension, and must not exceed limitations on weight or size imposed by the friction hinge or the tilt and turn hinge manufacturer.

(2) Windows fabricated with flush sashes should be fitted with dog bolts, positioned centrally along the length of the sash in addition to the cavity wedges, where their length exceeds 1170 mm (1250 mm overall length).

Fittings

1.12 BBA-approved hardware must be used with these systems.

1.13 Outward opening top-hung and side-hung windows covered by this Certificate are fitted with friction hinges constructed from stainless steel type 1.4016 to BS EN 10088-2 : 2005. The hinges incorporate a plastic slider which can be adjusted by means of a brass screw or a die-cast, slot-headed cam to provide the necessary braking action. The hinges are fixed to the frames with screws. Opening windows are fastened by means of concealed shootbolt locking system constructed from materials assessed and approved by the BBA.

1.14 Tilt and turn windows are fitted with a specific type of tilt and turn mechanism comprising an espagnolette type locking system, hinges and a tilt stay, all formed from materials assessed and approved by the BBA. The mechanism incorporates locking rollers and, as an option, shootbolt locks which engage with keeps fixed to the outer frame, and is operated with a handle. The tilt and turn mechanism locates in a purpose-made groove in the opening light profile.

1.15 Shootbolt and tilt and turn handles are available, with a key locking facility as an option. The shootbolt, keeps and tilt and turn mechanism are fixed by means of self-tapping screws which penetrate a thickened area of the profile wall or the reinforcing. The shootbolt and tilt and turn handles (with various finishes) are formed from materials assessed and approved by the BBA.

1.16 Additional components are available from the range of fittings to restrict the opening of the window to a maximum distance of 100 mm.

Glazing

1.17 Windows are supplied factory glazed or ready for glazing using double-glazed units⁽¹⁾ with glass thicknesses in accordance with BS 6262-1 : 2005. All glass is positioned by plastic setting blocks and packing pieces.

(1) Outside the scope of this Certificate.

1.18 The glazing units must meet the requirements of BS EN 1279-2 : 2002 and (if relevant) BS EN 1279-3 : 2002.

1.19 NHBC require⁽¹⁾ that compliance to the standards referred to in sections 1.18 and 1.19 is confirmed by an appropriate independent technical approvals authority.

(1) *NHBC Standards 2016, Chapter 6.7.7 Glazing, Insulating Glass Units.*

Weatherstripping and gaskets

1.20 The integral black gaskets and weatherstripping are incorporated onto the profiles by post calibration co-extrusion (PCE) (see Figure 1). The double-glazed unit is secured by co-extruded bead.

2 Manufacture

2.1 The systems are fabricated using conventional production processes for PVC-U windows. The windows are fabricated from white, cream or woodgrain finish PVC-U profiles, produced by conventional extrusion techniques from material complying with BS EN 12608 : 2003. The inner core sections of the PVC-U profiles are extruded from RM_b recycled PVC-U and have virgin PVC-U external and internal faces. See also sections 1.3 to 1.20 of this Certificate.

2.2 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.

2.3 The management system of Eurocell Profiles Ltd has been assessed and registered as meeting the requirements of BS EN ISO 9001 : 2008 (Certificate FM 45551) and BS EN ISO 14001 : 2004 (Certificate 25110/A/0001/UK/En) by BSI.

3 Delivery and site handling

3.1 The windows are delivered to site glazed or ready for glazing. For transportation they are suitably protected to avoid damage. Particular care is needed to avoid damaging woodgrain finishes, as it may be impossible to restore the finish.

3.2 The windows should be stored under cover in a clean area, on edge and suitably supported to avoid distortion or damage.

3.3 The weight of the unglazed frame and of the glazing (which can be obtained from the Certificate holder) and their ease of handling, particularly by one person, must be taken into account when planning site operations.

Assessment and Technical Investigations

The following is a summary of the assessment and technical investigations carried out on Modus Outward Opening and Tilt and Turn Systems.

Design Considerations

4 Use

Modus Outward Opening and Tilt and Turn Systems are satisfactory for use in non-loadbearing applications where windows are installed vertically into the external walls of new and existing dwellings, light commercial premises or similar habitable applications.

5 Practicability of installation

The systems are designed to be installed by a competent general builder, or a contractor, experienced with these types of systems.

6 Thermal properties



6.1 The following Modus outward opening PVC-U window, 1230 mm wide by 1480 mm high, achieves a U value (U_w) of $1.2 \text{ W}\cdot\text{m}^{-2}\cdot\text{K}^{-1}$ when calculated in accordance with BS EN ISO 10077-2 : 2012:

- a side-hung opening light and a fixed-light
- LSF 1021 outer frame (unreinforced)
- LSF 1005 sash (unreinforced)
- LSF 1003 mullion (reinforced with EWS 801P)
- LSF 1301 glazing bead
- 4/20/4 mm sealed double-glazed unit
 - 20 mm argon-filled cavity (90%)
 - external pane: 4 mm SG Diamant, Saint Gobain
 - internal pane: 4 mm SG Planitherm One, Saint Gobain, (ϵ_n) = 0.01
 - spacer: Edgetech SuperSpacer.

6.2 The following Modus outward opening PVC-U window, 1230 mm wide by 1480 mm high, achieves a U value (U_w) of $1.2 \text{ W}\cdot\text{m}^{-2}\cdot\text{K}^{-1}$ when calculated in accordance with BS EN ISO 10077-2 : 2012:

- a side-hung opening light and a fixed-light
- LSF 1021 outer frame (unreinforced)
- LSF 1008 flush sash (unreinforced)
- LSF 1002 mullion (reinforced with EWS 801P)
- LSF 1301 glazing bead
- 4/20/4 mm sealed double-glazed unit
 - 20 mm argon-filled cavity (90%)
 - external pane: 4 mm SG Diamant, Saint Gobain
 - internal pane: 4 mm SG Planitherm One, Saint Gobain, (ϵ_n) = 0.01
 - spacer: Superspacer Premium.

6.3 The following Modus tilt and turn PVC-U window, 1230 mm wide by 1480 mm high, achieves a U value (U_w) of $1.2 \text{ W}\cdot\text{m}^{-2}\cdot\text{K}^{-1}$ when calculated in accordance with BS EN ISO 10077-2 : 2012:

- a tilt and turn opening light and a fixed-light
- LSF 1021 outer frame (unreinforced)
- LSF 1007 sash (unreinforced)
- LSF 1002 mullion (reinforced with EWS 801P)
- LSF 1301 glazing bead
- 4/20/4 mm sealed double-glazed unit
 - 20 mm argon-filled cavity (90%)
 - external pane: 4 mm SG Diamant, Saint Gobain
 - internal pane: 4 mm SG Planitherm One, Saint Gobain, (ϵ_n) = 0.01)
 - spacer: Superspacer Premium.

6.4 The overall thermal insulation of the window will be dependent on the performance of the double-glazed units. For units other than those described above, the indicative U values shown in Table 6e of SAP 2009 *The Government's Standard Assessment Procedure for Energy Rating of Dwellings* can be used. When available, a certified U value by measurement to BS EN ISO 12567-1 : 2010, or calculation to BS EN ISO 10077-1 : 2006 and BS EN ISO 10077-2 : 2012, should be used in preference. Alternatively, Window Energy Ratings may be available for specific frame and glazing combinations on the BFRC website (www.bfrc.org).

6.5 Design U values are detailed in the documents supporting the national Building Regulations.

7 Weathertightness

7.1 Selected samples from the systems were tested, generally in accordance with BS EN 14351-1 : 2006 (BS EN 1026 : 2000, BS EN 1027 : 2000 and BS EN 12211 : 2000), and are suitable for use as indicated in Table 3. The classifications are based on the assumption that the outer frame is supported on all four sides in accordance with the manufacturer's instructions. These test results are indicative and only valid for the windows tested. If classification for a particular window is required, and it is not covered within Table 3, the window should be tested in accordance with BS EN 14351-1 : 2006.

7.2 For unusual building layouts, building shapes or ground topography, the designer will need to give particular consideration to the prevailing exposure conditions.

Table 3 Indicative weathertightness classifications

	Classification according to:			
	Air permeability according to BS EN 12207 : 2000	Watertightness according to BS EN 12208 : 2000	Resistance to wind load according to BS EN 12210 : 2000	Overall UK exposure to BS 6375-1 : 2015
Outward opening <i>Multilight units</i>				
side-hung next to fixed next to side-hung ⁽¹⁾ (1800 mm wide x 1500 mm high), mullion LSF 1003 ⁽²⁾ (1500 mm long)	Class 4 (max test pressure 600 Pa)	Class E1050 (max test pressure 1050 Pa)	Class A4 (1600 Pa)	1600
side-hung next to fixed ⁽¹⁾ (1500 mm wide x 1500 mm high), mullion 1500 mm long LSF 1003 ⁽²⁾ (1500 mm long), flush sash	Class 4 (max test pressure 600 Pa)	Class E1050 (max test pressure 1050 Pa)	Class 4 (1600 Pa)	1600
side-hung next to fixed ⁽¹⁾ (1500 mm wide x 1350 mm high), mullion LSF 1003 ⁽²⁾ (1350 mm long)	Class 4 (max test pressure 600 Pa)	Class E750 (max test pressure 750 Pa)	Class A4 (1600 Pa)	1600
side-hung next to fixed ⁽¹⁾ (1500 mm wide x 1500 mm high), mullion LSF 1003 ⁽³⁾ (1500 mm long)	Class 4 (max test pressure 600 Pa)	Class E1050 (max test pressure 1050 Pa)	Class 4 (1600 Pa)	1600
<i>Individual opening lights:</i> top-hung opening light ⁽¹⁾	Class 4 (max test pressure 600 Pa)	Class E1050 (max test pressure 1050 Pa)	Class A5 (2000 Pa)	2000
side-hung opening light ⁽¹⁾	Class 4 (max test pressure 600 Pa)	Class E1050 (max test pressure 1050 Pa)	Class CE2400 (2400 Pa)	2000 +
<i>Fixed lights⁽⁴⁾:</i>	Class 4 (max test pressure 600 Pa)	Class E1050 (max test pressure 1050 Pa)	Class A5 (2000 Pa)	2000

Table 3 Indicative weathertightness classifications (continued)

	Classification according to:			
	Air permeability according to BS EN 12207 : 2000	Watertightness according to BS EN 12208 : 2000	Resistance to wind load according to BS EN 12210 : 2000	Overall UK exposure to BS 6375-1 : 2015
Tilt and turn Multilight units tilt and turn opening light next to fixed next to tilt and turn opening light ⁽¹⁾ (1800 wide x 1500 high), mullion LSF 1002 ⁽²⁾ (1500 mm long)	Class 4 (max test pressure 600 Pa)	Class 6A (max test pressure 250 Pa)	Class 4 (1600 Pa)	1600
Tilt and turn Multilight units tilt and turn opening light next to fixed next to tilt and turn opening light (1800 wide x 1500 high), mullion LSF 1002 ⁽³⁾ (1500 mm long)	Class 4 (max test pressure 600 Pa)	Class 1050 (max test pressure 1050 Pa)	Class 4 (1600 Pa)	1600
Tilt and turn Individual opening lights ⁽¹⁾	Class 4 (max test pressure 600 Pa)	Class 9A (max test pressure 600 Pa)	Class 5 (2000 Pa)	2000

(1) Outer frame and sash unreinforced.

(2) Mullion unreinforced.

(3) Mullion reinforced with EWS 7621S.

(4) Outer frame unreinforced.

8 Ventilation



8.1 The opening area for natural ventilation may be calculated by multiplying together the overall width and height dimensions of the frame containing the opening lights reduced by the relevant profile dimensions. For opening lights abutting a mullion or transom, the overall width or height of that element will be given as the dimension from the edge of the outer frame to the centre line of the mullion or transom or, where relevant, between centres of the mullion or transom.

8.2 The background ventilation requirements of the various national Building Regulations can be met by the incorporation in the window of a suitably-sized trickle ventilator⁽¹⁾.

(1) Outside the scope of this Certificate.

9 Unauthorised access



9.1 Windows according to Enhanced Security Sheet (ES5) for Product Sheet 5 have been tested in accordance with PAS 24 : 2012, Annex C, and can contribute to preventing unauthorised access to dwellings and similar habitable applications.

9.2 The opening lights are fitted with lock mechanisms as described in sections 1.13 to 1.15 of this Certificate. When fastened in the closed position, the opening light cannot be opened by manipulation from the outside (for example, by the insertion of a thin blade). Key-operated handles are required for certain windows to meet the security requirements of *NHBC Standards 2016 Chapter 6.7 Doors, windows and glazing*. Glass packing must be carried out according to the manufacturer's recommendations to prevent forced entry by the flexing of frame members allowing disengagement of the lock mechanism.

9.3 Removal of internally-fitted glazing beads from the outside is extremely difficult.

10 Glass area



The approximate unobstructed glass area of the windows is determined by deducting from the overall width and height the appropriate profile dimensions. For example, a fixed light requires twice the outer frame dimension to be deducted from the overall width and overall height.

11 Unobstructed opening area



11.1 A window can provide an adequate means of escape from a dwelling when it incorporates an opening light that:

- is in a room with a floor not more than 4.5 m above ground level
- is positioned so that the bottom of the opening is no more than 1.1 m above the floor
- provides a clear opening area of at least 0.33 m² and not less than 450 mm high by 450 mm wide, which may be at an angle or straight through. The obstruction caused by opening lights hung on projecting friction stays must be taken into account when the clear opening is determined.

11.2 In addition:

England and Wales — windows must remain open without needing to be held

Scotland — locks may be used but must not cause a permanent obstruction to satisfy clause 2.9.4⁽¹⁾ as escape windows

(1) Technical Booklet (Domestic).

Northern Ireland — the window must be positioned not less than 800 mm above the floor.

12 Condensation risk



12.1 In normal domestic or similar applications, PVC-U windows will not constitute a significant condensation risk when correctly installed.

12.2 Guidance on some satisfactory design details are given in *Limiting thermal bridging and air leakage : Robust construction details for dwellings and similar building*, TSO 2002 and the *Accredited Construction Details*. Further information is contained in BRE Report BR 262 : 2002.

13 Safety



13.1 For tilt and turn opening lights, the external face of the window can be cleaned from inside the building as windows open in. Outward opening windows fitted with suitable hinges may be able to be cleaned safely.

13.2 For windows not covered by section 13.1 of this Certificate, reasonable provision shall be made for safe means of access to clean both faces of the window. For ways of complying with the requirements of the national Building Regulations see:

England — Approved Document K5.4 (requirement does not apply to dwellings)

Wales — Approved Document N4 (requirement does not apply to dwellings)

Scotland — Standard 4.8(c), clauses 4.8.3⁽¹⁾⁽²⁾ and 4.8.4⁽¹⁾⁽²⁾

(1) Technical Handbook (Domestic).

(2) Technical Handbook (Non-Domestic).

Northern Ireland — Technical Booklet V, Section 5.

13.3 The windows can comply with the recommendations of BS 8213-1 : 2004 with regard to the positioning of hand-operated controls.



13.4 When fitted with a restrictor, movement of the opening light can be effectively limited to give an opening of not more than 100 mm, as recommended for child safety in BS 8213-1 : 204.

13.5 Under certain circumstances, account must be taken of the recommendations given in BS 6262-4 : 2005⁽¹⁾, which includes the use of safety glass complying with BS EN 12600 : 2002.

(1) Dealing with the safety of people upon impact with the glazing.

13.6 Reasonable provision shall be made to minimise the risk of people colliding with an open window when moving in or about a building. For ways of complying with the requirements of the national Building Regulations see:

England — Approved Document K5.1 (for buildings other than dwellings)

Wales — Approved Document N1 (for buildings other than dwellings)

Scotland — Standard 4.8(a), clause 4.8.1⁽¹⁾⁽²⁾

(1) Technical Handbook (Domestic).

(2) Technical Handbook (Non-Domestic).

Northern Ireland — Technical Booklet H, Section 8. The requirements of Regulation 60 shall only apply to a window installed in a dwelling which opens over a public route of travel.

13.7 Transparent glazing, of which people may be unaware and with which they are likely to collide, shall incorporate features which make it apparent. For ways of complying with the requirements of the Building Regulations see:

England — Approved Document K5.2 (for buildings other than dwellings)

Wales — Approved Document N2 (for buildings other than dwellings)

Scotland — Standard 4.8(b), clause 4.8.2⁽¹⁾⁽²⁾

(1) Technical Handbook (Domestic).

(2) Technical Handbook (Non-Domestic).

Northern Ireland — Technical Booklet V, Section 3.

13.8 Approved Document K4 to the Building Regulations (England), Approved Document N1 to the Building Regulations (Wales), *NHBC Standards* 2016, Chapter 6.7.7, and BS 6262-4 : 2005⁽¹⁾ make recommendations to ensure the safe performance of glazing. These include the use of safety glass complying with BS EN 12600 : 2002 in locations where accidental collision is likely. The windows can be supplied with toughened or laminated glazing units, but the performance of the glazing units is outside the scope of this Certificate.

(1) Dealing with the safety of people upon impact with the glazing.

13.9 When selecting means of access during the period of installation (for example use of scaffolding), the safety of the operatives, occupants and passers-by should be considered.

14 Ease of operation

The windows can be operated without difficulty when correctly installed.

15 Maintenance



15.1 The windows can be re-glazed, and the gaskets and weatherstripping replaced. The use of conventional gaskets and weatherstripping with the Modus systems is possible, but specific details are outside the scope of this Certificate.

15.2 If a co-extruded glazing bead is fitted and the gasket is damaged, for example during re-glazing, it may be necessary to replace the complete bead. These operations should be carried out by specialist operatives using materials recommended by the Certificate holder and approved by the BBA.

15.3 If damage occurs, the furniture and fittings can be replaced.

15.4 The friction hinges, tilt and turn gear and locking mechanism should be cleaned and lubricated periodically to minimise wear and to ensure smooth operation. Care should be taken to avoid applying lubricant to the sliders as this will impair their braking action. If necessary, the resistance of the sliders can be adjusted using the brass screw or die-cast, slot-headed cam provided in each slider.

15.5 The seal to the building structure will need to be replaced within the life of the window.

15.6 The PVC-U frame members can be cleaned using a soft sponge and soapy water. Solvent-based, corrosive or abrasive cleaners must not be used, particularly on woodgrain finishes as the loss of the acrylic lacquer will have a serious effect on durability. If dirt is allowed to build up on the members over long periods it may become more difficult to restore the surface appearance.

15.7 Care should be taken when using proprietary materials for cleaning the glass, to ensure that deposits are not allowed to remain on the PVC-U where they may cause discoloration and damage to the surface. In addition, care must be taken to avoid damage to, or discoloration of, the members when stripping paint from adjacent timber (for example, by means of a blowlamp or paint stripper).

15.8 Repair of the laminated foil is outside the scope of this Certificate.

16 Durability



16.1 The PVC-U extruded profiles will continue to function satisfactorily for a period in excess of 35 years.

16.2 The co-extruded glazing beads, gaskets and fittings, including the hinges, locking mechanism and operating handles, as described in this Certificate, may need to be replaced within the life of the window, particularly when exposed to aggressive environments, such as coastal or industrial locations.

16.3 Any slight colour change or surface dulling that might occur will be uniform over the visible surfaces of the windows for the white and woodgrain finishes, assuming in the latter case that the acrylic lacquer is undamaged.

16.4 Paint can adversely affect the impact strength of the PVC-U frame members and the application of dark colours to white profiles could lead to a risk of thermal distortion. Therefore paint should not be applied.

17 Reuse and recyclability

The PVC-U profiles of the systems can be recycled.

Installation

18 General

18.1 The window must be fixed into the opening, in accordance with BS 8213-4 : 2016, using proprietary expanding anchors through the frame or galvanized steel fixing lugs.

18.2 Openings in new walls should be formed using a suitable template, 10 mm wider and higher than the window to be installed. The window should not be built-in at the construction stage.

18.3 In common with other types of window fitted to prepared openings, the systems must be correctly positioned in relation to damp-proof courses to prevent water penetration to the internal reveal.

18.4 The provision of a cavity closer and/or cavity barrier around the window opening, prior to the installation, may be required. Details of products covered by an Agrément Certificate can be found on the BBA website (www.bbacerts.co.uk).

Technical Investigations

19 Tests

Tests were carried out and the results assessed to determine:

- air permeability
- watertightness
- effect of wind loads
- efficiency of window fittings
- resistance to mechanical loading
- ease of operation.

19.2 Tests were carried out generally in accordance with BS 7412 : 2007 on windows and BS EN 12608 : 2003 on the PVC-U extrusions.

19.3 BBA-approved hardware has been tested to BS EN 1670 : 2007 for resistance to salt spray corrosion.

20 Investigations

20.1 The thermal transmittance values of outward opening and tilt and turn windows were calculated in accordance with BS EN ISO 10077-1 : 2006 and BS EN ISO 10077-2 : 2012.

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

Bibliography

- BS 6262-1 : 2005 *Glazing for buildings — General methodology for the selection of glazing*
- BS 6262-4 : 2005 *Glazing for buildings — Code of practice for safety related to human impact*
- BS 6375-1 : 2015 *Performance of windows and doors — Classification for weathertightness and guidance on selection and specification*
- BS 7412 : 2007 *Specification for windows and doorsets made from unplasticized polyvinyl chloride (PVC-U) extruded hollow profiles*
- BS 8213-1 : 2004 *Windows, doors and rooflights — Design for safety in use and during cleaning of windows, including door-height windows and roof windows — Code of practice*
- BS 8213-4 : 2016 *Windows and doors — Code of practice for the survey and installation of windows and external doorsets*
- BS EN 1026 : 2000 *Windows and doors — Air permeability — Test method*
- BS EN 1027 : 2000 *Windows and doors — Watertightness — Test method*
- BS EN 1279-2 : 2002 *Glass in building — Insulating glass units — Long term test method and requirements for moisture penetration*
- BS EN 1279-3 : 2002 *Glass in building — Insulating glass units — Long term test method and requirements for gas leakage rate and for gas concentration tolerances*
- BS EN 1670 : 2007 *Building hardware — Corrosion resistance — Requirements and test methods*
- BS EN 10088-2 : 2005 *Stainless steels — Technical delivery conditions for sheet/plate and strip of corrosion resisting steels for general purposes*
- BS EN 10346 : 2009 *Continuously hot-dip coated steel flat products — Technical delivery conditions*
- BS EN 12207 : 2000 *Windows and doors — Air permeability — Classification*
- BS EN 12208 : 2000 *Windows and doors — Watertightness — Classification*
- BS EN 12210 : 2000 *Windows and doors — Resistance to wind load — Classification*
- BS EN 12211 : 2000 *Windows and doors — Resistance to wind load — Test method*
- BS EN 12600 : 2002 *Glass in building — Pendulum test — Impact test method and classification for flat glass*
- BS EN 12608 : 2003 *Unplasticized polyvinylchloride (PVC-U) profiles for the fabrication of windows and doors — Classification, requirements and test methods*
- BS EN 14351-1 : 2006 *Windows and doors — Product standard, performance characteristics — Windows and external pedestrian doorsets without resistance to fire and/or smoke leakage characteristics*
- BS EN ISO 9001 : 2008 *Quality management systems — Requirements*
- BS EN ISO 10077-1 : 2006 *Thermal performance of windows, doors and shutters — Calculation of thermal transmittance — General*
- BS EN ISO 10077-2 : 2012 *Thermal performance of windows, doors and shutters — Calculation of thermal transmittance — Numerical method for frames*
- BS EN ISO 12567-1 : 2010 *Thermal performance of windows and doors — Determination of thermal transmittance by the hot box method — Complete windows and doors*
- BS EN ISO 14001 : 2004 *Environmental management systems — Requirements with guidance for use*
- BRE Report (BR 262 : 2002) *Thermal insulation : avoiding risks*
- PAS 24 : 2012 *Enhanced security performance requirements for doorsets and windows in the UK — External doorsets and windows intended to offer a level of security suitable for dwellings and other buildings exposed to comparable risk*

21 Conditions

21.1 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 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.

21.2 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.

21.3 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.

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

21.5 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.

21.6 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.