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**Agrément
Certificate
No 04/4151**

Designated by Government
to issue
European Technical
Approvals

EUROCLAD LTD ROOF SYSTEMS

Système de couverture
Dacheindeckungen

Product




- THIS CERTIFICATE RELATES TO EUROCLAD LTD ROOF SYSTEMS, FOR FIXING TO STEEL OR TIMBER SUBSTRUCTURES.
- The systems are suitable for buildings used for industrial, commercial, retail and leisure purposes as well as residential and non-residential buildings such as schools and hospitals.
- The systems are for use as fully-finished structural roofs where access is available for maintenance and repair only.
- The product is weathertight and structurally stable within the limits set out in this Certificate, and is intended to be fixed to steel or timber purlins and structural decking.

These Front Sheets must be read in conjunction with the accompanying Detail Sheet, which provides information specific to particular systems.

Regulations — Detail Sheet 1

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

 The Secretary of State has agreed with the British Board of Agrément aspects of performance to be used by the BBA in assessing the compliance of roof decks and waterproofing with the Building Regulations. In the opinion of the BBA, Euroclad Ltd Roof Systems, if used in accordance with the provisions of this Certificate, will meet or contribute to meeting the relevant requirements.

Requirement: A1	Loading
Comment:	The systems have sufficient strength and stiffness to sustain and transmit the design load in accordance with the <i>Structural performance</i> section of the accompanying Detail Sheet.
Requirement: B2	Internal fire spread (linings)
Requirement: B3(1 and 4)	Internal fire spread (structure)
Comment:	The exposed surfaces (seen from the inside of the building) of the system have been assessed as having the class surface as given in the <i>Performance in relation to fire</i> section of the accompanying Detail Sheet.
Requirement: B4(2)	External fire spread
Comment:	The external surface of the sheets can be taken to have a notional AA designation as defined by BS 476-3 : 1958 and therefore is not subject to the limitations of a minimum distance from any point on a boundary. See the <i>Performance in relation to fire</i> section of the accompanying Detail Sheet.
Requirement: C4	Resistance to weather and ground moisture
Comment:	When subjected to the maximum design load given in this Certificate, the systems will resist passage of moisture to the inside of the building. See the <i>Weathertightness</i> section of the accompanying Detail Sheet.

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Requirement:	F2	Condensation in roofs
Comment:		A roof construction incorporating a system can be designed to satisfy this Requirement. See the tinted area of the <i>Condensation risk</i> section of the accompanying Detail Sheet.
Requirement:	L1(a)(i)	Dwellings
Requirement:	L2(a)	Buildings other than dwellings
Comment:		The thermal transmittance (U value) of the roof system is dependent on the purlin spacing used. Example U values are given in the tinted area of the <i>Thermal insulation</i> section of the accompanying Detail Sheet. Provided the U value is equal to or less than the relevant U value, given in Table 1 of Approved Document L1 and L2, the Elemental Method of showing compliance can be used. Alternatively, the example U values can be used when a 'trade-off' between construction elements is used or with the Target U value or Carbon Index methods or with the Whole-building or Carbon Emissions Calculation Methods. The system also limits extraneous air paths as far as is reasonably practical and, therefore, will contribute to the building complying with these Requirements. See the tinted areas of the <i>Thermal insulation</i> and <i>Air leakage</i> sections of the accompanying Detail Sheet.
Requirement:	Regulation 7	Materials and workmanship
Comment:		The systems are acceptable. See the tinted areas in the <i>Durability</i> section of the accompanying Detail Sheet.

2 The Building Standards (Scotland) Regulations 1990 (as amended)



In the opinion of the BBA, Euroclad Ltd Roof Systems, if used in accordance with the provisions of this Certificate, will satisfy or contribute to satisfying the various Regulations and related Technical Standards as listed below.

Regulation:	10	Fitness of materials and workmanship
Standard:	B2.1	Selection and use of materials, fittings, and components, and workmanship
Comment:		The product is acceptable. See the <i>Installation</i> part of the accompanying Detail Sheet.
Standard:	B2.2	Selection and use of materials, fittings, and components, and workmanship
Comment:		The product is acceptable. See the tinted areas in the <i>Durability</i> section of the accompanying Detail Sheet.
Regulation:	11	Structure
Standard:	C2.1	Stability
Comment:		The systems have sufficient strength and stiffness to transmit the design load in accordance with the <i>Structural performance</i> section of the accompanying Detail Sheet.
Regulation:	12	Structural fire precautions
Standard:	D7.1	Fire spread on internal linings — Principles
Comment:		The exposed surfaces (seen from the inside of the building) of the system have been assessed as having the class surface as given in the <i>Performance in relation to fire</i> section of the accompanying Detail Sheet.
Standard:	D9.1	Fire spread from an adjoining building
Comment:		The sheets have an AA designation and satisfy this Standard. See the <i>Performance in relation to fire</i> section of the accompanying Detail Sheet.
Regulation:	17	Resistance to moisture
Standard:	G3.1	Resistance to precipitation — Resistance to precipitation
Comment:		When subjected to the maximum design load given in this Certificate the systems will resist the passage of moisture to the inside of the building. See the <i>Weathertightness</i> section of the accompanying Detail Sheet.
Regulation:	18	Resistance to condensation
Standard:	G4.1	Condensation — Interstitial condensation
Comment:		The system will have a minimal risk of damage due to interstitial condensation. See the tinted area of the <i>Condensation risk</i> section of the accompanying Detail Sheet.
Standard:	G4.2	Condensation — Surface condensation
Comment:		The system will have a minimal risk of surface condensation.
Regulation:	22	Conservation of fuel and power
Standard:	J2.1	Rules for the use of Part J — Thermal conductivity and transmittance
Comment:		The calculated example thermal transmittance (U values) given in the tinted area of the <i>Condensation risk</i> section of the accompanying Detail Sheet may be used.
Standard:	J3.2	Buildings in purpose group 1 — Elemental Method
Standard:	J8.2	Buildings in purpose groups 2 to 7 — Elemental Method
Comment:		The thermal transmittance (U value) of the roof system is dependent on the purlin spacing used. Example U values are given in the tinted area of the <i>Thermal insulation</i> section of the accompanying Detail Sheet. Provided the U value is equal to or less than the relevant Maximum U value of exposed building elements given in the Table 1 to J3.2 or Table to J8.3 the Elemental Method of showing compliance can be used.

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Standards:	J3.4 to J3.10	Buildings in purpose group 1 – Target U-value Method
Standard:	J3.11	Buildings in purpose group 1 – Carbon index Method
Standard:	J3.12	Buildings in purpose group 1 – Maximum permissible U-values
Standards:	J8.5 and J8.6	Buildings in purpose groups 2 to 7 – Heat Loss Method
Standards:	J8.7 to J8.9	Buildings in purpose groups 2 to 7 – Carbon Emissions Calculation Method
Comment:		The calculated example thermal transmittance (U values) given in the tinted area of the <i>Thermal insulation</i> section of the accompanying Detail Sheet may be used.
Standard:	J4.1	Buildings in purpose group 1 – Limiting thermal bridging at junctions and around openings
Standard:	J9.1	Buildings in purpose groups 2 to 7 – Limiting thermal bridging at junctions and around openings
Comment:		Details around openings and at junctions incorporating the system must satisfy the relevant Standard.
Standard:	J5.1	Buildings in purpose group 1 – Limiting infiltration
Standard:	J10.1	Buildings in purpose groups 2 to 7 – Limiting infiltration
Comment:		The system limits extraneous air paths as far as is reasonably practical and will therefore contribute to the building complying with the relevant Standard. See the tinted areas of the <i>Air leakage</i> section of the accompanying Detail Sheet.

3 The Building Regulations (Northern Ireland) 2000



In the opinion of the BBA, Euroclad Ltd Roof Systems, if used in accordance with the provisions of this Certificate, will satisfy or contribute to satisfying the various Building Regulations as listed below.

Regulation:	B2	Fitness of materials and workmanship
Comment:		The product is acceptable. See the tinted areas in the <i>Durability</i> section of the accompanying Detail Sheet.
Regulation:	C4	Resistance to ground moisture and weather
Comment:		When subjected to the maximum design load given in this Certificate, the systems will resist the passage of moisture to the inside of the building. See the <i>Weathertightness</i> section of the accompanying Detail Sheet.
Regulation:	C5	Condensation
Comment:		The risk of harmful effects on the building due to interstitial condensation within the system will be minimal. See the tinted area in the <i>Condensation risk</i> section of the accompanying Detail Sheet.
Regulation:	D1	Stability
Comment:		The systems have sufficient strength and stiffness to sustain and transmit the design load in accordance with the <i>Structural performance</i> section of the accompanying Detail Sheet.
Regulation:	E3	Internal fire spread – Linings
Regulation:	E4	Internal fire spread – Structure
Comment:		The exposed surfaces (seen from the inside of the building) of the system have been assessed as having the class surface as given in the <i>Performance in relation to fire</i> section of the accompanying Detail Sheet.
Regulation:	E5	External fire spread
Comment:		The external surface of the sheets can be taken to have a notional AA designation as defined by BS 476-3 : 1958 and therefore is not subject to the limitation of a minimum distance from any point on a boundary. See the <i>Performance in relation to fire</i> section of the accompanying Detail Sheet.
Regulation:	F2	Building fabric
Comment:		The thermal transmittance (U value) of the roof system is dependent on the purlin spacing used. Example U values are given in the tinted area of the <i>Thermal insulation</i> section of the accompanying Detail Sheet. Provided the U value is equal to or less than the relevant Maximum U value given in Table 1.2 or 1.4 of Technical Booklet F, an Elemental Method of showing compliance can be used. Alternatively, the example U values can be used with the Target U value Method or Calculation Method or Energy Use Method. The system also limits extraneous air paths as far as is reasonably practical and will therefore contribute to the building complying with this Regulation. See the tinted areas of the <i>Air leakage</i> section of the accompanying Detail Sheet.

4 Construction (Design and Management) Regulations 1994 (as amended)

Construction (Design and Management) Regulations (Northern Ireland) 1995 (as amended)

Information in this Certificate may assist the client, planning supervisor, designer and contractors to address their obligations under these Regulations.

See section: 2 *Delivery and site handling* (2.1 and 2.2) of the accompanying Detail Sheet.

Bibliography

BS 476-3 : 1958 *Fire tests on building materials and structures — External fire exposure roof test*

Conditions of Certification

5 Conditions

5.1 This Certificate:

- (a) relates only to the product that is described, installed, used and maintained as set out in this Certificate;
- (b) is granted only to the company, firm or person identified on the front cover — no other company, firm or person may hold or claim any entitlement to this Certificate;
- (c) is valid only within the UK;
- (d) has to be read, considered and used as a whole document — it may be misleading and will be incomplete to be selective;
- (e) is copyright of the BBA;
- (f) is subject to English law.

5.2 References in this Certificate to any Act of Parliament, Regulation made thereunder, Directive or Regulation of the European Union, Statutory Instrument, Code of Practice, British Standard, manufacturers' instructions or similar publication, are references to such publication in the form in which it was current at the date of this Certificate.

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

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

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

- (a) the presence or absence of any patent, intellectual property or similar rights subsisting in the product or any other product;
- (b) the right of the Certificate holder to market, supply, install or maintain the product; and
- (c) the actual works in which the product is installed, used and maintained, including the nature, design, methods and workmanship of such works.

5.5 Any recommendations relating to the use or installation of this product which are contained or referred to in this Certificate are the minimum standards required to be met when the product is used. They do 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 or in the future; nor is conformity with such recommendations to be taken as satisfying the requirements of the 1974 Act or of any present or future 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 installation and use of this product.



In the opinion of the British Board of Agrément, Euroclad Ltd Roof Systems are fit for their intended use provided they are installed, used and maintained as set out in this Certificate. Certificate No 04/4151 is accordingly awarded to Euroclad Ltd.

On behalf of the British Board of Agrément

A handwritten signature in black ink, appearing to read 'P. Q. Newson'.

Date of issue: 23rd September 2004

Chief Executive



Euroclad Ltd

Certificate No 04/4151

**EUROCLAD LTD SECRET-FIX SF500 STEEL
DOUBLE-SKIN ROOF SYSTEM**

DETAIL SHEET 2

Product



- THIS DETAIL SHEET RELATES TO THE EUROCLAD LTD SECRET-FIX SF500 STEEL DOUBLE-SKIN ROOF SYSTEM.
- The systems are suitable for buildings used for industrial, commercial, retail and leisure purposes as well as residential and non-residential buildings such as schools and hospitals.
- The system can be used as finished structural roofing with a finished fall of 1° to 60° or a minimum radius of 80 metres, if curved, where access is available for maintenance and repair only.
- The system is weathertight if designed and constructed within the limits set out in this Detail Sheet.
- The system is intended to be fixed to steel or timber purlins, and structural decking.

This Detail Sheet must be read in conjunction with the Front Sheets, which give the product's position regarding the Building Regulations, and the Conditions of Certification, respectively.

Technical Specification

1 Description

1.1 The Euroclad Ltd Secret-Fix SF500 Steel Double-Skin Roof System is a covering of interlocking profiled sheets (see Figure 1) attached to the roof substructure, through the concealed underlap of the sheet, to a bracket and rail system which, in turn, is fixed by mechanical fasteners to the roof purlin or structural decking.

Figure 1 Typical sheet profile



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1.2 Euroclad Ltd SF500 roof profile sheets are roll formed from 0.7 mm thick steel with a range of coatings and substrates. These include Colorcoat HPS200⁽¹⁾ and PVF₂ [27 µm⁽¹⁾] and Dobel 200XT⁽²⁾.

- (1) The Colorcoat finishes are produced by Corus UK Limited and are covered by BBA Certificate No 91/2717, Fourth issue.
- (2) 200XT is produced by Dobel Coated Steel Ltd and is covered by BBA Certificate No 93/2973.

1.3 The sheets are roll formed to the full length of the roof eliminating the need for end laps. Sheet lengths greater than 22 m are generally rolled on site.

1.4 The system can also be used with a top hat section, secured to purlins or structural decking, to receive the rail fixing bracket.

1.5 Components forming part of the system include:

Fixings⁽¹⁾

- The sheets and brackets are fixed using fasteners bought in to specification defined by the Certificate holder and include:
 - SD3 — 3.5 mm x 25 mm carbon steel self-drilling screw for use on purlin, verge and sheet fixing
 - SL2-T-A14.4 — 8 mm x 20 mm carbon steel screw (washer) for use on flashings, hip, ridges, sheet and verge details
 - 6604/6/3W — aluminium Bulbtite rivet fitted with an EPDM washer for use on drip angle of sheets
 - SX12-L12-A14 — 5.5 mm x 22 mm stainless steel screw for use on curved roofs on eaves stitching
 - TDC-T-T16 — 6.3 mm x 45 mm screws for use when fixing spacer bracket through liner to timber purlins⁽²⁾.
- (1) Further details of fixings and their use are given in section 13.20.
 - (2) The designer should confirm number and length of fasteners to give sufficient pull-out resistance with grade of timber used for purlin.

Lightweight metal support frame

- Ashgrid AG40 bracket and rail system — rail manufactured from S390GD+Z275(NA/C) coil to BS EN 10147 : 2000 and brackets from Fe PO2G+Z275 to EN 10142 : 2000. Ashgrid bracket size will depend on the depth of construction, but to a maximum of 190 mm.

Verge support section

- formed from 0.9 mm thick galvanized steel to BS EN 10147 : 2000, grade Fe E220G Z275 as specified for the roof profile sheets (see section 1.2).

Ridge support section

- the ridge support section is manufactured from the same 0.7 mm thick steel as used for the profiled sheets. It is available in lengths of 2.02 m giving a cover length of 2 m.

Underlining sheets

- Euroclad Ltd 32/1000 or Euroclad Ltd 19/1000 liner sheets rolled from 0.7 mm thick steel with bright white lining enamel coating.

Flashings

- flashings for eaves drip angle, ridge and verges are manufactured from 0.7 mm thick steel (same specifications as profile sheet).

Vapour control layer (where required)

- Type 1 reinforced virgin polyethylene sheet with minimum thickness of 0.25 mm, or

- Type 2 aluminium foil (encapsulated) with reinforced virgin polyethylene sheet to a minimum thickness of 0.35 mm
- 50 mm wide VCL sealing tape — as specified by the manufacturer.

Blanket insulation

- mineral fibre quilts available in various thicknesses, which can be made up to the required depth of insulation (190 mm for the 32/1000 liner and 180 mm for the 19/1000 liner) to suit the specified U values in Table 3 (see section 6.1). The insulation quilt must be non-combustible in accordance with BS 476-4 : 1970 and have a thermal conductivity ($\lambda_{90/90}$ value) of 0.040 Wm⁻¹K⁻¹ or lower.

1.6 Other accessories covered by this Certificate, (unless otherwise stated) and used with the system, include:

Eaves and ridge foam filler pieces

- closed-cell EPDM or cross-linked polyethylene foam with gaps to provide adequate ventilation.

Sealant

- butyl rubber — run as a continuous 3 mm diameter bead
- butyl rubber strip — 2 mm by 19 mm
- type A butyl rubber strip — 1 mm by 50 mm side lap sealant
- type A butyl rubber strip — 6 mm by 5 mm.

1.7 Accessories that can be incorporated in the roof, but are outside the scope of this Certificate, include:

- gutters
- gutter support
- channels
- openings to details, such as vents, PVC or GRP rooflights.

1.8 Quality control checks include:

- dimensions
- chemical composition
- mechanical properties
- coating thicknesses
- finished panel dimensions.

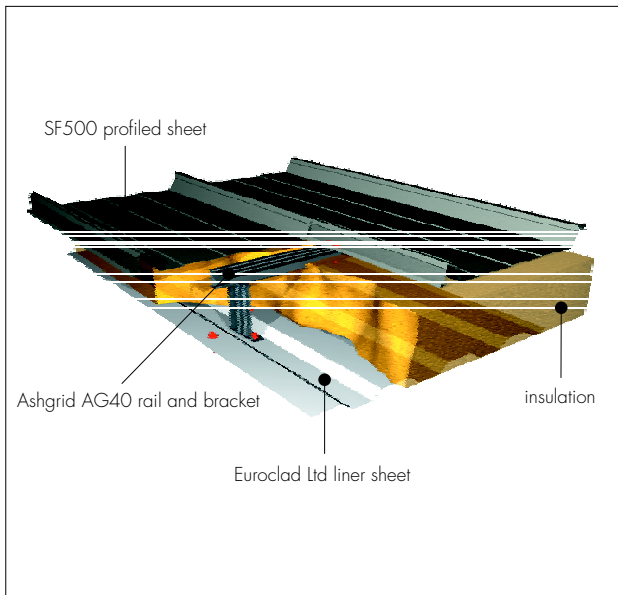
1.9 The foam filler blocks for the eaves and the ridge are bought in from the Certificate holder's approved suppliers list, to meet their specifications and are subject to visual and dimensional quality control checks.

1.10 The sheets used with the fixings detailed in section 1.5 enable various constructions to be built. Details of the basic systems and the sequence of components are:

Euroclad Ltd SF500 double-skin construction (see Figure 2)

- SF500 interlocking profiled sheets
- Ashgrid AG40 rail and bracket
- insulation — mineral wool in thicknesses to suit U value required (see section 6.1)
- vapour control layer (if required, see section 5.4) — minimum 50 mm laps sealed with VCL sealing tape to penetrations and abutments and continuous over details such as hips, ridges, valleys and around the perimeter
- Liner — Euroclad Ltd 32/1000 or Euroclad Ltd 19/1000 mild steel non-structural liner sheet
- ventilated foam filler blocks.

Figure 2 Euroclad Ltd SF500 with Ashgrid AG40 rail and bracket

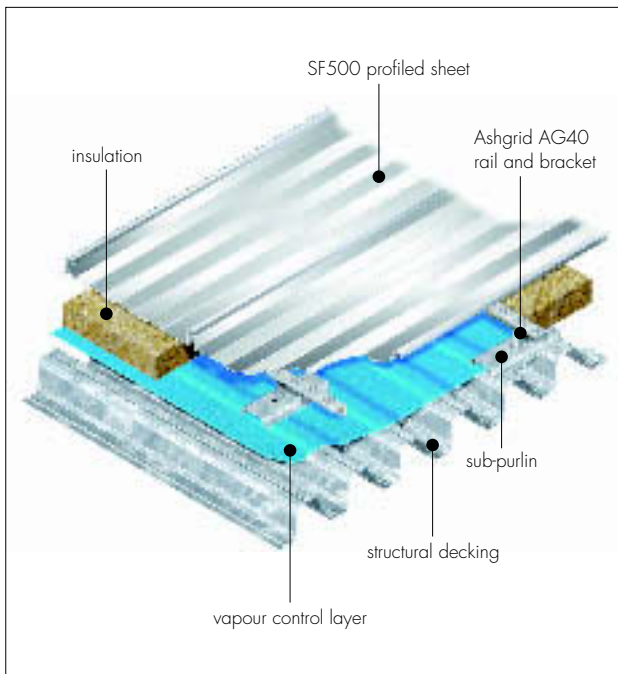


Euroclad Ltd SF500 sheets on structural decking (Figure 3)

As for double-skin construction, but using the following structural decking as the underlining sheet:

- structural decking sheets — manufactured from various high grades of galvanized steel, various thickness and profiles. The spanning capabilities, durability and fire adequacy of the structural decking are outside the scope of this Certificate
- the Ashgrid bracket may be fixed via a top hat section sub-purlin to the structural deck.

Figure 3 Euroclad Ltd SF500 sheet on structural decking



Other constructions

When used in other assemblies the full system performances given in this Certificate cannot be assumed. The Euroclad Ltd SF500 sheet profile's structural details, fire performance and durability as described in this Certificate will apply but the designer

must be satisfied on other aspects of performance, ie thermal insulation, risk of condensation and acoustic performance.

2 Delivery and site handling

2.1 Euroclad Ltd SF500 sheets are packed in bundles of 18 sheets; each pack not weighing more than one tonne and carrying a label bearing the BBA identification mark incorporating the number of this Certificate, the quantity, panel lengths, gross weight and site location. A lifting beam must be used to unload lengths exceeding 8 m.

2.2 Where sheets are to be temporarily stored on the roof:

- the loadbearing capacity of the structure must be considered, and
- they must be restrained from movement caused by either gravity or wind action.

2.3 Where sheets are to be stored on the ground, the base must be dry, firm and gently sloped to allow drainage, and the sheets should be protected from the risk of damage.

2.4 The durability of the roof system will depend on component items being undamaged before or during installation, therefore the handling and storage of items should be in accordance with the recommendations as:

- liner and decking sheets — should be handled in the same manner as for the profile sheets
- vapour control layer — the rolls must be handled carefully to avoid puncturing and to prevent damage, and must not be stored on end. For long-term storage the rolls should be protected from ultraviolet light indoors or under non-translucent covers. The vapour control layer should be dry during installation
- blanket insulation — delivered to site in polyethylene wrapped rolls. For long-term protection they must be stored indoors or under a waterproof covering.

Design Data

3 General

3.1 The Euroclad Ltd Secret-Fix SF500 Steel Double-Skin Roof System is satisfactory for use as a structural roof system, for roofs with a finished fall of 1° to 60° or a minimum radius of 80 metres, if curved, where access is available for maintenance and repair only.

3.2 If architectural features, through fittings or rooflights are required on the roof, special care and attention is necessary to ensure that, in common with all metal roofs, these features have been correctly detailed and fitted.

4 Structural performance

4.1 The system has adequate strength and stiffness to sustain specified loads. Load/span values are given in Table 1 and should be used as follows:

- based on span (see footnote 3 to Table 1), it must be confirmed that the proposed specification is adequate to resist the design loads (see section 4.2)
- the spacing between Ashgrid brackets must be checked to be adequate, values given in Table 1 are based on one metre bracket spacings.

Table 1 Maximum permissible snow and wind load for Euroclad Ltd SF500⁽¹⁾⁽²⁾

Span ⁽³⁾ (m)	Maximum positive snow loading (kNm ⁻²)		Maximum negative (wind) loading (kNm ⁻²)	
	Factor 1.6	Factor 2.0	Factor 1.4	Factor 2.0
1.0	4.75	3.80	4.27	2.99
1.1	4.48	3.58	4.00	2.80
1.2	4.15	3.32	3.62	2.53
1.3	3.92	3.13	3.11	2.18
1.4	3.65	2.92	2.70	1.89
1.5	3.38	2.71	2.25	1.58
1.6	3.11	2.49	2.11	1.47
1.7	2.91	2.33	1.98	1.38
1.8	2.70	2.16	1.84	1.29
1.9	2.43	1.95	1.75	1.23
2.0	2.22	1.78	1.63	1.14

- (1) The tables are for uniformly distributed loads on multiple spans.
 (2) Positive deflection limit = span/250 and negative deflection limit = span/150.
 (3) The span is the distance between purlins or Ashgrid rails if fitted to a structural deck.

General notes:

- The above data has been prepared in accordance with BS 5427-1 : 1996, based on test data from CERAM Building Technology.
- The self-weight of the Euroclad Ltd SF500 sheeting has been taken into account in preparing the above data.
- For single spans, excessive loads or spans, different deflection criteria, different factors of safety and different metals, advice should be sought from the Certificate holder.
- The partial safety factors used in generating the above data are dead loads: 1.4 in same direction to wind load and 1.0 in opposite direction to wind load.
- Imposed loads: 1.6 for normal loads, 1.05 for exceptional snow drifting. Wind loading: 1.4. Attachment: 2.0.
- All spans are assumed to be equal or within 15% of the largest span.

4.2 When evaluating the design loads, the wind loads must be calculated in accordance with the recommendations of BS 6399-2 : 1997, and the imposed snow loads must be checked in accordance with the recommendations of BS 6399-3 : 1988.

4.3 Where the liner provides lateral restraint to the purlin, the detail of the fixing between purlin and liner must be determined by the structural engineer responsible for the overall roof design.

4.4 The profiled sheets are capable of withstanding impacts associated with normal handling, installation and service.

5 Condensation risk

5.1 In common with all metal roof constructions, there is a risk of condensation; this can arise as either interstitial condensation within the roof construction or surface condensation at thermal bridges.

Surface condensation

5.2 The internal temperature at which surface condensation will occur on the internal surfaces of the roof is dependent on both the internal relative humidity and the external temperature. It has been shown by computer modelling that the risk of condensation occurring on the internal surfaces (including those below the thermal bridges formed by the Ashgrid rail and bracket) is negligible.

5.3 In buildings likely to experience high internal relative humidities (eg Building internal humidity class 5) there is a minimal risk of intermittent condensation forming on the fixing screws penetrating the purlin. The designer should anticipate the areas of the structure that could be at risk from sustained sources of humidity and take the necessary measures to prevent any such problems (see section 5.6).

Interstitial condensation



5.4 The system has been assessed by computer modelling for the risk of damage and harmful effects on the building due to interstitial condensation. The modelling predicts that for buildings in internal humidity classes 1 to 4 (see Table 2), under the normal climatic conditions experienced in the UK, interstitial condensation is unlikely to be a significant problem and, therefore, the risk of reducing the thermal and structural performance of the roof system due to interstitial condensation will be limited. This assessment is only valid provided the following details are carried out in accordance with the Certificate holder's instructions and this Certificate:

- the vapour control layer remains undamaged, is continuous over ridges and hips, and is sealed at penetrations/abutments
- vapour control layer laps are adequately sealed
- for installations without the separate vapour control layer (Building internal humidity classes 1 and 2 only), the liner panel laps are adequately sealed
- the ribs of the SF500 profile are ventilated by air passing along them from and to open areas at the eaves and the ridge.

Table 2 Building internal humidity classes

Humidity class ⁽¹⁾	Building type
1	Storage areas
2	Offices, shops
3	Dwellings with low occupancy
4	Dwellings with high occupancy, sports halls, kitchens, canteens, buildings heated with unflued gas heaters
5	Special buildings, eg laundries, breweries, swimming pools

(1) As referenced in ISO 13788 : 2001 and BS 5250 : 2002.

5.5 For buildings in internal humidity class 5 and in buildings or areas of a building with special internal design conditions, a hygrothermal assessment of the proposed roof system should be undertaken using the guidance given in BS 5250 : 2002, BS 5720 : 1979, BS 5925 : 1991 and BS 6229 : 2003, to establish whether special provisions are required.

5.6 For those conditions that apply in section 5.5, a breather membrane might be required within the roof system, and/or additional ventilation or air-conditioning within the building may be required to maintain the internal conditions within acceptable limits. Advice should be sought from the Certificate holder's technical department.

5.7 For domestic situations, a separate vapour control layer is required.

6 Thermal insulation



6.1 The thermal transmittance (U values) for example constructions are given in Table 3. These have been calculated using an insulation thermal conductivity value of 0.040 Wm⁻¹K⁻¹ with Ashgrid brackets at one metre centres (see section 1.5).

Table 3 U values for SF500 (Wm⁻²K⁻¹)

Liner panel	Purlin spacing (m)								
	0.7	0.8	0.9	1.0	1.2	1.4	1.6	1.8	2.0
32/1000	0.26	0.25	0.25	0.25	0.25	0.24	0.24	0.24	0.24
19/1000	0.25	0.25	0.25	0.25	0.24	0.24	0.24	0.24	0.24

11 Durability

6.2 Thermal bridging at the junctions of the system and the external wall and around openings such as rooflights must be limited. The performance of the junction will be dependent on building elements not covered by this Certificate and a suitable assessment of all junction details should be carried out (see *Additional Information* part).

7 Air leakage



7.1 The airtightness of the system is reliant on the careful sealing of the liner or vapour control layer. The airtightness of a roof system is dependent on maintaining the integrity of seal throughout. In addition to sealing at all joints, the liner or vapour control layer must be suitably sealed at the perimeter and all penetrations. Details of sealing at eaves, ridges, hips, valleys and penetrations must be in accordance with the Certificate holder's instructions and this Certificate.

7.2 The airtightness of the building will also be dependent on the performance of the other building elements. Provided these also incorporate appropriate design details and building techniques, air infiltration through the building fabric should be minimal and the building reasonably airtight.



7.3 For non-domestic buildings of 1000 m² gross floor area or more, air leakage tests in accordance with CIBSE TM 23 : 2000⁽¹⁾ should be carried out to confirm an acceptable airtightness.

(1) CIBSE TM 23 : 2000 *Testing buildings for air leakage*.

7.4 Air leakage design test data are available from the Certificate holder.

8 Weathertightness



8.1 When installed in accordance with the Certificate holder's instructions, the system is weathertight when used on roofs with finished fall of 1° to 60° or, a minimum radius of 80 metres if curved and within exposure conditions related to recommended maximum design wind pressures.

8.2 The weathertightness of the product will not be adversely affected by normal service deflections.

9 Performance in relation to fire



The sheets have a notional AA designation as defined by BS 476-3 : 1958 provided the blanket insulation installed has a 'non-combustible' classification when tested in accordance with BS 476-4 : 1970.

10 Maintenance

10.1 The system should be inspected regularly (at least once a year) for accidental damage to the roof sheets and their coatings, and also for any build-up of dirt and debris. Damage must be repaired and accumulated dirt and debris removed. The frequency of inspections will depend on the environment and use of the building.

10.2 In industrial and coastal areas it may be necessary to clean the installation periodically by hosing with water and a neutral detergent to restore its appearance and to remove corrosive deposits. It may be necessary to clean soffits in any environment.

10.3 Damaged sheets can be removed and replaced. The Certificate holder should be contacted for details.



11.1 The durability of the sheets will depend upon the coating material, the immediate environment, aspect faced and use.

11.2 Maintenance painting may be necessary to restore the appearance of coated sheets or to extend their design life, and should be considered at the intervals given in Table 4.

Table 4 Service life

Sheet material	Minimum service life (years) ⁽¹⁾	
	Environment	
	Rural or suburban	Industrial or coastal
Polyester coated steel ⁽²⁾	15	10
Colorcoat PVF ₂ coated steel ⁽²⁾	20	15
Colorcoat HPS200 coated steel ⁽²⁾	25	20 ⁽³⁾
Dobel 200XT coated steel ⁽⁴⁾	15	10

(1) Minimum service life is that when first maintenance painting is required.

(2) Full details of Corus coated materials are given in BBA Certificate No 91/2717.

(3) This value is not given in BBA Certificate No 91/2717, but has been individually assessed.

(4) Full details of coated materials are given in BBA Certificate No 93/2973.

11.3 For coated sheets, if the building has an exposed eaves detail and is in an aggressive environment, or if there are corrosive conditions inside, a more durable specification of the reverse-side coating should be used. Details can be obtained from the Certificate holder.

11.4 A planned maintenance cycle (see section 10) should be introduced if an extended design life is required. The Certificate holder can recommend a suitable system for maintenance painting.

11.5 Colour changes will be slight and uniform on any one elevation.

Installation

12 General

12.1 Installation of the Euroclad Ltd Secret-Fix SF500 Steel Double-Skin Roof System is carried out in accordance with the Certificate holder's instructions, by experienced roofing contractors. Guidance can be provided by the Certificate holder for contractors who are unfamiliar with the system.

12.2 Euroclad Ltd 32/1000 or Euroclad Ltd 19/1000 liner sheets can be fitted to achieve a non-fragile class B rating in accordance with ACR[M]001 : 2000. Copies of drawings FR1 (32/1000) and FR2 (19/1000) detailing these installations may be obtained from the Certificate holder.

13 Procedure

13.1 The liner sheets are placed in position with all joints lapped, stitched and sealed (where necessary) and fixed to the roof purlins/rafters. Solid filler blocks are located in the liner or decking profile at details such as eaves, hips and ridges.

13.2 Where a sealed liner is used to achieve vapour control in place of a separate VCL, the end laps must be a minimum of 100 mm and sealed with 6 mm by 5 mm

type A butyl rubber strip positioned below fixing positions parallel to the edge of the sheet.

13.3 The side laps are sealed with 50 mm by 1 mm type A butyl rubber strip positioned centrally along the side lap joint, or 6 mm by 5 mm type A butyl rubber strip positioned inside the lap with stitching screws at 500 mm centres.

13.4 All fixings penetrating the liner must have bonded washers to provide an air seal.

13.5 Swarf or debris is removed from the liner or decking before being covered by the vapour control layer (VCL) sheets, if required. The VCL is laid in the same direction as the liner/decking sheets and is made continuous by lapping all joints by a minimum of 50 mm and sealing with 50 mm wide VCL sealing tape, centrally along the side lap joint. The VCL sheets should be continuous over ridges/hips and sealed to penetration/abutments.

13.6 The Ashgrid brackets are inserted into the rail at appropriate centres and fixed, using appropriate fasteners, through the VCL and liner sheet directly to the purlins. All fixings must have bonded washers to provide an air seal.

13.7 It is recommended that Ashgrid support rails are secured to the purlins at each end with sway brackets. Sway brackets are also required in certain size roofs, to provide additional shear resistance between the Ashgrid support system and the purlin.

13.8 The mineral fibre blanket insulation is laid between and underneath the Ashgrid rail taking care to ensure continuity and the space is fully filled, ie no voids.

13.9 The verge section (Figures 3b and 3d) can then be fitted onto one side of the roof and fixed to the Ashgrid rails ensuring 90° positioning to the purlins.

13.10 The overlap of the Euroclad Ltd SF500 profile sheet incorporating the 2 mm by 19 mm butyl rubber strip on the crest is placed into the verge section and fixed at 450 mm centres using the appropriate fixings. A fixing template is used to hold the profile sheet firmly while it is secured through the underlap to the Ashgrid rail. The fixing template is used at all times when securing the SF500 profile panel to prevent spread of the cover width.

13.11 The barge board flashing is fixed to the verge to complete the detail, using the appropriate fasteners at 600 mm centres.

13.12 Prior to the next panel being positioned, a 3 mm bead of butyl rubber sealant is run along the length of underlap in the groove provided on the installed panel. The panels are snapped together and secured to the Ashgrid rail using the fixing template.

13.13 When the final panel has been secured, a 2 mm by 19 mm strip of butyl rubber sealant is laid on

the crest of the underlap side of the profile sheet. The bottom flange of the verge section is then fitted inside the underlap of the profiled sheet and secured with the appropriate fixings. The barge board flashing is fixed in place to complete the verge detail (see Figures 3b and 3d).

13.14 The sheet pan must be turned up at ridge and down at eaves using the turn up/down tool provided.

13.15 The ridge detail (Figure 3a) is constructed by clipping the ridge filler blocks into the ridge support that is positioned close to the apex at 90° to the profiled sheets. The ridge support is secured with two fasteners at each crest.

13.16 A continuous 2 mm by 19 mm strip of butyl rubber sealant is applied to the top of the ridge support section, and the ridge flashing is fixed.

13.17 Care must be taken to avoid damage/penetration of the profiled sheets when fixing the ridge flashing to the ridge support.

13.18 Eaves details may vary but a typical construction is shown in Figure 3c.

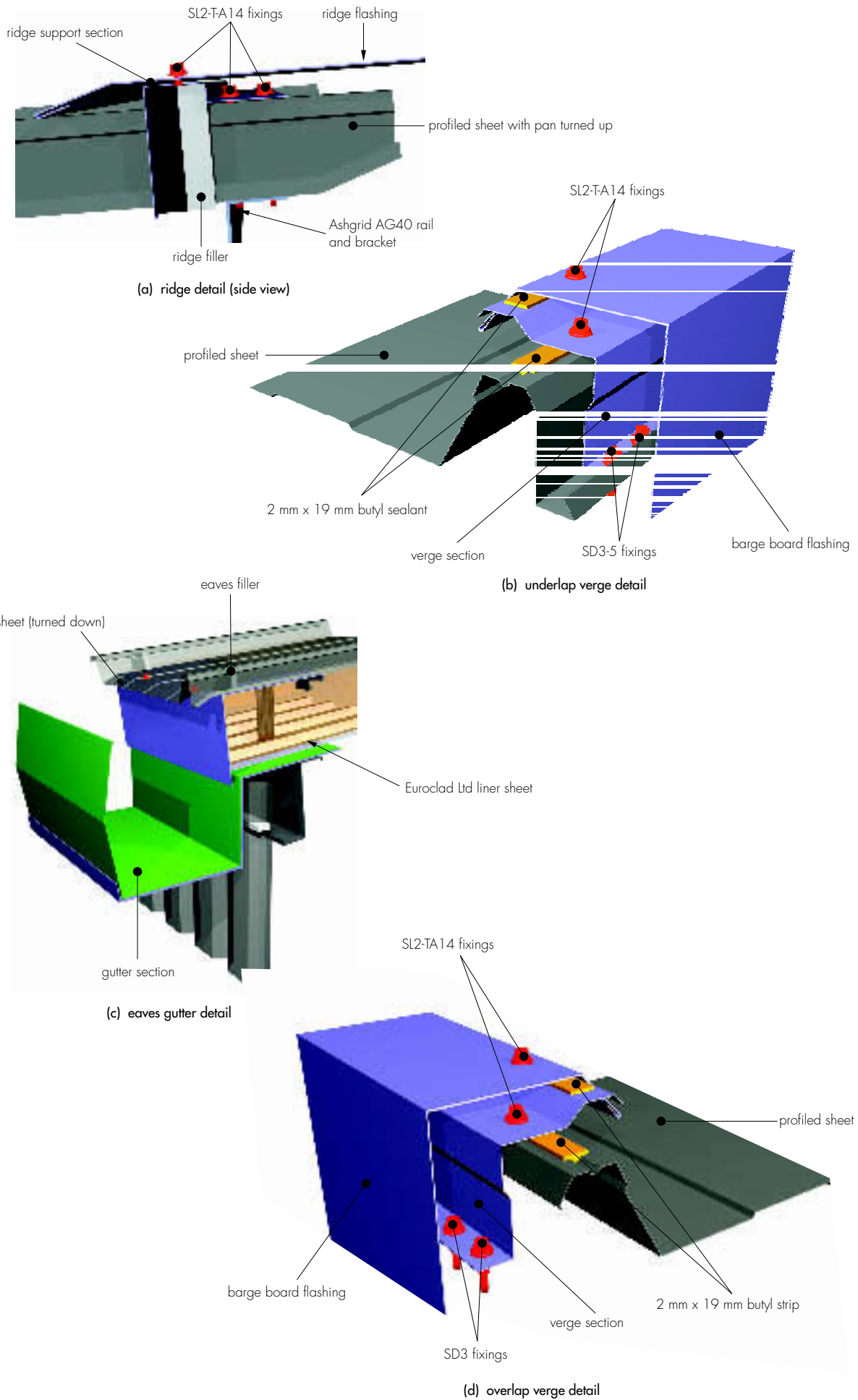
13.19 Closures and fillers for hip details are cut according to roof pitch and plan angle for each side of the hip to suit project requirements. They are installed as described in section 13.15 but are positioned parallel to the centreline of the hip.

13.20 Details of fixings and their appropriate use are given in Table 5.

Table 5 Details of fixings

Type	Application	Frequency
SD3-5 Non-washed	Sheet to spacer and secure bottom of verge	2 fixings at each spacer
SL2-T-A14-4	Spacer to purlin fixings	2 fixings per bracket
	Verge section to sheet crown	at 450 mm centres
	Ridge/hip support to sheet	2 fixings at each sheet crest
	Flashing to ridge support	at 500 mm centres
	Flashing to verge section	at 600 mm centres
6604/6/3W	Flashing to hip support	1 at the centre of each sheet profile (varies dependent on hip)
	Drip angle to sheet (Anchor fixing)	2 per sheet
	SXL12-A14-colour	Eaves stitching Screw (curved roofs only)
Liner stitching screw		at 500 mm centres on sidelaps
TDC-T-T16	Spacer bracket through liner to timber purlin	2 fixings per bracket

Figure 3 Typical verge, ridge and gutter installation detail



Technical Investigations

The following is a summary of the technical investigations carried out on the Euroclad Ltd Secret-Fix SF500 Steel Double-Skin Roof System.

14 Tests

Tests were carried out on the product to establish:

- resistance to dead and imposed (snow) loading
- resistance to wind loading
- behaviour of fixings and profile under static and cyclic loading
- resistance to impact
- behaviour under concentrated loads.

15 Investigations

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

15.2 An assessment was made of:

- fire resistance
- practicability of installation
- condensation risk and thermal transmittance
- weathertightness of fixed cladding and details
- acoustic performance.

15.3 Existing information, relating to the durability of the system, performance in fire and compatibility of materials in contact, has been examined.

15.4 A visit was made to a site to assess the practicability of installation.

Additional Information

- Assemblies using Euroclad Ltd external profiles, rooflights and liner profiles have been tested in accordance with ACR[M]001 : 2000. Systems are capable of achieving Class B classification. This aspect is outside the scope of this Certificate and is entirely the responsibility of the Certificate holder. Further details are available from the Certificate holder.

- Three dimensional thermal modelling has been carried out by the Certificate holder to establish P_{si} values and f factors for a number of standard construction details. These performances are outside the scope of this Certificate. Further details are available from the Certificate holder.

Bibliography

- BS 476-3 : 1958 *Fire tests on building materials and structures — External fire exposure roof test*
- BS 476-4 : 1970 *Fire tests on building materials and structures — Non-combustibility test for materials*
- BS 5250 : 2002 *Code of practice for control of condensation in buildings*
- BS 5427-1 : 1996 *Code of practice for the use of profiled sheet for roof and wall claddings on buildings — Design*
- BS 5720 : 1979 *Code of practice for mechanical ventilation and air conditioning in buildings*
- BS 5925 : 1991 *Code of practice for ventilation principles and designing for natural ventilation*
- BS 6229 : 2003 *Flat roofs with continuously supported coverings — Code of practice*
- 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 EN 10147 : 2000 *Continuously hot-dip zinc coated structural steels strip and sheet — Technical delivery conditions*
- EN 10142 : 2000 *Continuously hot-dip zinc coated low carbon steels strip and sheet for cold forming — Technical delivery conditions*
- ISO 13788 : 2001 *Hygrothermal performance of building components and building elements — Internal surface temperature to avoid critical surface humidity and interstitial condensation — Calculation methods*
- Advisory Committee for Roofwork, ACR[M]001 : 2000 *Test For Fragility of Roofing Assemblies [second edition]*



On behalf of the British Board of Agrément

A handwritten signature in black ink, appearing to read 'P. C. Newson'.

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Chief Executive