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Agrément Certificate

00/3665

Product Sheet 1

ANGLIAN PVC-U CONSERVATORY SYSTEMS

ANGLIAN WHITE KNIGHT PVC-U CONSERVATORY SYSTEMS

This Agrément Certificate Product Sheet⁽¹⁾ relates to the Anglian White Knight PVC-U Conservatory Systems for ground level conservatories with a maximum floor area of 30 m², in new or existing dwellings.

(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 systems have adequate strength to resist wind and snow loads calculated in accordance with the relevant Eurocodes (see section 6).

Weathertightness — the systems will resist the passage of rain and snow and can be used in the exposure situations described in this Certificate (see section 7).

Ventilation and solar heat gain — the ridge beam incorporates a permanent vent, and opening lights can provide rapid ventilation (see section 8).

Thermal insulation — the systems can adequately limit excessive heat loss (see section 9).

Condensation — the risk is generally moderate, but is high on the ring beam (see section 10).

Durability — the systems are estimated to have a service life of at least 25 years depending on the installation environment. Some components may need replacing within the overall life of the systems (see section 15).

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

Date of First issue: 22 June 2021

Originally certificated on 29 March 2000

Hardy Giesler
Chief Executive Officer

The BBA is a UKAS accredited certification body – Number 113.

The schedule of the current scope of accreditation for product certification is available in pdf format via the UKAS link on the BBA website at www.bbacerts.co.uk

Readers MUST check the validity and latest issue number of this Agrément Certificate by either referring to the BBA website or contacting the BBA directly.

Any photographs are for illustrative purposes only, do not constitute advice and should not be relied upon.

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Regulations

In the opinion of the BBA, the Anglian White Knight PVC-U Conservatory 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)

In the opinion of the BBA, the Anglian White Knight PVC-U Conservatory Systems, if installed, used and maintained in accordance with the provisions of this Certificate, are not subject to these Regulations. Users should however refer to the detailed criteria in Regulations 9 and 21 and Schedule 2, Class 7.



The Building (Scotland) Regulations 2004 (as amended)

In the opinion of the BBA, the Anglian White Knight PVC-U Conservatory 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. Conservatories with a floor area not exceeding 8 m² and meeting the relevant exemption criteria, are not subject to these Regulations.

Regulation:	8(1)(2)	Durability, workmanship and fitness of materials
Comment:		The use of the systems satisfies the requirement of this Regulation. See sections 14 and 15 and the <i>Installation</i> part of this Certificate.
Regulation:	9	Building standards applicable to construction
Standard:	1.1	Structure
Comment:		The systems can contribute to satisfying this Standard, with reference to clauses 1.1.1 ⁽¹⁾ and 1.1.3 ⁽¹⁾ . See section 6 of this Certificate.
Standard:	2.5	Internal lining
Comment:		The systems can contribute to satisfying this Standard, with reference to clauses 2.5.1 ⁽¹⁾ , 2.5.2 ⁽¹⁾ and 2.5.3 ⁽¹⁾ . See section 12 of this Certificate.
Standard:	2.8	Spread from neighbouring buildings
Comment:		The systems can contribute to satisfying this Standard, with reference to clause 2.8.1 ⁽¹⁾ and Annex 2D ⁽¹⁾ . See section 12 of this Certificate.
Standard:	3.6(a)	Surface water drainage
Comment:		The systems can contribute to satisfying this Standard, with reference to clause 3.6.1 ⁽¹⁾ . See section 7 of this Certificate.
Standard:	3.10	Precipitation
Comment:		The systems can contribute to satisfying this Standard, with reference to clause 3.10.1 ⁽¹⁾ . See section 7 of this Certificate.
Standard:	3.14	Ventilation
Comment:		The systems can contribute to satisfying this Standard, with reference to clause 3.14.1 ⁽¹⁾ . See section 8.2 of this Certificate.
Standard:	3.15	Condensation
Comment:		The systems can contribute to satisfying this Standard, with reference to clauses 3.15.1 ⁽¹⁾ , 3.15.4 ⁽¹⁾ and 3.15.5 ⁽¹⁾ . See sections 10.1 and 10.2 of this Certificate.
Standard:	6.2	Building insulation envelope
Comment:		The systems can contribute to satisfying this Standard, with reference to clause 6.2.12 ⁽¹⁾ . See section 9 of this Certificate.

Standard: 7.1(a)(b) **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⁾ [Aspects 1⁽¹⁾ and 2⁽¹⁾], 7.1.6⁽¹⁾ [Aspects 1⁽¹⁾ and 2⁽¹⁾] and 7.1.7⁽¹⁾ [Aspect 1⁽¹⁾]. See section 9 of this Certificate.

Regulation: 12 **Building standards applicable to conversions**
Comment: All comments given for the systems under Regulation 9, Standards 1 to 6, also apply to this Regulation, with reference to clause 0.12.1⁽¹⁾ and Schedule 6⁽¹⁾.

(1) Technical Handbook (Domestic).



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

A conservatory constructed as an annex to an existing building, with a floor area not exceeding 30 m² and not less than one metre from any boundary, is exempt from these Regulations provided that the conditions described in A5 Exemptions are met.

Construction (Design and Management) Regulations 2015

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

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


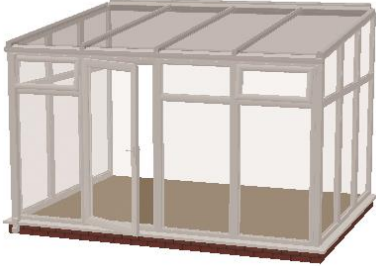

See section: 3 *Delivery and site handling* (3.4 and 3.5) of this Certificate.

Technical Specification

1 Description

1.1 The Anglian White Knight PVC-U Conservatory Systems consist of white PVC-U wall frames and aluminium roof with PVC-U internal and external cladding, in the configurations shown in Table 1.

Table 1 Access categories

Conservatory Configuration	Description
	<p>Victorian style</p> <p>A 'faceted' style end with 3 or 5 facets available, with a bow with roof pitches between 15 and 40°, and tunnel wall and bow frames.</p>
	<p>Lean-to style (Garden Room)</p> <p>A mono pitched design, with a roof pitch available between 5 and 30°, front wall frames and gable ends.</p>
	<p>Composite style</p> <p>A combination of Victorian and Lean-to styles used to form shapes on plan such as P, T or B, including pitched roof configurations with hips and valleys.</p>

1.2 The full specifications and drawings for the materials and components covered by this Certificate have been examined and are retained by the BBA. This section gives only general details of the systems. Further information about the components of the system can be provided by the Certificate holder.

Roof components

1.3 The roof systems consist of a number of components, including beams, bars and brackets. The structural sections are manufactured from aluminium to BS EN 755-9 : 2016, designation 6063-T6. These are glazed with double-glazed sealed units. An aluminium eaves beam or ring beam is attached to the supporting side wall structure with corner joints fixed with aluminium cleats and zinc-plated screws.

1.4 Other components associated with the beams, bars and brackets include:

- ridge beam member
- glazing bar sections (light and heavy duty steel, reinforced or unreinforced)
- eaves ring beam (light and heavy duty)
- gable beam (steel, reinforced or unreinforced)
- hip and valley beam
- starter bars (light and heavy duty)
- wall plates
- die cast radius end
- corner joint cleats
- TPE co-extruded gaskets
- SpeedLok connection system
- tie bars.

Figure 1 Beams and bars

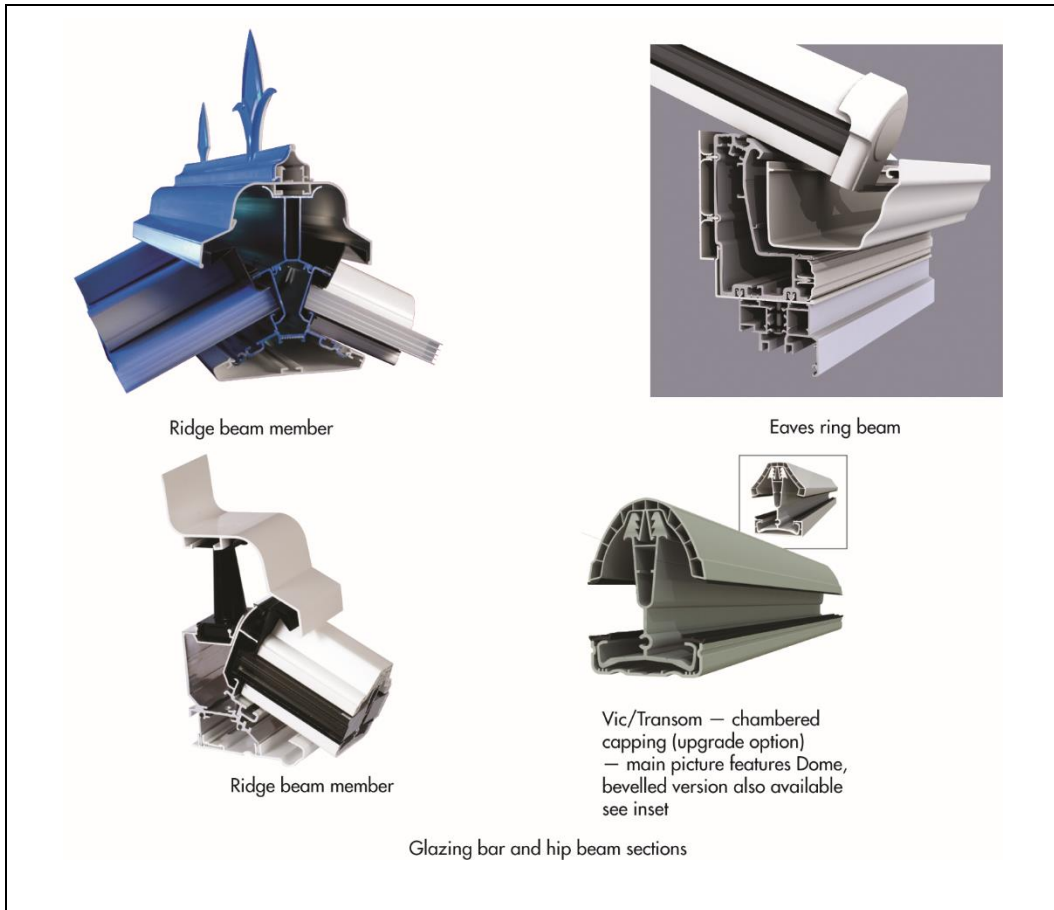


Figure 2 Connections and fixings



Glazing components

- 24 mm thick (4-16-4) double-glazed sealed units.

Ancillary items

- gutters and brackets
- PVC-U trim and cladding, manufactured from material to BS EN 12608-1 : 2016
- capping and endcaps

- flashing
- gaskets
- sealant.

1.5 Not all components will be required for each conservatory style. The combination of components will vary depending on the configuration required.

1.6 Transom glazing bars, with PVC-U internal cladding and TPE co-extruded gaskets, are attached to the eaves beam and ridge beam member with zinc-plated steel bolts (captive in slots in the ridge and eaves beam aluminium extrusions). Hip bars are clamped onto the die-cast ridge end with SpeedLok fixings. Starter glazing bars are attached to the ridge and eaves beams in the same manner as the transom glazing bars. The starter glazing bars are fixed directly to the existing building wall using appropriate fixings.

1.7 Glazing panels or units are supported by the glazing bars and located into the ridge assembly through a PVC-U rain baffle and a co-extruded gasket, to provide a seal against ingress of moisture. External PVC-U caps with TPE co-extruded gaskets snap into position on the glazing bars and hold down the roof panels or units, forming a seal between the internal and external gaskets.

1.8 To prevent the ingress of moisture, a closed-cell bung is positioned at the ridge end at the intersection of the hip bars and a silicone seal is applied to the joints.

1.9 An external PVC-U ridge cap with integral ridge flashing trim is positioned on top of the ridge body and clamped in position from the inside with nylon fixing rods. The internal face of the ridge beam is clad with PVC-U cladding.

1.10 A PVC-U gutter system is attached on site to the aluminium eaves beam around the full perimeter of the roof via push-fit integral brackets. The underside of the eaves beam is finished off with a PVC-U trim. The internal face of the eaves beam is clad with an internal PVC-U cladding.

Gable support system

1.11 The gable support system (see Figure 3) is suitable for a lean-to style conservatory and comprises a steel-reinforced aluminium extruded lintel. The lintel is installed across either end of the conservatory to give increased structural stability and integrity, particularly in designs where double doors are featured in the same elevation.

Figure 3 Gable support system

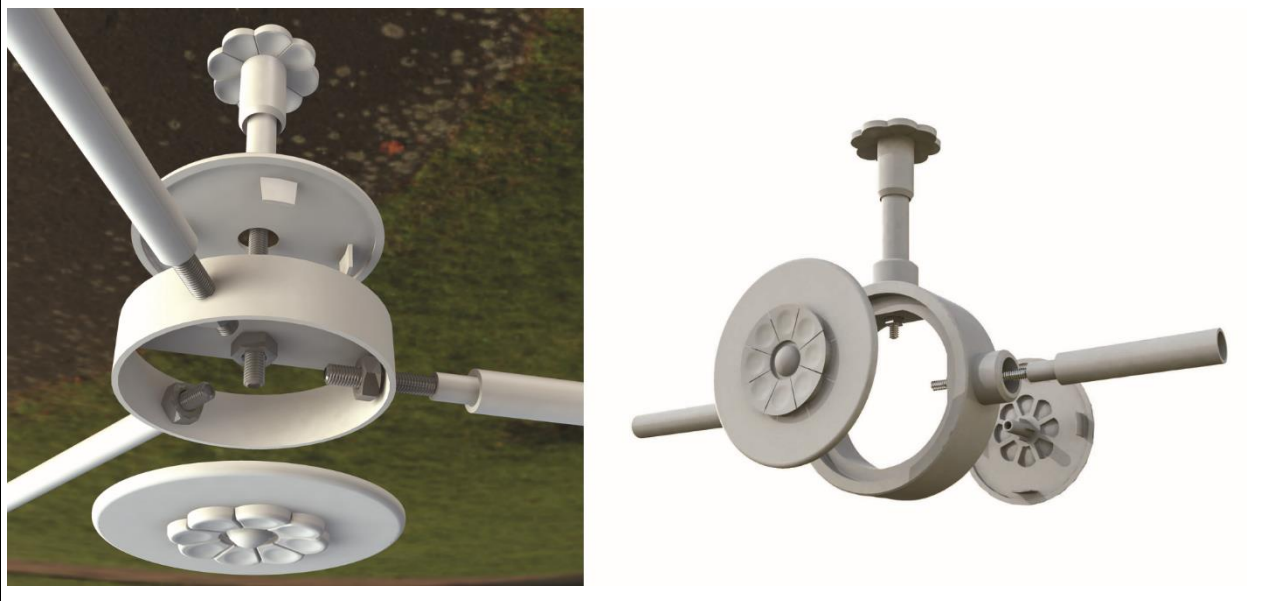


1.12 The gable support beam is for 10 to 30° lean-to roof pitches. It is supplied with infill wedges, PVC-U cladding, PVC-U guttering and aluminium corner cleats to connect the gable beam to the eaves beam.

Tie bars

1.13 Tie bars (see Figure 4) are necessary on some sizes and shapes of conservatory roof and consist of steel threaded rods, 10 mm diameter, which connect via brackets to the transom bars, or the ridge at one end and to a cast steel collar at the other. The components of the tie bar assembly are trimmed with PVC-U or are powder-coated to match the colour of the other conservatory components.

Figure 4 Tie bar

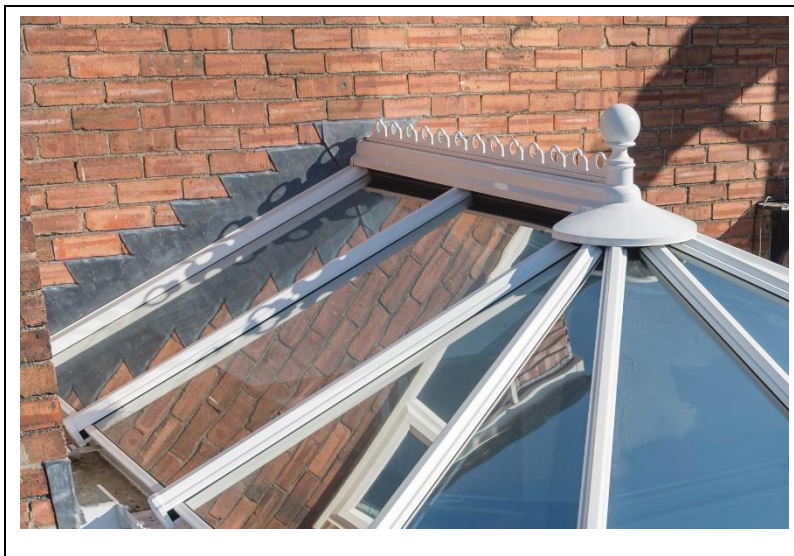


All systems

1.14 A manually or motorised opening PVC-U roof vent designed to match the glazing bar sections is available if required.

1.15 The conservatory system has traditional lead flashings with milled lead to comply to BS EN 12588 : 2006, as shown in Figure 5.

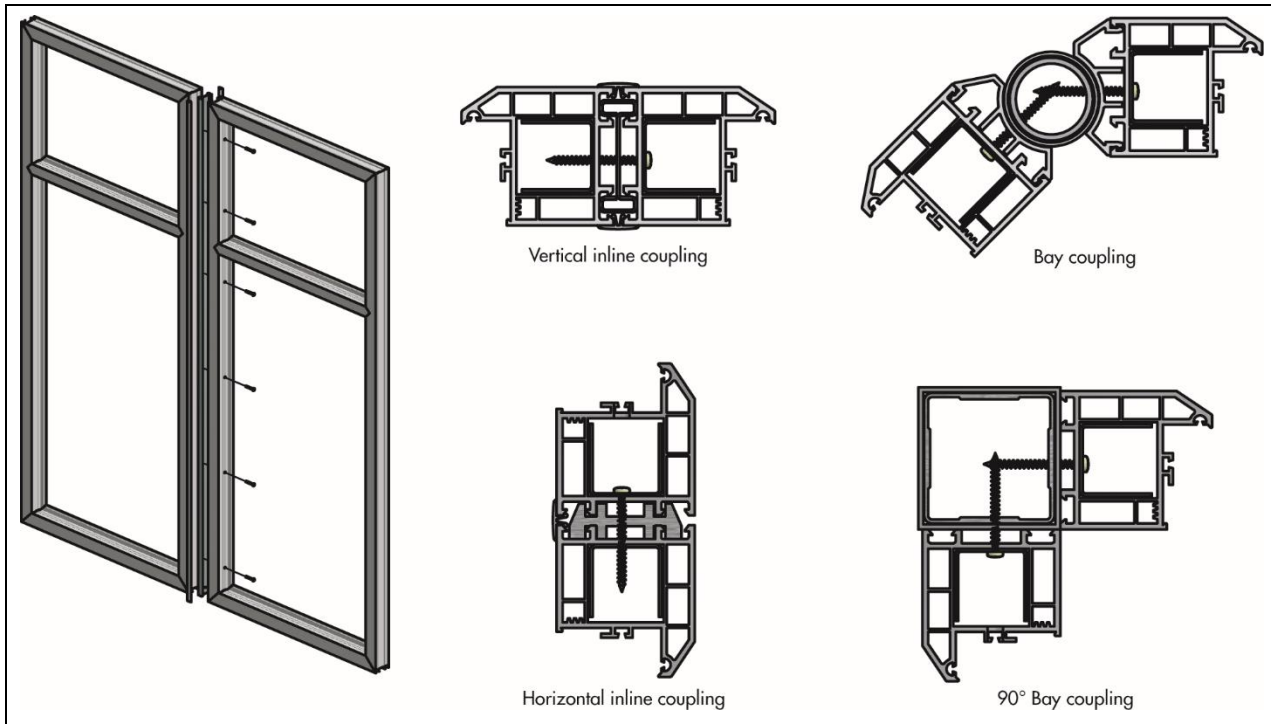
Figure 5 Flashing system



Wall Frames

1.16 Wall frames (see Figure 6) are fabricated from white unplasticized polyvinyl chloride (PVC-U) profiles, produced by conventional extrusion techniques from material complying with Case B (PVC-U with additional polymers), as defined in BS EN 12608 -1: 2016. The profiles, methods of fabrication, welding of joints and reinforcing are generally as described in BBA Certificate No 93/2906, Product Sheet 1, White Knight tilt and turn and outward opening window systems. Further information can be provided by the Certificate holder.

Figure 6 Typical wall frame



1.17 Wall frames comprise fixed and opening lights internally glazed with sealed double-glazed units or infill panels, with PVC-U skins and a polystyrene foam and plywood core, in different sizes and configurations. Further details can be provided by the Certificate holder.

1.18 Coupling mullions, corner posts, and bay poles are used when required. The components are steel sections manufactured to BS EN 10346: 2015 of grade and coating designation DX51D+Z350NA-C or manufactured from aluminium alloy to BS EN 12020-2:2016 of grade 6063 – T6.

1.19 Single or double opening residential doors and patio doors (as per BBA Certificate 94/3000, Product Sheets 1 and 2) in white PVC-U can be included in the wall frames.

1.20 A masonry base wall of cavity construction can be incorporated in the conservatory. Further details can be provided by the Certificate holder.

2 Manufacture

2.1 The roof and wall conservatory systems incorporate components made from a wide range of materials and manufacturing processes, and many bought-in components. Conventional manufacturing processes such as extrusion (both of PVC-U and aluminium sections), injection moulding and die casting are utilised as well as cutting, drilling and fabrication.

2.2 Quality control includes checks on all materials and components, in particular: extruded PVC-U profiles, fabrication of roof and wall systems, extrusions and components (visual inspection) and overall dimensions.

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 Anglian Windows Ltd has been assessed and registered as meeting the requirements of BS EN ISO 9001 : 2015 by British Standards Institution (Certificate FM11180).

3 Delivery and site handling

3.1 Conservatory wall and roof components are fabricated by Anglian Windows Ltd. Components are marked and numbered to assist assembly. All components are suitably protected and delivered to site by the Certificate holder.

3.2 The conservatory systems package has a label bearing the Certificate holder's mark and the BBA logo incorporating the number of this Certificate.

3.3 The roof and wall components of the conservatory systems should be stored under cover in a clean area and suitably protected to avoid distortion or damage.

3.4 The weight of glazing can be calculated, where required for manual handling operations, by reference to the information contained in BS 952-1 : 1995. The weight of the unglazed frame, and its ease of handling, particularly by one person, must also be taken into account when planning site operations.

3.5 When selecting means of access during the period of installation (eg use of scaffolding), the safety of the operatives, occupants and persons in or about the house should be considered.

Assessment and Technical Investigations

The following is a summary of the assessment and technical investigations carried out on the Anglian White Knight PVC-U Conservatory Systems.

Design Considerations

4 Use

The Anglian White Knight PVC-U Conservatory Systems are satisfactory for use as conservatories installed as extensions to new or existing dwellings that are thermally separate.

5 Practicability of installation

The systems are designed to be installed by Anglian Windows Limited.

6 Strength and stability



6.1 The walls are designed in accordance with the relevant Eurocodes and known material (PVC-U) properties in accordance with BS EN 12608-1 : 2016 by the Certificate holder to resist design loads from the roof and wind action in service and ultimate limit states. The roof systems are designed in accordance with the relevant Eurocodes using bespoke design software. This determines the loading on the members and connections, the resultant forces in the members and specifies the components that ensure adequate resistance is provided to the worst case of service and ultimate loads.

6.2 Site-specific information must be provided to enable such calculations to be performed including:

- style, roof pitch, glazing type and dimensions of the conservatory
- the location, altitude and height of the conservatory to establish wind and snow loading
- the orientation of the conservatory
- anchors specified (as designated by the designers) to secure the profiles to the host wall.

6.3 The wind and snow loading, including snow drift loads where appropriate, relevant to each site is established in accordance with BS EN 1991-1-3 : 2003 and BS EN 1991-1-4 : 2004 and the respective national annexes.

6.4 The load from the self-weight of the components is calculated in accordance with BS EN 1999-1-1 : 2007 and its National Annex, with an allowance for roof access established from Table NA7 of the National Annex to BS EN 1991-1-1 : 2002. Load combinations are determined in accordance with BS EN 1990 : 2002 and its National Annex, and the worst case is used to verify the adequacy of the systems.

6.5 The structural resistance properties of the components of the systems are determined in accordance with BS EN 1990 : 2002. In addition to the normal design checks ie bending, shear, axial load combined stresses, flexural buckling, lateral buckling and combined stresses, the deflections of the members are limited under worst case loading to span/175 for glazed systems.

6.6 The BBA have analysed the output from a range of typical structural designs and confirmed that the assumptions made by the software are appropriate, the section properties are accurately determined to BS EN 1999-1-1 : 2007 and that an adequate range of loading cases together with relevant load and material factors are computed (see section 6.3 of this Certificate).

6.7 In addition, structural testing has been used to confirm adequacy of the connections between structural members and tie bar systems. Full-scale tests were carried out to justify the predicted performance based on the Certificate holder's design methodology. The conservatories will have adequate resistance to wind loads in areas where the design wind pressure is up to 900 Pa.

6.8 The design software creates nodes at each connection point with the supporting structure, and assigns fixity to such nodes in accordance with normal design practice. Connections between structural components of the roof system are generally assumed to be pinned at each end and restrained in position in the other two planes. Fixings to the wall and support frame are assumed to have partial fixity. Failure to comply with the design assumptions with respect to fixity will cause increased deflections and possible distortion of the roof. It is therefore essential that a suitably qualified and experienced person establishes the suitability of the supporting wall fixings and that appropriate fixities are used in the design.

6.9 Wall and door frames must provide conservatory systems with overall lateral stability and resistance to axial loading. They have been tested for racking resistance based on the BBA test specifications and their design racking resistance is 0.68 kN.m⁻¹.

6.10 All supporting side frames incorporating window profile material, ie PVC, timber or aluminium, should be designed in accordance with the relevant British Standards for imposed loadings.

6.11 Foundations must be designed in accordance with BS 8004 : 2015 and NHBC Standards, Chapter 4 *Foundations* where applicable.

7 Weathertightness



7.1 Selected samples from the Anglian White Knight Conservatory Systems' configurations covered by this Certificate were tested for weathertightness. There are no Standards or guides applicable to conservatory roofs. Therefore, for the assessment, use was made of BS 6375-1 : 2015 and MOAT No 1 : 1974 for the conservatory roof, giving the results shown in Table 2 of this Certificate, below. Regarding the wall frames, the weathertightness classification based on the test along with 35 mm deflection due to racking load, was given in accordance with BS 6375-1 : 2015, BS EN 14351-1 : 2006 and BS EN 12208 : 2000 and the results are shown in Table 3. Further information on the gradings can be provided by the Certificate holder.

Table 2 Weathertightness of the roof ⁽¹⁾

	BS 6375-1 : 2015 Test pressure class (Pa)	MOAT No 1 : 1974 Grading ⁽²⁾
Watertightness	300	E ₃

(1) A value for air permeability is not given as it will vary depending on the nature of the supporting wall structure.

(2) E₃ indicates water leakage occurring between 300 Pa and <500 Pa.

Table 3 Weathertightness of the wall frames with racking

	BS 6375-1 : 2015 Test pressure class (Pa)	BS EN 14351-1 : 2006 and BS EN 12208 : 2000 Test pressure class (Pa)
Watertightness	AE1050	AE1050

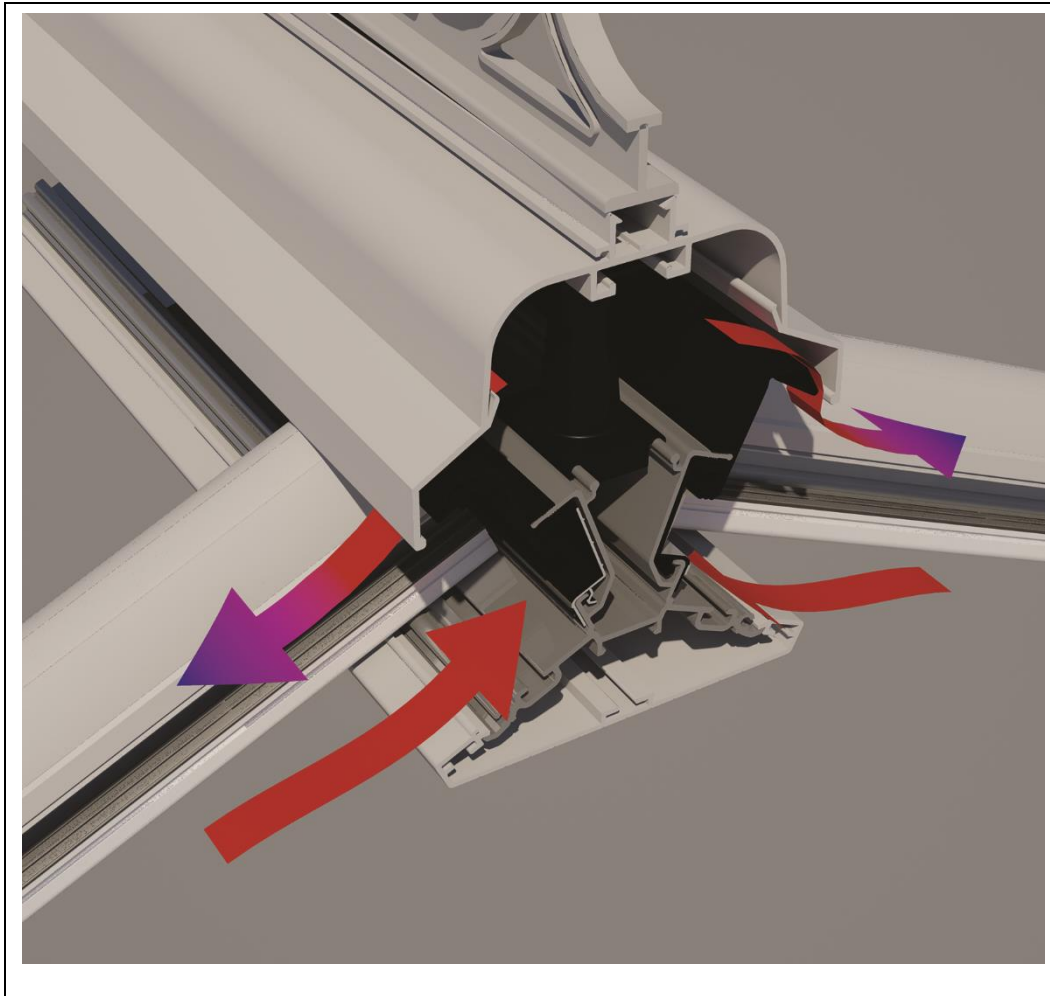
7.2 To achieve the gradings given in Tables 2 and 3, particular attention must be paid to the correct fitting of all gaskets and weatherseals, and to the detailing of sealants and flashings.

7.3 The ridge and eaves trickle ventilators will help to equalise the internal and external air pressures.

8 Ventilation and solar heat gain

8.1 Trickle ventilation is provided through the ventilated ridge (see Figure 7) and ventilated eaves (when fitted). Additional background ventilation can be provided through trickle ventilators in the head of the window and door units; however, this is outside the scope of this Certificate.

Figure 7 Ventilated ridge



8.2 Opening roof vents can be included where required to provide greater levels of ventilation.

8.3 Solar heat gain through the roof panels and wall frames may provide a useful additional heat input during winter conditions; however, summertime internal temperatures will also be raised. To limit the latter effect, the following design factors should be considered:

- orientation, with respect to south facing
- aspect ratio of the floor plan of the conservatory
- area of opening lights and doors in relation to floor area
- solar reflectance of glass used.

8.4 As an approximate guide, northerly facing conservatories should have opening lights or doors of not less than 15% of the floor area, rising to not less than 25% with roof blinds for those of a southerly aspect. This should limit the solar gain temperature rise to less than 12°C for most situations in summertime, using only natural ventilation. Where lower temperature rises are desired, consideration can be given to mechanical forced ventilation. More precise methods of design and solar data are given in CIBSE (Chartered Institution of Building Services Engineers) Guide A (2015), Section 4 and Appendix 5.A11.

8.5 To reduce the effects of solar heat gain on the internal temperature of the conservatory, blinds can be fitted, but their performance has not been assessed by the BBA.

9 Thermal insulation



9.1 The area-weighted average U-values for the glazed conservatory should be calculated in accordance with EN ISO 10077-1 : 2017, using:

- glazing U-values in Table 4;
- frame linear thermal transmittance values in the relevant column of Table 4;
- window and door U-values values in the relevant column of Table 4;

Table 4 Indicative U values of glazing ⁽¹⁾⁽²⁾

	Type	Emissivity of coating (ε)	U-value (W·m ⁻² ·K ⁻¹) in vertical plane	U-value (W·m ⁻² ·K ⁻¹) in horizontal plane
Windows/Doors	4 mm clear /16 mm Argon filled /4 mm clear	-	2.62	-
	4 mm clear /16 mm Argon filled /4 mm clear with ClimaGuard A+ (face 3)	0.05	1.20	-
Patio doors ⁽³⁾	4 mm clear /16 mm Argon filled /4 mm clear with ClimaGuard A+	0.05	1.50	
Roof	4 mm clear /16 mm Argon filled /4 mm with low emissivity coating	0.64	2.36	2.89

(1) The U values are indicative figures calculated for the glazing option as provided for this assessment. If other glazing options are required, the standards referenced above should be used accordingly.

(2) Values for glass glazing calculated in accordance with BS EN 673 : 2011 and BS EN ISO 10211 : 2017.

(3) The patio door's U-values is taken from BBA Certificate 94/3000, Product Sheet 2.

9.2 For conservatories subject to the building regulations in Scotland, individual glazed elements must not exceed a U-value of 3.3 W·m⁻²·K⁻¹ and the combined wall/roof area-weighted U-value must not exceed 1.8 W·m⁻²·K⁻¹.

9.3 The thermal transmittances for conservatory wall (window and door) and roof components have been calculated in accordance with EN ISO 10077-2 : 2017 and EN ISO 10077-1 : 2017, as appropriate, and are shown in Table 5, below.

Table 5 Thermal transmittance of Anglian conservatory components

Element	Component	Linear thermal transmittance ⁽¹⁾ , ($W \cdot m^{-1} \cdot K^{-1}$)	Thermal transmittance, U-value ($W \cdot m^{-2} \cdot K^{-1}$)
Roof ⁽⁶⁾	Wall plate	0.40	-
	Standard capping (glazing rafter)	0.24	-
	Ring beam (eaves)	0.40	-
	Ridge beam	1.07	-
	Rafter to wall	0.20	-
	Rafter to gable	0.17	-
Wall	Windows	-	2.4 ⁽²⁾⁽³⁾
	Doors (single)	-	2.4 ⁽²⁾⁽⁴⁾
	Doors (double)	-	2.4 ⁽²⁾⁽⁵⁾

(1) 24 mm glazing unit incorporating aluminium spacer bar.

(2) Glazing: 4 mm Guardian ExtraClear float glass, 16 mm Argon (90%), 4 mm Guardian ExtraClear float glass $U_g = 2.6 W \cdot m^{-2} \cdot K^{-1}$

(3) 70 mm PVC U tilt and turn window - fully reinforced with steel - DGS aluminium spacer - 24 mm glazing unit.

(4) 70 mm PVC U residential single door - fully reinforced with steel - DGS aluminium spacer - 24 mm glazing unit.

(5) 70 mm PVC U residential double door - fully reinforced with steel - DGS aluminium spacer - 24 mm glazing unit.

(6) Glazing specification: 4 mm clear / 16 mm Argon filled / 4 mm with low emissivity coating ($\epsilon = 0.64$).

10 Condensation



10.1 The risk of condensation forming on an internal surface of the glazed conservatory is dependent on:

- the external temperature
- the components' temperature factor
- the temperature and humidity of the adjacent air in the conservatory.

The risk will be minimal when the conservatory component's minimum temperature factor shown in Table 6 exceeds that shown in Table 7 for the relevant building occupancy type.

10.2 Modelling of the glazed conservatory components in accordance with BS EN ISO 10211 : 2017 indicates the minimum temperature factors in Table 6, below.

Table 6 Minimum temperature factors for frame components

Element	Component	Minimum temperature factor, f_{Rsi}
Roof ⁽¹⁾	Wall plate	0.40
	Standard capping	0.37
	Ridge Beam	0.41
	Rafter (starter bar) to wall	0.49
	Starter bar to gable conservatory wall	0.38
	Window coupling	0.46
	Eaves to conservatory wall	0.31
	Wall corner posts	0.37
	Bay pole	0.42
	Sill junction	0.46
	Wall jambs	0.45
Window ⁽²⁾⁽³⁾	Outer frame 8960	0.42
	Transom and Mullion, 8962 and 8963	0.43
	Opening Sash 8961	0.42
Single Door ⁽²⁾⁽³⁾	Midrail 8966	0.42
	Open-In threshold EXA/399 with opening ramps EX/381 door leaf 20064	0.40
	Outer frame 8960 with door leaf 20064	0.43
Double Door ⁽²⁾⁽³⁾	Meeting stile 8967 with 2 x door leaf 20065	0.42
	Outer frame 8960 with door leaf 20065	0.42
	Open-out threshold EXA/400 with door leaf 20065	0.42

(1) Glazing specification: 4 mm clear / 16 mm Argon filled / 4 mm with low emissivity coating ($\epsilon = 0.64$)

(2) Glazing bead: 20051

(3) Glazing specification: 4 mm clear / 16 mm Argon filled / 4 mm clear.

Table 7 Minimum temperature factors⁽¹⁾ to minimise the risk of surface condensation

Humidity class	Building type	Minimum temperature factor, f_{Rsi}
1	Storage areas	≤ 0.20
2	Office, shops	0.21-0.40
3	Dwellings with low occupancy	0.41-0.57
4	Dwellings with high occupancy, sports halls, kitchens, canteens, buildings heated with unflued gas heaters	0.58-0.71
5	Special buildings, eg laundry, brewery, swimming pools	≥ 0.72

(1) The ratio of temperature difference between the internal rooflight surface and the external environment, and the total temperature difference between internal and external environments.

10.3 Where the temperature factors given in Table 6 are less than those given in Table 7 for the relevant building type, there is a risk of surface condensation forming. However, limited intermittent condensation, appearing initially on the glazing immediately adjacent to the frames, or on the frames themselves, should not be detrimental to the conservatory roof. By way of comparison, minimum temperature factors for typical PVC-U windows are between 0.50 and 0.65.

10.4 In all cases, the risk of surface condensation can be reduced by limiting activities which produce large amounts of moisture and providing means for adequate ventilation; in particular air flow from trickle ventilators in the conservatory windows, when fitted (outside the scope of this Certificate), can alleviate localised surface condensation. In addition, background heating of the conservatory will help to maintain the internal surface temperatures above the dew-point temperature.

11 Security against intrusion

11.1 The opening lights, residential and patio doors are fitted with locking mechanisms. They provide reasonable security against unauthorised entry by the opportunist intruder.

11.2 All glazing beads for conservatory walls are either fitted internally to the wall frames or, where fitted externally, the glass unit is retained by adhesive glazing tape and therefore removal of the glazing from the outside is extremely difficult.

11.3 Glazing sheets for conservatory roofs are retained by glazing bar top cappings. Removal of glazing bar top cappings is extremely difficult without use of a special tool.

11.4 It is recommended that a conservatory forming an extension to an existing dwelling should retain a lockable exterior type door to the main building.

12 Behaviour in relation to fire



Thermally toughened safety glass can be classified as A1 in accordance with BS EN 13501-1 : 2018.

13 Safety

13.1 Where a glass roof and wall is specified, either sealed double-glazed units incorporating toughened safety glass Kitemarked to BS 6206 : 1981, or laminated glass, is used.

13.2 Under certain circumstances, account must be taken of the recommendations given in BS 6262-4 : 2018⁽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.

13.3 The design of the glazing system is such that removal of the glazing from the outside is extremely difficult as all beads are fitted internally.

13.4 The positioning of hand-operated controls for the opening windows and roof vent should comply with the recommendations of BS 8213-1 : 2004.

14 Maintenance



14.1 The conservatory roof and wall frames can be re-glazed and the gaskets replaced, but these operations should be carried out by specialist operatives, using the materials recommended by the Certificate holder and approved by the BBA.

14.2 If damage occurs, the furniture and fittings can be readily replaced by releasing the fixing screws and changing the fitting.

14.3 Internal and external PVC-U cladding can be cleaned using water containing household detergent. If dirt is allowed to build up on the members over long periods it may become more difficult to restore the surface appearance.

14.4 Care should be taken when using proprietary materials for cleaning the glazing to ensure that deposits are not allowed to remain on the PVC-U, where they may cause discolouration and damage to the surface. In addition, care must be taken to avoid damage to, or discolouration of, the members when stripping paint from adjacent surfaces, eg by means of a blowlamp, paint stripper or mechanical stripper.

14.5 Paint can adversely affect the impact strength of the PVC-U cladding and the application of dark colours could lead to a risk of thermal distortion. Therefore, painting is not recommended.

14.6 The roof vent-locking mechanisms, wall frames tilt and turn gear and locking mechanism and friction hinges should be cleaned and lubricated periodically as recommended by the Certificate holder, to minimise wear and to ensure smooth operation.

14.7 Roof and wall frames can be readily replaced, if damaged, by removal of the glazing bar top capping using a special tool. Cleaning should be carried out using water containing household detergent. To avoid scratching of the surface, only soft cloths should be used when cleaning.

14.8 Low pitch roofs are likely to require more frequent cleaning than those with a higher pitch; a greater pitch aids removal of dirt and debris by rainwater.

15 Durability



15.1 Evidence from UK sites indicates that PVC-U similar to that used for the internal and external cladding has a satisfactory performance over a period of 15 years in windows and in excess of 20 years in other external applications. Such evidence, when compared with the results of tests on Anglian PVC-U, indicates that the conservatory systems will have a life of at least 25 years. Slight colour change or surface dulling may occur within the overall life of the roof.

15.2 Aluminium glazing bars and other components, including the hinges, locking mechanism and flashing, will have similar durability. Where conservatory systems are to be installed in areas subject to particularly aggressive conditions (for example, in coastal locations or near sources of industrial pollutants), replacement of components may be necessary within the life of the conservatory.

15.3 The gaskets and sealant, as well as the seal to the supporting building structure, may need to be replaced within the life of the conservatory.

15.4 The external surface temperature reached will be dependent upon a number of factors including:

- orientation — south facing and 'sun-trap' locations with restricted air movement
- dark finishes — dark woodgrain finishes will reach a higher temperature than lighter shades
- shading by trees or other buildings.

15.5 Any slight colour change or surface dulling that might occur in the roof components will be uniform over the visible surfaces of the windows.

16 Reuse and recyclability

The PVC-U, aluminium and steel profiles can be recycled.

17 General

17.1 Design and manufacture of the conservatory systems are undertaken by the Certificate holder in accordance with their published procedures.

17.2 The Anglian White Knight Outward Opening and Tilt and Turn PVC-U Window wall frames must be fixed into the building in accordance with the recommendations in BS 8213-4 : 2016 using proprietary expanding anchors through the frame or galvanized steel fixing lugs.

17.3 Cavity trays are required where the conservatory roof and walls abuts a masonry cavity wall.

17.4 When the pitch of the building roof adjacent to the conservatory is steeper than 30°, consideration should be given to the inclusion of snow guards to minimise the worst effects of snow slides and dropping debris.

18 Preparation

The site is prepared, foundations are constructed and any walls are built to the instructions of Anglian Windows Limited. The foundations meet the requirements of BS 8004 : 2015, where applicable. Anglian Windows Limited take into consideration local conditions seeking advice from the local authority, when necessary. If there are any doubts with regard to the stability of the site a suitably qualified engineer is consulted.

19 Procedure

Victorian, Lean-to and Composite systems

Base wall and wall frame installation

19.1 The conservatory basewall dpc is chased into the building wall and lapped. Any airbricks obstructed by the conservatory base are ducted to the outside.

19.2 The sill is positioned on the basewall, and where appropriate the dpm is folded over the brickwork, and a mastic seal is applied beneath the sill.

19.3 All fixed glazing is removed from the wall frames prior to positioning on the sill. Starting with the centre frame, and applying a mastic seal between sill and frame, the frames are secured to the sill with screws at 600 mm (maximum) centres.

19.4 The wall construction is made from individual PVC-U frames joined via coupling mullions, bay poles or corner posts, secured by screws located at 150 mm centres from top and bottom corners and then at 400 mm (max) centres.

19.5 The final wall frames are fixed to the building wall using expanding anchors through the frame.

Roof installation

19.6 The eaves beam is positioned on top and in line with the supporting side frames and secured using the recommended fastener and fixing centres. The corner joints are spliced with aluminium cleats and fixing screws.

19.7 The ridge beam is placed in position and located with the starter glazing bars, hip bars and transom bars. The hip bars with SpeedLok fixings are clamped to the die-cast ridge end and to the eaves beam by captive bolts located in the eaves beam extrusion. Starter glazing bars and transom bars are attached to the ridge section and to the eaves beam by captive bolts located in the ridge and eaves beam extrusions.

19.8 Starter glazing bars are fixed directly to the existing house wall, using appropriate fixings.

19.9 The roof is glazed with sealed double-glazed units. Each panel is located into the ridge system between the PVC-U rain baffle and the co-extruded TPE gasket. External glazing caps with co-extruded TPE gaskets are snapped onto the glazing bars to form a seal against the glazing panel.

19.10 A closed-cell foam bung is positioned at the ridge end of the intersection of the hip bars, and silicone sealant is applied to the joints. The PVC-U ridge cap is clamped into position from inside.

19.11 The installation is completed by fitting such items as trims, ridge cresting, finials, gutters and downpipes. Rainwater is directed to a suitable soakaway or drain (see Figures 8 to 10).

Figure 8 Typical installation details

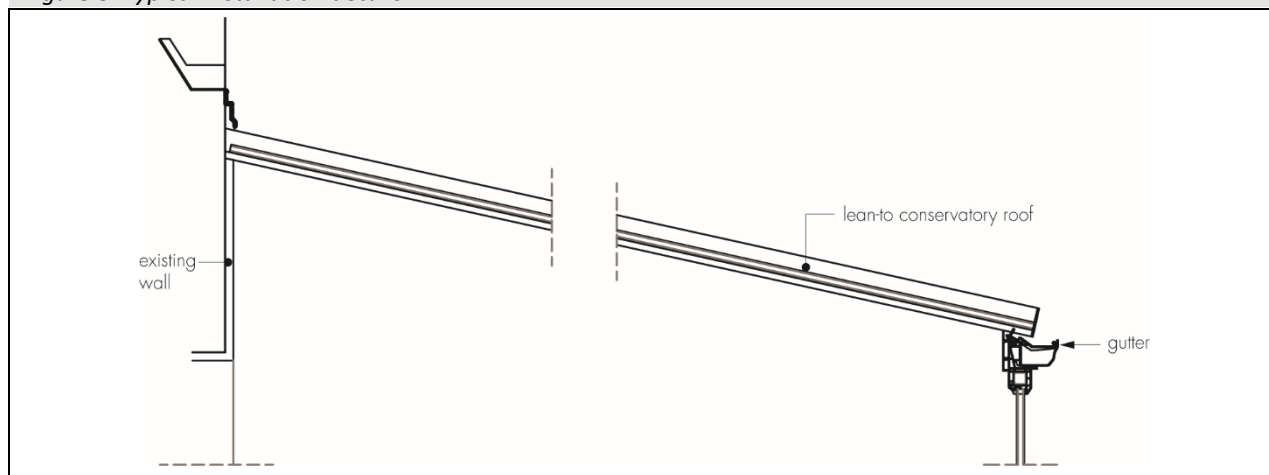


Figure 9 Typical installation details – Beam & Block floor detail

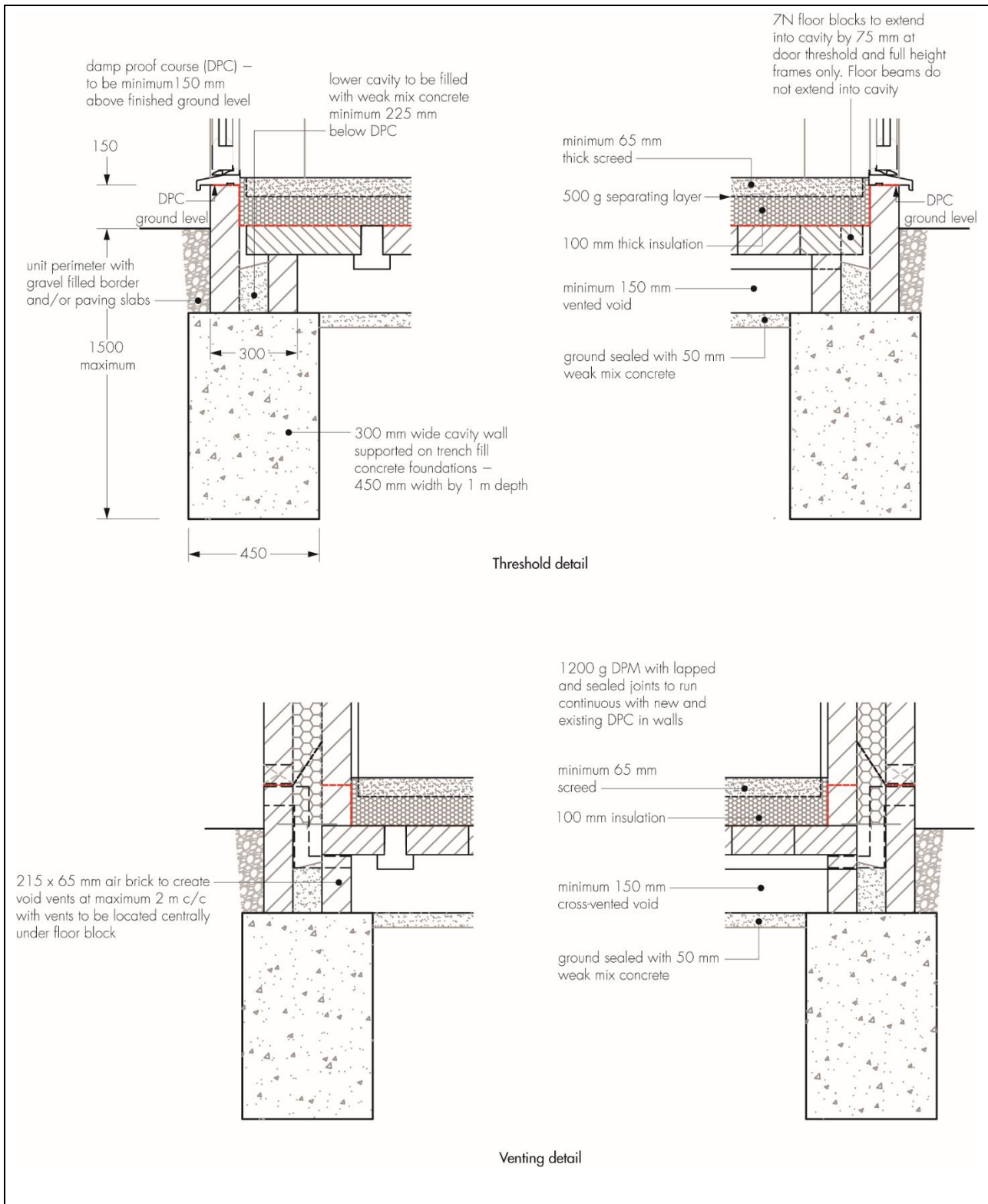


Figure 10a Typical installation details – Ground supported slab detail

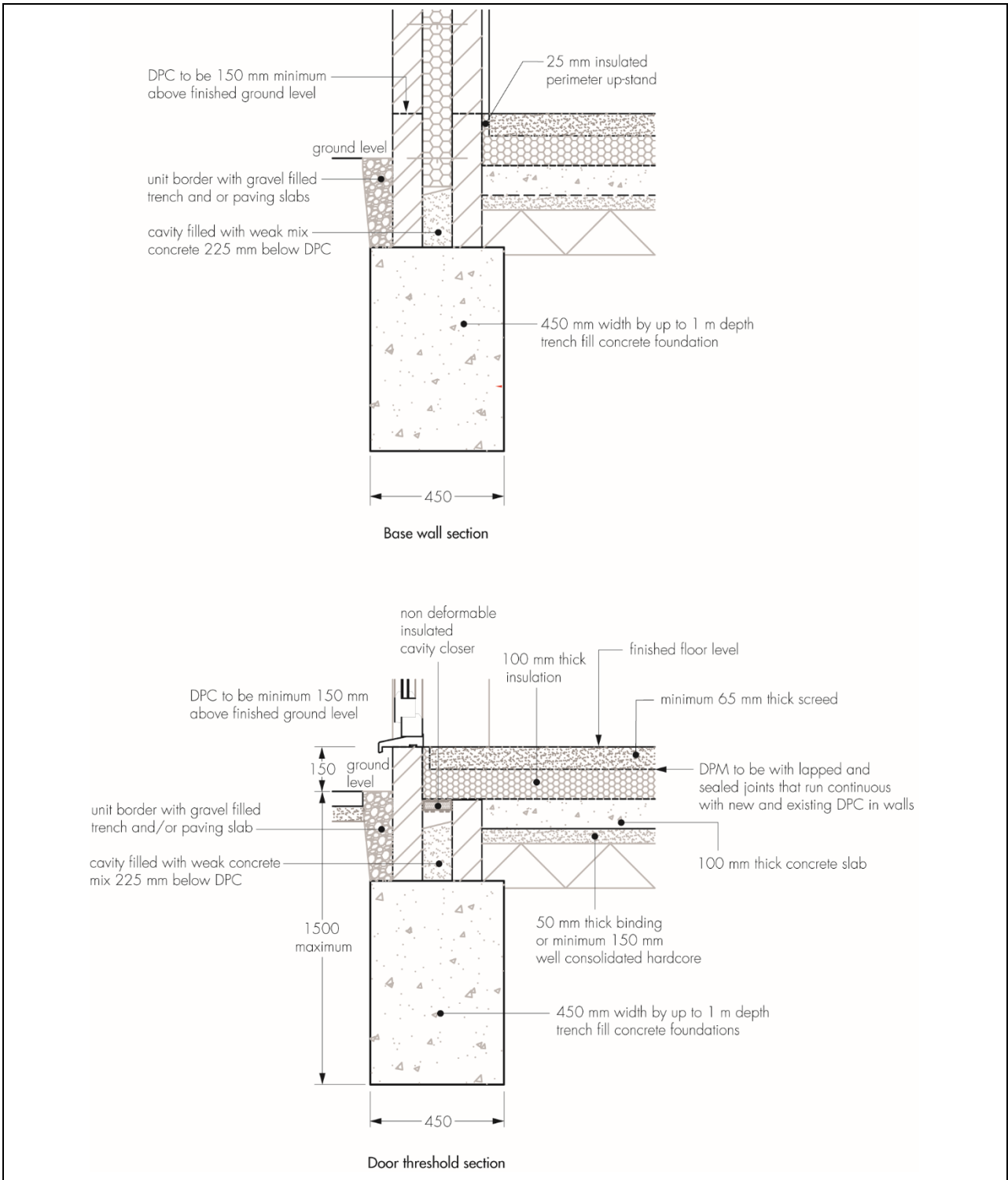
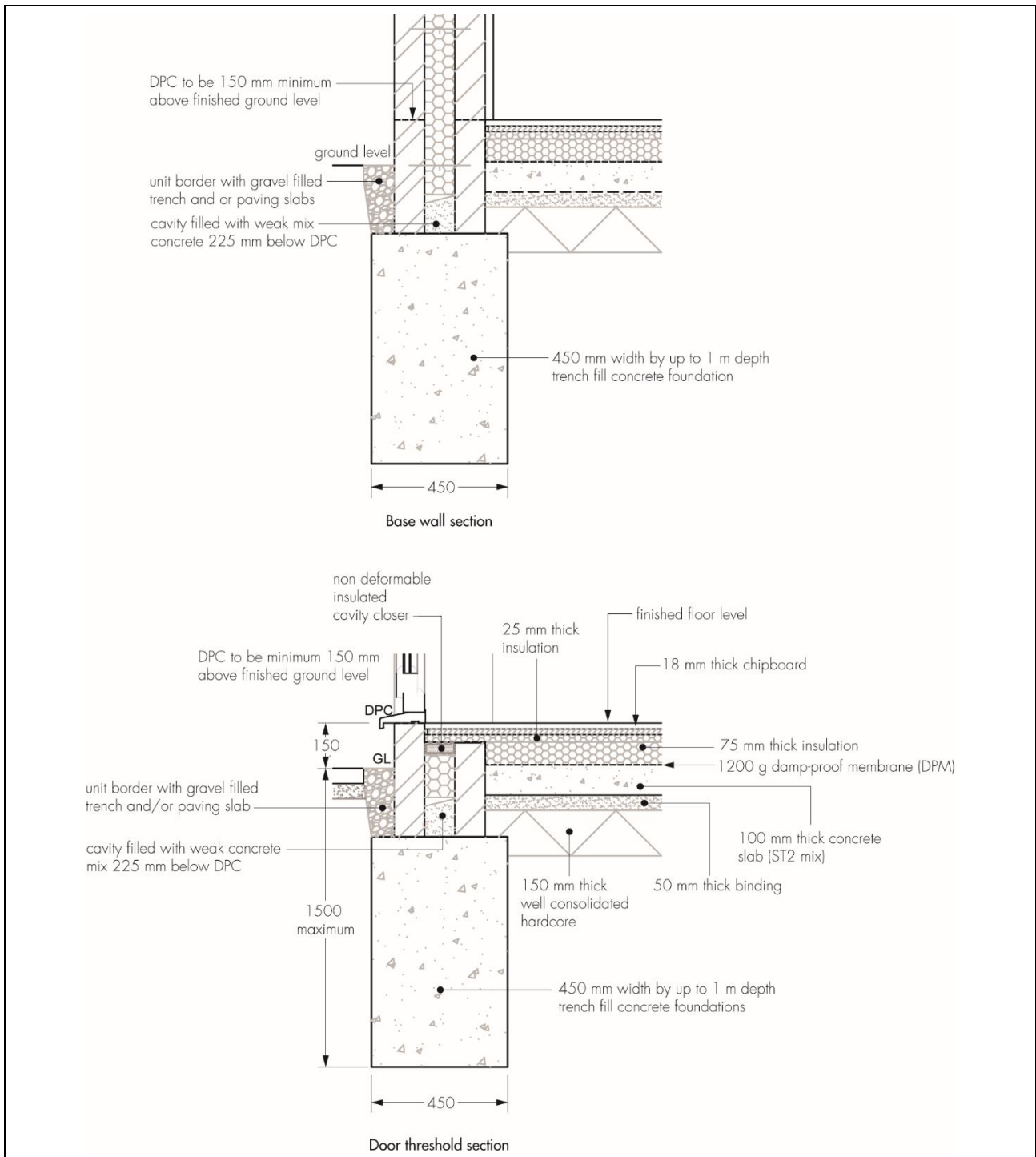


Figure 10b Typical installation details – Ground supported slab detail



Gable support system

19.12 The eaves beam and gable beam are positioned on top of the side frames. The corner joints are fixed with aluminium cleats and fixing screws.

19.13 The eaves beam and gable beam are fixed to the supporting frames using the recommended fasteners and fixing centres.

19.14 Gutter brackets are attached to gable/eaves beam at the recommended spacing and the gutter is clipped into position.

19.15 The gable beam top cladding is attached and the gable window frame is placed centrally on the gable beam and fixed into position with self-tapping screws or recommended fixings for the reinforced gable beam.

19.16 Gable infill wedges are fitted in place and the gable-frame furring top cap placed in position.

19.17 The ridge is centrally located to the gable frame and fixed to the starter bars, which are in turn fixed to the gable window frame.

19.18 The roof is fitted and glazed in the normal manner.

19.19 Finally, cappings, trims and end caps are fitted.

Flashing system

19.20 The mortar along the appropriate brick-line is chased out using a grinding wheel.

19.21 The traditional lead flashing units are installed from the gutter end towards the ridge beam.

19.22 Silicone sealant is used to seal the flashing units in at the wall where the mortar has been chased out.

Technical Investigations

20 Tests

Tests were carried on the systems and the results assessed to determine:

- fire performance
- air permeability
- watertightness and watertightness with racking load
- effect of wind loads
- effect of snow loads
- resistance to racking loads
- resistance to impact
- suitability of materials.

21 Investigations

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

21.2 The Certificate holder's design code was examined for compliance with:

- thermal performance
- condensation risk
- durability of the systems
- effect of ventilation and solar heat gain
- security against intrusion and safety
- computer software on structural analysis and design of the systems.

21.3 Computer predictions of structural performance were compared to those obtained from full-scale testing.

Bibliography

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BS 6206 : 1981 *Specification for impact performance requirements for flat safety glass and safety plastics for use in buildings*

BS 6262-4 : 2018 *Glazing for buildings— Code of practice for safety related to human impact*

BS 6375-1 : 2015 *Performance of windows — Classification for weathertightness (including guidance on selection and specification)*

BS 8004 : 2015 + A1 : 2020 *Code of practice for foundations*

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 673 : 2011 *Glass in building — Determination of thermal transmittance (U value) — Calculation method*

BS EN 755-9 : 2016 *Aluminium and aluminium alloys — Extruded rod/bar, tube and profiles — Profiles, tolerances on dimensions and form*

BS EN 1990 : 2002 + A1: 2005 *Eurocode — Basis of structural design*

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BS EN 1991-1-1 : 2002 *Eurocode 1 : Actions on structures —General actions — Densities, self-weight, imposed loads for buildings*

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BS EN 1991-1-3 : 2003 + A1: 2015 *Eurocode 1 : Actions on structures — General actions — Snow loads*

NA + A2 : 2018 to BS EN 1991-1-3 : 2003 + A1: 2015 UK National Annex to *Eurocode 1 : Actions on structures — General actions — Snow loads*

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BS EN 12588 : 2006 *Lead and lead alloys – Rolled lead sheet for building purposes*

BS EN 12600 : 2002 *Glass in building — Pendulum test — Impact test method and classification for flat glass*

BS EN 12608-1 : 2016 *Unplasticized polyvinylchloride (PVC-U) profiles for the fabrication of windows and doors — Classification, requirements and test methods — Non-coated PVC-U profiles with light coloured surfaces*

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BS EN 14351-1 : 2006 *Windows and doors — Product standard, performance characteristics — Windows and external pedestrian doorsets*

BS EN ISO 9001 : 2015 *Quality management systems — Requirements*

BS EN ISO 10077-1 : 2017 *Thermal performance of windows, doors and shutters — Calculation of thermal transmittance — General*

BS EN ISO 10077-2 : 2017 *Thermal performance of windows, doors and shutters — Calculation of thermal transmittance — Numerical method for frames*

BS EN ISO 10211 : 2017 *Thermal bridges in building construction — Heat flows and surface temperatures — Detailed calculations*

MOAT No 1 : 1974 *Directive for the Assessment of Windows*

22 Conditions

22.1 This Certificate:

- relates only to the systems 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.

22.2 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.

22.3 This Certificate will remain valid for an unlimited period provided that the systems 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.

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

22.5 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 systems or any other system
- the right of the Certificate holder to manufacture, supply, install, maintain or market the systems
- actual installations of the systems, including their nature, design, methods, performance, workmanship and maintenance
- any works and constructions in which the systems are installed, including their nature, design, methods, performance, workmanship and maintenance
- any loss or damage, including personal injury, howsoever caused by the systems, including their manufacture, supply, installation, use, maintenance and removal
- any claims by the manufacturer relating to CE marking.

22.6 Any information relating to the manufacture, supply, installation, use, maintenance and removal of these systems which is contained or referred to in this Certificate is the minimum required to be met when the system are 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.