

Viridian Solar

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Agrément Certificate

No 07/4474

PRODUCT SHEET 1 — CLEARLINE RANGE OF SOLAR COLLECTORS**PRODUCT SCOPE AND SUMMARY OF CERTIFICATE**

This Certificate relates to the Clearline Range of Solar Collectors, to pre-heat water in domestic hot water systems.

THIS CERTIFICATE INCLUDES:

- factors relating to compliance with UK 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**

Structural performance — when installed in accordance with the Certificate holder's instructions, the product will resist the loads likely to be met during installation and service (see section 4).

Behaviour in relation to fire — the product has been tested for surface spread of flame and penetration performance in accordance with BS 476-3 : 2004 and may be characterised as having an AA rating (see section 5).

Energy performance — the product reduces the need for 'on grid' energy supplied to heat the water required within a dwelling. The performance is proportional to the solar conditions at the required time (see section 6).

Weathertightness — the product will not be adversely affected by rain, wind-driven snow or rain penetrating the tiling during service. The product is resistant to rain penetration in accordance with the test method described in BS EN 12975-2 : 2006 (see section 7).

Durability — the product will have a life equivalent to that of the roof structure in which it is incorporated. The product is fixed to the timber battens which are protected by tiles/flashing components (see section 11).

The BBA has awarded this Agrément Certificate for the Clearline Range of Solar Collectors to Viridian Solar as fit for their intended use provided they are installed, used and maintained as set out in this Agrément Certificate.

On behalf of the British Board of Agrément

Greg Cooper: Chief Executive

Date of First issue: 1 November 2007

The BBA is a UKAS accredited certification body — Number 113. The schedule of the current scope of accreditation for product certification is available in pdf format via the UKAS link on the BBA website at www.bbacerts.co.uk

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

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Regulations

In the opinion of the BBA, the Clearline Range of Solar Collectors, if used in accordance with the provisions of this Certificate, will meet or contribute to meeting the relevant requirements of the following Building Regulations:



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

Requirement:	A1(1)(b)	Loading
Comment:		The product adequately transmits self weight and wind loads to typical roof structures. See section 4.7 of this Certificate.
Requirement:	B4(2)	External fire spread
Comment:		The product does not affect the existing fire rating of a roof structure. The panel has an 'AA' fire rating in accordance with BS 476-3 : 2004. See sections 5.1 to 5.3 of this Certificate.
Requirement:	C2(b)	Resistance to moisture
Comment:		The product does not adversely affect a roof's resistance to the ingress of precipitation. See sections 7.1 and 7.2 of this Certificate.
Requirement:	L1(a)(i)	Conservation of fuel and power
Comment:		The product may be considered as energy efficient during use. See section 6.1 of this Certificate.
Requirement:	Regulation 7	Materials and workmanship
Comment:		The product is an acceptable material. See section 11 of this Certificate.



The Building (Scotland) Regulations 2004 (as amended)

Regulation:	8	Fitness and durability of materials and workmanship
Regulation:	8(1)	Fitness and durability of materials and workmanship
Comment:		The product can contribute to a construction satisfying this Regulation. See section 11 and the <i>Installation</i> part of this Certificate.
Regulation:	9	Building standards – construction
Standard:	1.1(b)	Structure
Comment:		The product has sufficient strength and stiffness to sustain design loads, with reference to clauses 1.1.0 ⁽¹⁾ and 1.1.1 ⁽¹⁾ . See section 4.7 of this Certificate.
Standard:	2.8	Spread from neighbouring buildings
Comment:		The product does not affect the existing fire rating of a roof structure. The collector panel has an 'AA' fire rating in accordance with BS 476-3 : 2004 and is considered 'low vulnerability', with reference to clause 2.8.2 ⁽¹⁾ . See sections 5.1 to 5.3 of this Certificate.
Standard:	3.10	Precipitation
Comment:		The product does not adversely affect a roof's resistance to the ingress of precipitation, with reference to clause 3.10.8 ⁽¹⁾ . See sections 7.1 and 7.2 of this Certificate.
Standard:	4.9	Danger from heat
Comment:		The product is sealed with the facility to enable the system fluid to expand without the need for discharge overflow or tundish facilities, with reference to clause 4.9.1 ⁽¹⁾ . See section 10.1 of this Certificate.
Standard:	6.1(b)	Carbon dioxide emissions
Standard:	6.3	Heating system
Comment:		The product may be considered as having low carbon dioxide emissions and will contribute to the energy efficiency of the building, with reference to clause 6.3.11 ⁽¹⁾ . See section 6.1 of this Certificate.
Regulation:	12	Building standards – conversions
Comment:		All comments given for this product under Regulation 9, 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) 2000 (as amended)

Regulation:	B2	Fitness of materials and workmanship
Comment:		The product is acceptable. See section 11 of this Certificate.
Regulation:	C4(b)	Resistance to ground moisture and weather
Comment:		The product does not adversely affect a roof's resistance to the ingress of precipitation. See sections 7.1 and 7.2 of this Certificate.
Regulation:	D1	Stability
Comment:		The product adequately transmits self weight and wind loads to typical roof structures. See section 4.7 of this Certificate.
Regulation:	E5(b)	External fire spread
Comment:		The product does not affect the existing fire rating of a roof structure. The collector panel has an 'AA' fire rating in accordance with BS 476-3 : 2004. See sections 5.1 to 5.3 of this Certificate.
Regulation:	F2(a)(ii)	Conservation measures
Comment:		The product incorporated into a water heating system may be installed to either vented or unvented hot water stores. See section 6.1 of this Certificate.

Standard:	F3	Target carbon dioxide Emissions Rate
Comment:		The product will contribute to reducing the total carbon dioxide emissions of the building. See sections 6.1 and 6.5 of this Certificate.
Regulation:	P5	Unvented hot water storage systems
Comment:		The product is sealed with a pressure relief valve incorporated. See section 10.1 of this Certificate.

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 obligations under these Regulations.

See section: 2 *Delivery and site handling* (2.3 and 2.4).

Non-regulatory Information

NHBC Standards 2007

NHBC accepts the use of the Clearline Range of Solar Collectors when installed and used in accordance with this Certificate, in relation to NHBC Standards, Chapter 7.2 *Pitched roofs*.

Zurich Building Guarantee Technical Manual 2007

In the opinion of the BBA, the Clearline Range of Solar Collectors, when installed and used in accordance with this Certificate, satisfy the requirements of the *Zurich Building Guarantee Technical Manual*, Section 4 *Superstructure*, Sub-section *Pitched roofs*.

General

This Certificate relates to the Clearline Range of Solar Collectors for use as liquid heating solar collectors, positioned above traditional roof structures with the controller and ancillary pipework situated within the building envelope.

Technical Specification

1 Description

1.1 The Clearline Range of Solar Collectors comprises flat plate collectors that may be installed to vented or unvented water heating stores. The product installed, may be regarded as an indirect system and uses a proprietary fluid to transfer heat from the collector panel to a heat exchanger raising the temperature of the potable water within the hot water store. The collector panel should be fixed to a battened roof which has a pitch of between 20° and 60°.

1.2 The solar collector system components (see Figure 1) include:

- roof-mounted collector panel
- roof flashing kit — panel surround suitable for interlocking or plain tiles (see Figure 2).

1.3 Other components used but not covered by this Certificate include:

- conventional pipework and fittings (not supplied)
- system controller with drain back facility
- heat transfer fluid (30% propylene glycol)
- hot water storage system.

1.4 The product has the nominal characteristics given in Table 1.

1.5 Quality control checks are carried out on the incoming materials, during production and on the finished product. Quality control checks on the finished product include:

- collector pressure test
- controller operation checks.

Table 1 Characteristics of Solar Collector range

	Collector panel type		
	V30	V20	V15
Panel length (m)	2.895	2.043	1.479
Panel width (m)	1.168	1.168	1.168
Panel weight (empty) (kg)	62	42	31
Heat transfer fluid capacity (litre)	1.4	1.4	1.4

Figure 1 Components

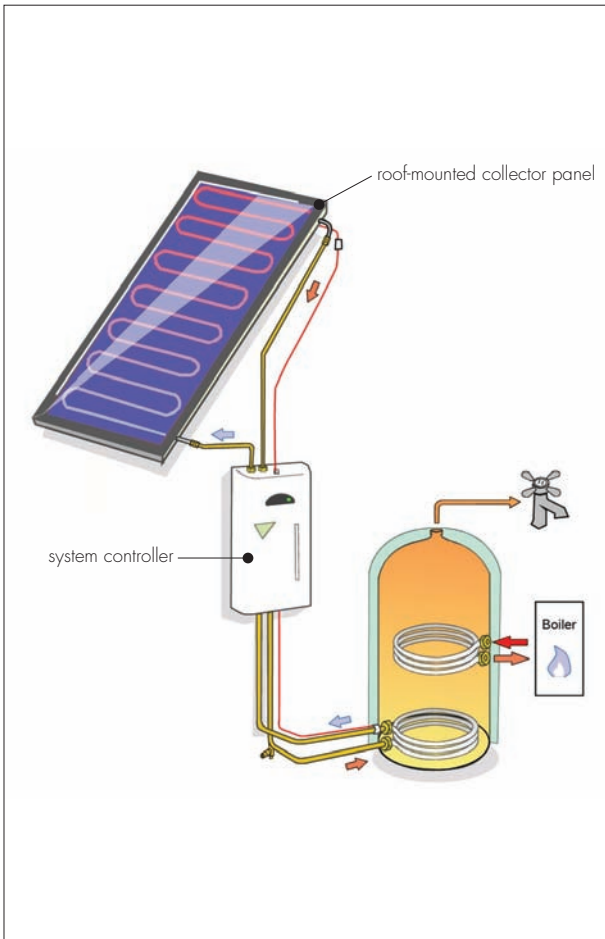
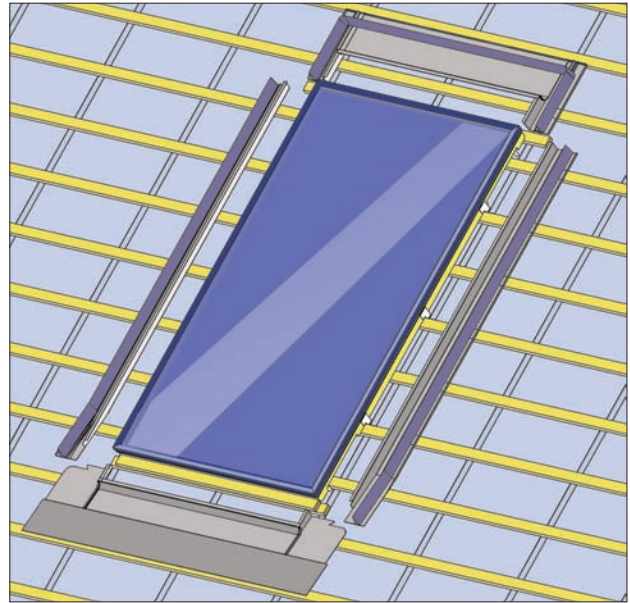


Figure 2 Roof flashing kit



2 Delivery and site handling

2.1 The product components are delivered to site boxed on a pallet with a label bearing the company name, product type and the BBA identification mark including the number of this Certificate. The Certificate holder's recommendations for installing the panels should be followed at all times.

2.2 The collector panel should be stored on a level, clean dry surface and remain in the packaging until installation. The controller and other ancillary items should be stored inside and treated as an electrical item.

2.3 Heat transfer fluid is supplied in 2.5 litre containers and is classified as 'flammable' under The Chemicals (Hazard Information and Packaging for Supply) Regulations 2002 (CHIP3).

2.4 The heat transfer fluid is a mixture of propylene glycol (30%) and water. The propylene glycol component may cause eye irritation, is flammable when undiluted and should be used in well ventilated areas. Disposal of the fluid should be by specialist methods that ensures the waste fluid does not pollute the environment.

Assessment and Technical Investigations

The following is a summary of the assessment and technical investigations carried out on the Clearline Range of Solar Collectors.

Design Considerations

3 Use

The Clearline Range of Solar Collectors is satisfactory for use in domestic applications where the roof structure is pitched between 20° and 60° and tiled using interlocking or plain tiles. The collector panel must be fixed to a pitched roof that has underlay and battens in place in accordance with BS 5534 : 2003. The collector, expansion vessel and controller may be connected to vented or unvented hot water stores with the facility of a secondary heat exchanger coil. The collector panel should be installed by competent persons with suitable training and practical experience of these systems.

4 Structural performance

4.1 When tested horizontally, in accordance with BS EN 12975-2 : 2006, the collector panel withstood a downward (imposed) and upward (suction) pressure of 1000 Pa.

4.2 Tests carried out by the BBA on the collector panel mounted at a pitch of 30° installed onto a roof indicate that the product can withstand a pressure of 1350 Pa and a suction of 700 Pa.

4.3 When calculating maximum allowable pressures for other pitches, the 1.0 kPa pressure (or suction) value obtained in section 4.1 should be used, with due allowance made for the panel self weight, taken to be 20 kgm⁻².

4.4 To minimise any offset forces, it is important to ensure that the fixing clips fit tightly into and against the sides of the collector panel.

4.5 The host roof structure, and any modifications necessary to accommodate the collector panel, should be checked by a suitably qualified engineer in accordance with the relevant national Building Regulations.

4.6 Imposed loads should be calculated in accordance with BS 6399-1 : 1996 or the relevant part of Eurocode 1, and wind loads in accordance with BS EN 1991-1-4 : 2005 and BS 6399-2 : 1997.



4.7 In addition to the requirements specifically referred to in this Certificate, the collector panel support system must be designed and constructed to comply with the technical specifications given in BS 5268-2 : 2002 or BS 5268-3 : 2006 and the national Building Regulations and Standards thus:

England and Wales — Approved Document A1/2, Section 2B1

Scotland — *Small Buildings Guide*

Northern Ireland — Technical Booklet D.

5 Behaviour in relation to fire



5.1 The collector panel (including flashings) may be classified as 'AA' or 'low vulnerability' in accordance with national Building Regulations and, therefore, is unrestricted under the following guidance:

England and Wales — Approved Document B, Section 10.4

Scotland — Mandatory Standard 2.8, clause 2.8.2⁽¹⁾

(1) Technical Handbook (Domestic).

Northern Ireland — Technical Booklet E, Section 4.19.

5.2 The collector panel components (including flashings) outside of the building envelope have been tested in accordance with BS 476-3 : 2004 to obtain the classification 'AA'.

5.3 The heat transfer fluid is 70% water, 30% propylene glycol (by volume). The collector panel was not tested with fluid.

6 Energy performance



6.1 The product will reduce the non-renewable fuel demand of the building in which it is incorporated:

England and Wales — Approved Document L1A, Section 1, paragraph 3.1

Scotland — Mandatory Standard 6.3, clause 6.3.11⁽¹⁾

(1) Technical Handbook (Domestic).

Northern Ireland — Technical Booklet F1, Section 2.25.

6.2 The product has a zero loss efficiency (η) of 0.8 and a heat loss co-efficient (A_1) of 3.8 shown by tests carried out in accordance with BS EN 12975-2 : 2006.

6.3 At high levels of sunlight when the average system fluid temperature is slightly higher than ambient temperature, the product can transfer approximately 2.3 kW of energy to the building hot water store. Test results of the performance of the largest-sized collector panel (V30) are shown in Table 2.

Table 2 Power output per collector⁽¹⁾ (W)

T _m -T _a ⁽²⁾ (K)	Global irradiance (Wm ⁻²)		
	400	700	1000
10	857	1590	2322
30	603	1335	2068
50	326	2059	1791

(1) SPF Solartechnik report C814LPEN.

(2) T_m = mean temperature of system fluid. T_a = ambient air temperature.

6.4 For further information regarding the suitability of this type of energy source for the type of building, reference may be made to the *Low or zero carbon energy source strategic guide* [The Building Regulations 2000 (as amended) (England and Wales)].



6.5 Reasonable provision should be made to ensure that the owner/occupier of the building is provided with sufficient information about the product so that it can be operated and maintained to maximise its potential for the conservation of fuel and power.

Weathertightness



7.1 The product is fixed to tiling battens above the roof tile underlay. Completed roofs will provide adequate resistance to weather ingress.

7.2 Particular attention must be paid to correct fitting of all components and to the detailing and positioning of gaskets and areas where pipework enters the building.

8 Practicability of installation

8.1 The product's internal and external installation are practicable, using the methods and procedures within this Certificate and in accordance with the guidance given in the Certificate holder's installation manuals.

8.2 The pipework associated with the product should be insulated as outlined in the Certificate holder's installation manual and in accordance with the national Building Regulations and Standards:

England and Wales — Approved Document L1A, Section 1, paragraph 39

Scotland — Mandatory Standard 6.4, clause 6.4.1⁽¹⁾

(1) Technical Handbook (Domestic).

Northern Ireland — Technical Booklet F, Section 3.42.

9 Maintenance

9.1 Annual and five-yearly maintenance schedules are supplied by the Certificate holder and allow for fluid level checks and replacement.

9.2 Fault diagnosis is described in the product literature. Faults not covered within the literature may be resolved by contacting the Certificate holder.

10 Safety



10.1 The product is a sealed system with a 3 bar pressure relief valve enabling liquid expansion into an integrated expansion tank. The tank size is sufficient to accommodate all the liquid in the collector panel without the need for overflow plumbing.

Scotland — Mandatory Standard 4.9, clause 4.9.1⁽¹⁾

(1) Technical Handbook (Domestic).

Northern Ireland — Technical Booklet P(2).

10.2 The hot water store should also incorporate a safety device to ensure the temperature of the stored water does not exceed 100°C at any time.

10.3 The product requires the provision of a 13A electrical socket outlet to power the controller. This should be provided in accordance with BS 7671 : 2001.

11 Durability



The product will have a life equivalent to that of the roof structure in which it is incorporated. The product is fixed to the timber battens which are protected by tiles/flashing components. The product has been assessed for durability in accordance with BS EN 12975-2 : 2006 and is considered durable in accordance with this test method.

Installation

12 General

The Clearline Range of Solar Collectors must be installed and fixed in accordance with the Certificate holder's instructions and provisions of this Certificate. Installation can be carried out under all conditions normal to roofing work and within the building under all conditions normal to plumbing work.

13 Procedure

Roofing works

13.1 The collector panel must be fitted to the roof structure only when roof tile underlay and tile battens are secured in place. The collector panels must be secured to the battens using the fixing components provided. Tile battens should be secured to the roof structure following the relevant recommendations of BS 5534 : 2003 and BS 8000-6 : 1990.

Plumbing works

13.2 The system controller and associated pipework should be installed by a competent plumber following the procedure documented by the Certificate holder. Plumbing works are carried out within the building as collector panel connections should be accessible from the loft area. Plumbing connections should only be carried out once the collector panel is fitted to the roof of the building.

13.3 Pipework, hot water stores and pressure relief systems are not included within the scope of this Certificate and as such, reference to preferred system designs or installations should be made to the Certificate holder or competent plumber/installer.

Technical Investigations

14 Tests

Tests carried out by the BBA on the Clearline Range of Solar Collectors included:

- thermal cycling performance
- wind-driven rain test to BS 6375-1 : 2004
- effect of heat ageing on elastomeric components.

15 Investigations

15.1 The performance of the collector panel and flashing kit has been assessed in accordance with BS EN 12975-2 : 2001.

15.2 The fire performance of the collector panel and flashing kit has been assessed in accordance with BS 476-3 : 2004.

Bibliography

BS 476-3 : 2004 *Fire tests on building materials and structures — Classification and method of test for external fire exposure to roofs*

BS 5268-2 : 2002 *Structural use of timber — Code of practice for permissible stress design, materials and workmanship*

BS 5268-3 : 2006 *Structural use of timber — Code of practice for trussed rafter roofs*

BS 5534 : 2003 *Code of practice for slating and tiling (including shingles)*

BS 6375-1 : 2004 *Performance of windows and doors — Classification of weathertightness and guidance on selection and specification*

BS 6399-1 : 1996 *Loading for buildings — Code of practice for dead and imposed loads*

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

BS 7671 : 2001 *Requirements for electrical installations. IEE Wiring Regulations. Sixteenth Edition*

BS 8000-6 : 1990 *Workmanship on building sites — Code of practice for slating and tiling of roofs and claddings*

BS EN 1991-1-4 : 2005 *Eurocode 1 : Actions on structures — General actions — Wind actions*

BS EN 12975-2 : 2006 *Thermal solar systems and components — Solar collectors — Test methods*

16 Conditions

16.1 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.

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

16.3 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.

16.4 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.

16.5 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.