Synseal Extrusions Ltd
Common Road
Huthwaite
Sutton-in-Ashfield
Nottinghamshire NG17 6AD
Tel: 01623 443200 Fax: 01623 550243
e-mail: sales@synseal.com
website: www.synseal.com

BBA APPROVAL INSPECTION TESTING CERTIFICATION
TECHNICAL APPROVALS FOR CONSTRUCTION

Agrément Certificate
09/4679
Product Sheet 2

SYNSEAL CONSERVATORY ROOF SYSTEMS

SYNSEAL GLOBAL CONSERVATORY ROOF SYSTEMS

PRODUCT SCOPE AND SUMMARY OF CERTIFICATE

This Certificate relates to Synseal Global Conservatory Roof Systems for conservatories used as extensions to new and existing buildings where an external grade door separates the conservatory from an inner room.



AGRÉMENT CERTIFICATION INCLUDES:

- factors relating to compliance with Building Regulations where applicable
- factors relating to additional non-regulatory information where applicable
- independently verified technical specification
- assessment criteria and technical investigations
- design considerations
- installation guidance
- regular surveillance of production
- formal three-yearly review.

KEY FACTORS ASSESSED

Strength and stability — the systems have adequate strength to resist wind and snow loads calculated in accordance with the relevant part of BS 6399-2 : 1997 and BS 6399-3 : 1988 (see section 5).

Weathertightness — the systems will resist the passage of rain and snow (see section 6).

Ventilation and solar heat gain — the systems require adequate ventilation to limit the effects of solar heat gain (see section 7).

Condensation risk and thermal insulation — the systems have a minimal risk of condensation (see section 8).

Durability — the systems are estimated to have a life of at least 25 years depending on the installation environment. Some components may need replacing within the overall life (see section 14).

The BBA has awarded this Agrément 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: 2 September 2009

Chris Hunt
Head of Approvals — Physics

Greg Cooper
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.

Regulations

In the opinion of the BBA, Synseal Global Conservatory Roof Systems, if used in accordance with the provisions of this Certificate, will meet or contribute to meeting the relevant requirements of the following Building Regulations:



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

The extension of a building by the addition at ground level of a conservatory, where the floor area does not exceed 30 m^2, is exempt from the Building Regulations.



The Building (Scotland) Regulations 2004 (as amended)

A conservatory forming a single-storey extension to an existing dwelling, where the conservatory does not contain a flue, a fixed combustion appliance or a sanitary facility and is not within one metre of a boundary and the floor area does not exceed 8 m^2, is exempt from these Regulations. Conservatories above 8 m^2 are subject to all relevant Regulations. The glazing used in regulated and unregulated conservatories must meet Standard 4.8(b) *Danger from accidents*; with reference to clause 4.8.2[(1)] *Collision with glazing*.

A maximum U value of 2.2 $Wm^{-2}K^{-1}$ is permissible for glazing (including frames) in a conservatory with a floor area of less than 50 m^2 and for those 20 m^2 or less, a maximum U value of 3.3 $Wm^{-2}K^{-1}$ is permissible. The systems, if used in accordance with the provisions of this Certificate, will satisfy or contribute to satisfying the Regulation and related Mandatory Standards as listed below.

Regulation:	8(1)(2)	Fitness and durability of materials and workmanship
Comment:		The use of the systems satisfies the requirements of this Regulation. See sections 13.1 to 13.8 and 14.1 to 14.5 and the *Installation* part of this Certificate.
Regulation:	9	Building Standards - construction
Standard:	1.1	Structure
Comment:		The systems can contribute to satisfying this Standard, with reference to clauses 1.1.1[(1)] to 1.1.3[(1)]. See sections 5.1 to 5.8 of this Certificate.
Standard:	2.5	Internal linings
Comment:		The systems can contribute to satisfying this Standard, with reference to clauses 2.5.1[(1)] and 2.5.2[(1)]. See section 10.3 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 sections 10.1 to 10.3 of this Certificate.
Standard:	3.10	Precipitation
Comment:		The systems can contribute to satisfying this Standard, with reference to clauses 3.10.1[(1)] and 3.10.8[(1)]. See sections 6.1 and 6.2 of this Certificate.
Standard:	3.15	Condensation
Comment:		The systems can contribute to satisfying this Standard, with reference to clause 3.15.1[(1)] and 3.15.4[(1)]. See section 8 of this Certificate.
Standard:	6.2	Building insulation envelope
Comment:		The systems can contribute to satisfying this Standard, with reference to clauses 6.2.1[(1)] to 6.2.3[(1)] 6.2.12[(1)] and the SBSA Technical Handbook for Conservatories. See section 8 of this Certificate.

(1) Technical Handbook (Domestic).

Note: Other Standards may be applicable to a complete conservatory installation, but are not specifically covered by this Certificate.



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

A conservatory constructed as an annexe to an existing building and having a floor area not exceeding 30 m^2 and not less than one metre from any boundary is exempt from these Regulations provided that in the case of a conservatory or porch, which is wholly or partially glazed, the glazing satisfies the requirements of Part V. See Schedule 1, *Classes of exempted buildings* and Schedule 7, *Extensions*.

Construction (Design and Management) Regulations 2007

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

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

See section: 2 *Delivery and site handling* (2.4 and 2.5).

Non-regulatory Information

NHBC Standards 2008

NHBC accepts the use of Synseal Global Conservatory Roof Systems, when installed and used in accordance with this Certificate, in relation to *NHBC Standards*, Chapter 1.1 *Introduction and Technical Requirements*, R3 *Materials requirement*.

Zurich Building Guarantee Technical Manual 2007

In the opinion of the BBA, Synseal Global Conservatory Roof Systems, when installed and used in accordance with this Certificate, satisfies the requirements of the *Zurich Building Guarantee Technical Manual*, Section 1 *Scope and Requirements*, Sub-section *Establishing fitness of materials and workmanship* (page12).

General

This Certificate relates to Synseal Global Conservatory Roof Systems which are for conservatories used as extensions to new or existing buildings where an external grade door separates the conservatory from an inner room.

It is essential that the roofs are installed and used in accordance with the conditions set out in the *Design Data* and *Installation* parts of this Certificate.

Technical Specification

1 Description

1.1 Synseal Global Conservatory Roof Systems are designed and fabricated by the Certificate holder for use in the exposure conditions described in this Certificate.

1.2 The roof systems are of aluminium construction with white or woodgrain PVC-U internal and external cladding or optional white powder coated and woodgrain foiled external claddings available in the following configurations:

- Victorian/Edwardian/Georgian and Gable styles (duo pitched) with roof pitches between 15° and 35° (see Figures 1, 2 and 3)
- Lean-to (mono pitch) style with roof pitches between 2.5° and 30° (see Figure 4)
- Combination 'P' shape (duo and mono pitched combined) achieved through a variable angle valley section (see Figure 5).

Figure 1 Victorian style conservatory roof



Figure 2 Edwardian/Georgian style conservatory roof



Figure 3 Gable style conservatory roof



Figure 4 Lean-to style conservatory roof



Figure 5 Combination style conservatory roof

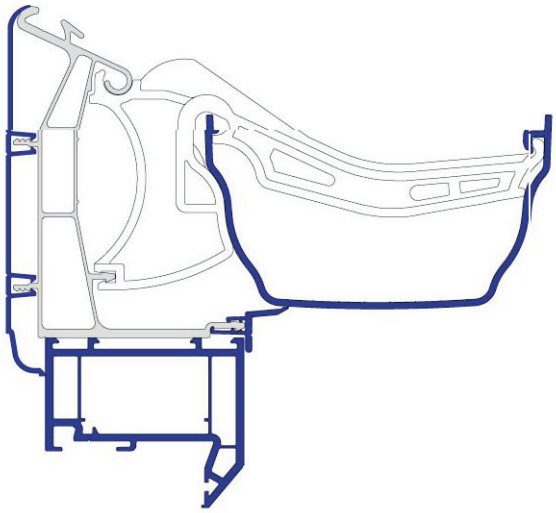


1.3 Permissible size parameters and configurations are described in the *Synseal Global Technical Manuals*. This Certificate relates to roofs used on conservatories not exceeding a floor area of 30 m^2 (8 m^2 in Scotland) within these parameters.

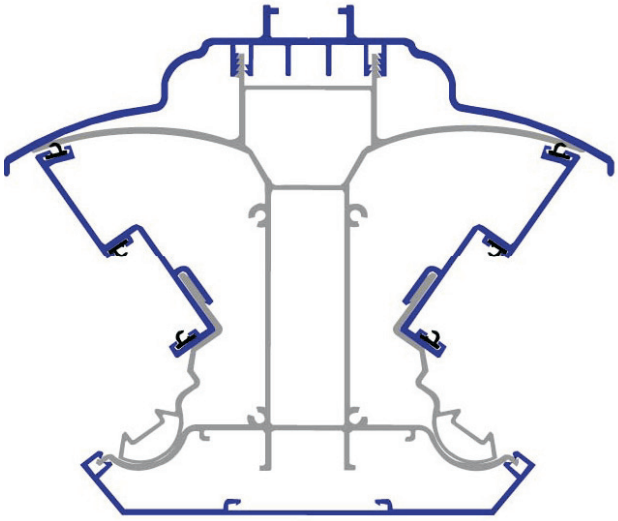
1.4 The full specifications and drawings for the materials and components covered by this Certificate have been examined. This section gives only general details of the system. A complete schedule of the component parts is contained in the *Synseal Global Technical Manuals* and on the BBA technical file.

1.5 The roof systems (see Figures 6 and 7) consist of a ridge beam, eaves beam, valley and glazing bar section, all extruded from aluminium to BS EN 755-2 : 2008, material designation 6063-T6. The roof can be glazed with either 25 mm five wall or 35 mm five wall polycarbonate panels or double-glazed sealed units. The 24 mm thick double glazed units can be a combination of 4 mm, 6 mm toughened glass or 6.4 mm laminated glass and carry a BSI Kitemark to BS EN 1279-2 : 2002 and if required BS EN 1279-3 : 2002. The aluminium adjustable eaves beam is attached at the corners using aluminium cleats and plated steel screws at recommended centres.

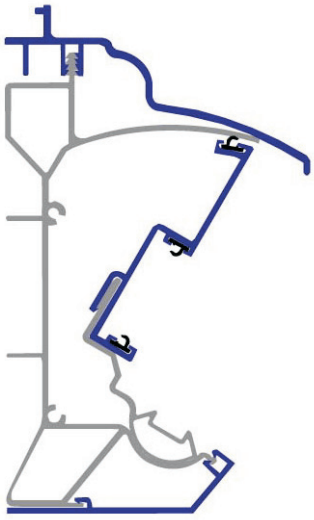
Figure 6 Cross-section through ridge and eaves beam



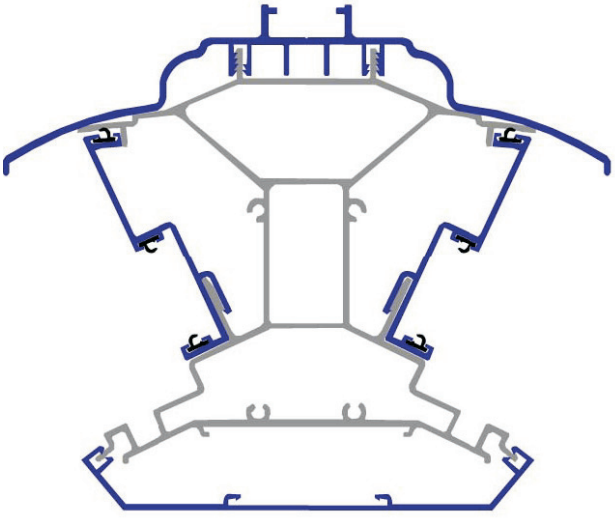
Global eaves beam assembly



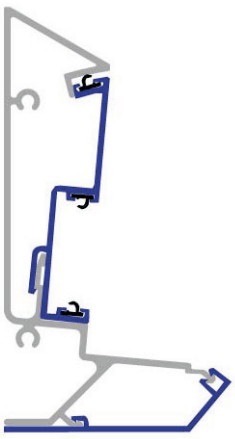
variable ridge assembly



variable wall plate assembly

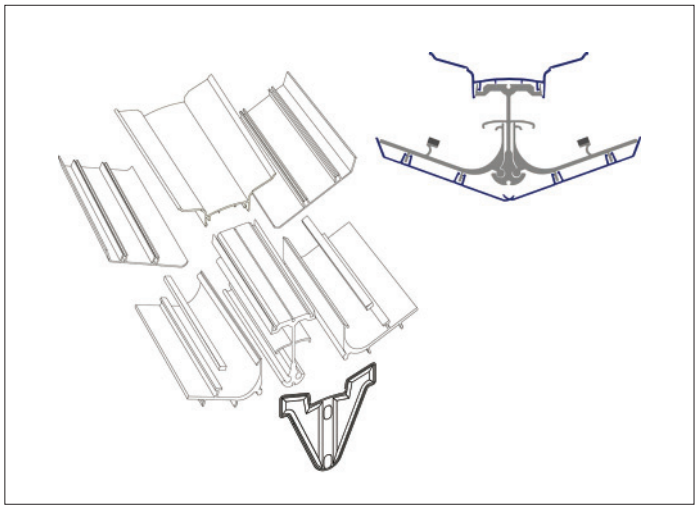


fixed ridge assembly



fixed wall plate assembly

Figure 7 Detail of valley



1.6 Glazing bars with PVC-U internal capping and TPE co-extruded gaskets are attached to the ridge beam and eaves beams with bolts. Wall plate glazing bars are attached to the ridge and eaves beam in the same manner. Hip bars are fixed onto the main aluminium radius end with bolts. Jack rafter glazing bars are attached to the hip bars and eaves beam if required. The wall plate is fixed directly to the existing host wall to provide lateral stability to the roof structure.

1.7 Glazing panels or double-glazed units are supported by the glazing bars located in the ridge system between TPE gaskets, providing a watertight seal against the ingress of moisture. External PVC-U caps, with TPE co-extruded gaskets or powder coated/foiled aluminium caps, snap onto the glazing bars and hold down the roof panels or units, forming a seal between the internal and external gaskets.

1.8 An external PVC-U or powder coated aluminium ridge capping and PVC-U crown are fixed into position on top of the ridge body. The ridge is completed with a PVC-U finial and cresting. The internal side of the radius end is covered with a PVC-U capping.

1.9 To prevent ingress of moisture, silicone sealant is applied to the joint between the ridge cap and radius end cap in accordance with the installation instructions.

1.10 An Ogee PVC-U gutter system is attached to the PVC-U aluminium eaves beam around the full perimeter of the roof by means of an integral clip feature.

1.11 The internal face of the eaves beam is covered with a PVC-U fascia.

1.12 A selection of tie-bars may be fitted as required.

Quality Control

1.13 Quality control includes checks on all materials and components in particular:

- extruded aluminium profiles
- extruded PVC-U profiles
- other components.

1.14 Fabrication of the roof system includes visual inspection of:

- extruded aluminium profiles
- PVC-U profiles
- components
- checks on overall dimensions.

2 Delivery and site handling

2.1 Conservatory roofs are prefabricated in the Certificate holder's factory. Components are marked and numbered to assist assembly. All components are suitably protected and delivered to customer by the Certificate holder.

2.2 The conservatory roof has a label bearing the company's mark and the BBA identification mark incorporating the number of this Certificate.

2.3 The roof components should be stored under cover in a clean area and suitably protected to avoid distortion or damage.

2.4 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.

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

Assessment and Technical Investigations

The following is a summary of the assessment and technical investigations carried out on Synseal Global Conservatory Roof Systems.

Design Considerations

3 Use

Synseal Global Conservatory Roof Systems are for conservatories used as extensions to new or existing buildings where an external grade door separates the conservatory from an inner room.

4 Practicability of installation

Installations of the systems are straightforward and can be carried out by tradesmen using traditional skills and with experience of these types of systems.

5 Strength and stability



5.1 The design guide contained within the Certificate holder's technical manual is based on:

- BS 6399-2 : 1997
- BS 6399-3 : 1988
- BS 8118-1 : 1991
- BS 8118-2 : 1991.

5.2 The guide is based on comprehensive calculations prepared by a consulting engineer and verified by the BBA. Information required to carry out a design to the document includes:

- roof type
- site location (to evaluate wind and snow loads)
- glazing material
- span
- roof pitch.

5.3 This data is used to establish the glazing bar profiles required and to decide whether tie bars are necessary.

5.4 Structural testing has been used to verify the relevant aspects of the manufacturer's design code.

5.5 The appropriate wind and snow loads should be calculated in accordance with the relevant part of BS 6399-2 : 1997 and BS 6399-3:1988. The manufacturer's design guide covers snow loads up to 0.8 kNm^{-2}, and design wind pressures (as defined in BS 6399-2 : 1997) of up to 1.0 kNm^{-2}. These loads cover the majority of sites in the UK. Where wind loads are outside of this range contact the Certificate holder's technical department for advice.

5.6 The basic acceptance criteria for the design are:

- aluminium sections to BS 8118-1 : 1991 and BS 8118-2 : 1991
- limited to span/175 for glazed roofs
- limited to span/125 for polycarbonate roof.

5.7 It is assumed that the supporting structure will have adequate rigidity. This aspect is outside the scope of the Certificate.

5.8 Details of the connections between the roof, the existing structure and the conservatory walls are dependent upon their type and condition. Guidance is available from the Certificate holder or should be entrusted to a suitably qualified person.

6 Weathertightness



6.1 Selected samples from the roof system 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 : 1989 and MOAT No 1 : 1974 giving the results shown in Table 1. The gradings are based on the assumption that the conservatory is installed in accordance with the *Synseal Global Technical Manuals*.

Table 1 Weathertightness[1]

	BS 6375-1 : 1989 Test pressure class (Pa)	MOAT No 1 Grading[2]
Watertightness		
Conservatory roof	300	E_3

(1) A value for air permeability is not given as it will vary depending on the nature of the supporting walling structure.
(2) E_3 indicates no water leakage occurring at 300 Pa.

6.2 To achieve the gradings given in Table 1, particular attention must be paid to the correct fitting of all gaskets and weatherseals, and to the detailing of sealants and flashings.

7 Ventilation and solar heat gain

7.1 Outward opening casement or tilt and turn lights can be included in the wall frame option to provide natural ventilation. Opening roof vents (not assessed by the BBA) can be included where required to provide greater levels of

rapid ventilation. Additional background ventilation can be provided by the inclusion of trickle ventilators in the head of window and door units.

7.2 Ventilation of a habitable room may occur through an adjoining conservatory where both have ventilation openings with an overall area equal to or greater than that given in the appropriate supporting document to the relevant Building Regulations for the room.

7.3 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
- aspect ratio of the floor plan of the conservatory
- area of opening lights and doors to area of floor expressed as a percentage.
- solar control glazing.

7.4 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 (1999), Section A4 and Appendix 5.A4.

7.5 To reduce the effects of solar heat gain on the internal temperature of the conservatory, blinds or coloured/heat resistant glazing can be fitted but their performance has not been assessed by the BBA.

8 Condensation risk and thermal insulation



In common with all glazed roof structures, temperature reduction under night-time winter sky radiation conditions will lead to the possibility of condensation. These effects may be minimised by the use of background heating to maintain the internal temperature between 3°C and 4°C above the external ambient temperature. The U values of the polycarbonate roof sheets, calculated according to BS EN ISO 10211 : 2007 and the central area of the double-glazed units, calculated according to BS EN 673 : 1998, are given in Table 2. The linear thermal transmittance of the glazing rafters, hip rafters and ridge beam has been calculated as approximately 0.8, 0.42 and 1.5 $Wm^{-1}K^{-1}$ respectively, when incorporating the 25mm polycarbonate sheeting. The internal surfaces of the glazing rafters and eaves beam adjacent to areas of glazing will have a similar risk of condensation to that of the glazing, whilst the internal surfaces of the PVC-U clad ring beam will have a higher risk of condensation. Any occurrence of condensation will be slight and temporary provided the environment within the conservatory is maintained within the normal domestic banding of 10°C to 25°C and 40% to 65% RH, which may require the use of ventilation via a rooflight.

Table 2 Indicative U values of glazing(1)

Type	Emissivity of coating (ϵ)	U value ($Wm^{-2}K^{-1}$) in vertical plane	U value ($Wm^{-2}K^{-1}$) in horizontal plane
4/16/4 mm double-glazed units with toughened glass	–	2.7	3.4
4/16/4 mm double-glazed unit with Low 'E' glass	0.04	1.4	2.2
4/16/4 mm double-glazed units with Low 'E' glass and Argon fill	0.01	1.0	1.7
25 mm structured polycarbonate sheeting	–	–	1.8
35 mm structured polycarbonate sheeting	–	–	1.5

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

9 Security against intrusion

9.1 Glazing sheets are retained by glazing bar top cappings. Removal of glazing bar top cappings is extremely difficult.

9.2 The roof light is fitted with a screw closing mechanism and provides reasonable security against unauthorised entry by the opportunist intruder.

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

10 Behaviour in relation to fire



10.1 The tempered safety glass used can be regarded as a non-combustible material and therefore can be taken as having a Class 0 performance rating.

10.2 The polycarbonate sheet used in the conservatory roof has achieved a Class 1 rating when tested to BS 476-7 : 1997 and is therefore classed as a TP(a) rigid thermoplastic.

10.3 The spread of flame across PVC-U is limited, and in a fire it will tend to char and may fall away. The use of the material in the construction of a conservatory roof would not accelerate the development of a fire.

11 Safety

Where a glass roof is specified, either sealed double-glazed units incorporating toughened safety glass Kitemarked to BS EN 12600 : 2002 or BS 6206 : 1981, or laminated glass, is used.

12 Supporting structure

All supporting side frames incorporating window profile material, i.e. PVC-U, timber or aluminium, should be designed in accordance with the relevant British Standards for imposed loadings. The side frames/walls must provide conservatories with overall lateral stability and resistance to axial loading.

13 Maintenance



13.1 The conservatory roof can be re-glazed and the gaskets replaced, but these operations should be carried out using the materials supplied by the Certificate holder and approved by the BBA.

13.2 If damage occurs to a roof vent, the furniture and fittings can be readily replaced by releasing the fixing screws and changing the fitting.

13.3 The PVC-U internal and external claddings 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. Abrasive cleaners should not be used, particularly on woodgrain finishes as the loss of the acrylic lacquer will have a serious effect on durability.

13.4 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, for example, by means of a blowlamp, paint stripper or mechanical stripper.

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

13.6 The roof vent locking mechanisms should be lubricated periodically to minimise wear and ensure smooth operation. The continuous hinge does not require lubrication.

13.7 The roof panels can be replaced, if damaged, by removal of the glazing bar top capping. Cleaning should be carried out using water containing household detergent. To avoid scratching of the surface, only soft cloths should be used when cleaning.

13.8 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.

14 Durability



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

14.2 Polycarbonate roof sheets, aluminium glazing bars and other components will have similar durability. Where conservatory roofs 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 roof. Replacement of polycarbonate roof sheets and sealed double-glazed units may be necessary where prolonged exposure to direct sunlight causes degradation.

14.3 The gaskets and silicone sealant may need to be replaced within the life of the conservatory roof.

14.4 Solar heat gain will lead to higher surface temperatures for woodgrain finish roofs in comparison to the white finish. The actual external temperature reached will be dependent upon a number of factors including:

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

14.5 In extreme cases, failure to consider these factors at the survey stage can lead to thermal distortion of capping profiles and noise from rapid expansion of individual components. For further guidance the Certificate holder should be contacted.

Installation

15 General

15.1 Design and manufacture of Synseal Global Conservatory Roof Systems are undertaken by the Certificate holder in accordance with their *Roof Fabrication Guide*.

15.2 Cavity trays are required where the conservatory roof abuts the wall of the building for new construction and consideration is given to their inclusion in existing walls in exposed situations.

15.3 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. This will prevent the worst effects of snow slides and dropping debris.

Preparation

15.4 All supporting side frames incorporating window profile material, i.e. PVC, timber or aluminium, should be designed in accordance with the relevant British Standards for imposed loadings. The side frames/walls must provide conservatories with overall lateral stability and resistance to axial loading. Advice should be sought from the frame supplier for the specific use of members for the conservatory construction, with due consideration given to the recommended packings between glazing and framework.

15.5 Foundations must meet the requirements of BS 8004 : 1986, *NHBC Standards* 2008, Part 4 *Foundations* and *Zurich Building Guarantee Technical Manual* 2007, Section 3 *Substructure*, Sub-section *Foundations* (page 66), where applicable. Consideration should be taken of local conditions and advice sought from the local authority when necessary. If there are any doubts with regard to the stability of a site, a suitably qualified engineer should be consulted.

16 Procedure

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

16.2 The pre-assembled eaves beam is placed in position and located by fixing the glazing bars into the holes provided. The hip bars are secured to the radius end brackets and eaves beam with bolts.

16.3 The wall-plate glazing bars are fixed directly to the existing host wall using appropriate fixings.

16.4 The roof is glazed with double-glazed units or polycarbonate sheets. Each panel is located on a supporting glazing bar with co-extruded TPE gasket. External caps with co-extruded TPE gasket are snapped onto the glazing bars to form a seal against the glazing panel.

16.5 A silicone seal is applied to the joints at the connection of the hip bars and ridge to the radius end. The PVC-U ridge capping is snapped into position from the outside. For use with woodgrain conservatories, a painted, aluminium capping slides on.

16.6 Lead flashing is fitted at the abutment of the roof to the house.

16.7 The installation is completed by fitting such items as trims, ridge, cresting, finial and downpipes. Rainwater is directed to a suitable soakaway or drain.

Technical Investigations

17 Tests

Tests were carried out on Synseal Global Conservatory Roof Systems to determine:

- watertightness (rain and wind)
- static load
- thermal cycling of gutter joints
- effect of wind loads
- suitability of materials
- gutter bracket strength.
- effect of snow loads
- effects of heating due to solar radiation

18 Investigations

18.1 The Certificate holder's technical manuals were examined for compliance with:

- BS 6399-2 : 1997
- BS 6399-3 : 1988
- BS 8118-1 : 1991
- BS 8118-2 : 1991.

18.2 Confirmatory calculations were carried out to verify section properties and glazing bar design charts.

18.3 Independent design calculations were carried out on typical roof designs to verify design methodology.

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

18.5 Confirmatory calculations were carried out to verify the flow capacity of the gutter.

18.6 Site visits were conducted to establish the product's ease of installation and performance and durability in service.

Bibliography

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

BS 952-1 : 1995 *Glass for glazing — Classification*

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

BS 6375-1 : 1989 *Performance of windows — Classification for weathertightness (including guidance on selection and specification)*

BS 6399-2 : 1997 *Loading for buildings — Code of practice for wind loads*
BS 6399-3 : 1988 *Loading for buildings — Code of practice for imposed roof loads*

BS 8004 : 1986 *Code of practice for foundations*

BS 8118-1 : 1991 *Structural use of aluminium — Code of practice for design*

BS 8118-2 : 1991 *Structural use of aluminium — Specification for materials, workmanship and protection*

BS EN 673 : 1998 *Glass in building — Determination of thermal transmittance (U value) — Calculation method*

BS EN 755-2 : 2008 *Aluminium and aluminium alloys — Extruded rod/bar, tube and profiles — Mechanical properties*

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

BS EN ISO 10211 : 2007 *Thermal bridges in building construction — Heat flows and surface temperatures — Detailed calculations*

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

Conditions of Certification

19 Conditions

19.1 This Certificate:

- relates only to the product/system that is named and described on the front page
- is granted only to the company, firm or person named on the front page — no other company, firm or person may hold or claim any entitlement to this Certificate
- is valid only within the UK
- has to be read, considered and used as a whole document — it may be misleading and will be incomplete to be selective
- is copyright of the BBA
- is subject to English law.

19.2 Publications and documents referred to in this Certificate are those that the BBA deems to be relevant at the date of issue or re-issue of this Certificate and include any: Act of Parliament; Statutory Instrument; Directive; Regulation; British, European or International Standard; Code of Practice; manufacturers' instructions; or any other publication or document similar or related to the aforementioned.

19.3 This Certificate will remain valid for an unlimited period provided that the product/system and the manufacture and/or fabrication including all related and relevant processes thereof:

- are maintained at or above the levels which have been assessed and found to be satisfactory by the BBA
- continue to be checked as and when deemed appropriate by the BBA under arrangements that it will determine
- are reviewed by the BBA as and when it considers appropriate.

19.4 In granting this Certificate, the BBA is not responsible for:

- the presence or absence of any patent, intellectual property or similar rights subsisting in the product/system or any other product/system
- the right of the Certificate holder to manufacture, supply, install, maintain or market the product/system
- individual installations of the product/system, including the nature, design, methods and workmanship of or related to the installation
- the actual works in which the product/system is installed, used and maintained, including the nature, design, methods and workmanship of such works.

19.5 Any information relating to the manufacture, supply, installation, use and maintenance of this product/system which is contained or referred to in this Certificate is the minimum required to be met when the product/system is manufactured, supplied, installed, used and maintained. It does not purport in any way to restate the requirements of the Health & Safety at Work etc Act 1974, or of any other statutory, common law or other duty which may exist at the date of this Certificate; nor is conformity with such information to be taken as satisfying the requirements of the 1974 Act or of any statutory, common law or other duty of care. In granting this Certificate, the BBA does not accept responsibility to any person or body for any loss or damage, including personal injury, arising as a direct or indirect result of the manufacture, supply, installation, use and maintenance of this product/system.

British Board of Agrément
Bucknalls Lane
Garston, Watford
Herts WD25 9BA

tel: 01923 665300
fax: 01923 665301
e-mail: mail@bba.star.co.uk
website: www.bbacerts.co.uk

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