



## Brett Martin Daylight Systems

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**Agrément  
Certificate  
No 04/4114**  
Second issue\*

Designated by Government  
to issue  
European Technical  
Approvals

## BRETT MARTIN DAYLIGHT SYSTEMS IN-PLANE GRP ROOFLIGHTS

Lucarnes au même plan  
Dachoberlichten in der gleichen Ebene

## Product



• THIS CERTIFICATE RELATES TO BRETT MARTIN DAYLIGHT SYSTEMS IN-PLANE GRP ROOFLIGHTS, CONSISTING OF A FACTORY-PRODUCED, GLASS-FIBRE REINFORCED POLYESTER RESIN PROFILED SHEET, AVAILABLE IN SINGLE-SKIN OR DOUBLE-SKIN, OR FOR IMPROVED THERMAL INSULATION, AS ENERGYSAVER<sup>(1)</sup> OR CLEAR THERM<sup>(1)</sup> MULTI-SKIN CONFIGURATIONS. THE ROOFLIGHTS ARE MECHANICALLY FIXED ON SITE.

• The rooflights are for use in pitched roofs of profiled sheet and are designed to admit controlled daylight into non-domestic and commercial buildings.

continued

## 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 the requirements of the Building Regulations to which rooflights can contribute in achieving compliance. In the opinion of the BBA, Brett Martin Daylight Systems In-plane GRP Rooflights, if used in accordance with the provisions of this Certificate, will meet or contribute to meeting the relevant requirements.

Requirement: A1

Comment:

Loading

When installed in accordance with the provisions of this Certificate, the rooflights will have sufficient strength and stiffness to sustain the design load. See the tinted areas in the *Resistance to wind loading* and *Resistance to snow loading* sections of these Front Sheets and the *Strength and stability* section of the accompanying Detail Sheets.

Requirement: B2

Comment:

Internal fire spread (linings)

See the tinted areas in the *Performance in relation to fire* section of these Front Sheets.

Requirement: B4(2)

Comment:

External fire spread

See the tinted areas in the *Performance in relation to fire* section of these Front Sheets.

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continued

- It is essential that the rooflights are installed and used in accordance with the relevant clauses of the Certificate holder's instructions.

(1) Registered trademark.

These Front Sheets must be read in conjunction with the accompanying Detail Sheets, which provide information relating to specific rooflights.

Requirement:	C2 (b) and (c)	Resistance to moisture
Comment:		When installed in accordance with this Certificate, the rooflights will not adversely affect the resistance of the roof to the passage of moisture. See the tinted area in the <i>Weathertightness</i> section of these Front Sheets.
Requirement:	L2(a)	Buildings other than dwellings
Comment:		When demonstrating compliance with this Requirement, the U values given in the tinted area of the <i>Thermal properties</i> section of the accompanying Detail Sheets, may be used.
Requirement:	Regulation 7	Materials and workmanship
Comment:		The rooflights are acceptable when used in accordance with this Certificate. See the tinted areas in the <i>Durability</i> section of the accompanying Detail Sheets.

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



In the opinion of the BBA, Brett Martin Daylight Systems In-plane GRP Rooflights, 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 rooflights can contribute to a construction meeting this Standard. See the <i>Installation</i> part of this Certificate.
Standard:	B2.2	Selection and use of materials, fittings, and components, and workmanship
Comment:		The rooflights are an acceptable material. See the tinted areas in the <i>Durability</i> section of the accompanying Detail Sheets.
Regulation:	11	Structure
Standard:	C2.1	Structure — Stability
Comment:		When installed in accordance with the provisions of this Certificate, the rooflights will have sufficient strength and stiffness to sustain design loads. See the tinted areas in the <i>Resistance to wind loading</i> and <i>Resistance to snow loading</i> sections of these Front Sheets and the <i>Strength and stability</i> section of the accompanying Detail Sheets.
Regulation:	12	Structural fire precautions
Standard:	D6.7	Structural fire precautions — Roofs and rooflights
Standard:	D7.1	Fire spread on internal linings — Principles
Standard:	D9.1	Fire spread from an adjoining building
Comment:		The GRP sheets used externally in the rooflights have a reaction to fire performance as indicated. See the tinted areas in the <i>Performance in relation to fire</i> section of these Front Sheets.
Regulation:	17	Resistance to moisture
Standard:	G3.1	Resistance to precipitation — Resistance to precipitation
Comment:		When installed in accordance with the provisions stated in this Certificate, the rooflights will not adversely affect the resistance of the roof to the passage of moisture. See the tinted area in the <i>Weathertightness</i> section of these Front Sheets.
Regulation:	22	Conservation of fuel and power
Standard:	J8.1	Buildings in purpose groups 2 to 7
Comment:		The U values shown in the tinted area of the <i>Thermal properties</i> section of the accompanying Detail Sheets should be used when showing compliance with the requirements of this Standard.
Regulation:	27	Miscellaneous hazards
Standard:	P2.4	Danger from accident — Cleaning of windows and rooflights
Standard:	P2.8	Danger from accident — Roof access
Comment:		Suitable roof access must be provided as described in the Standards or the deemed-to-satisfy provisions. The rooflights are not designed to provide access. See the tinted area in the <i>Strength and stability</i> section of Detail Sheet 3.

## 3 The Building Regulations (Northern Ireland) 2000



In the opinion of the BBA, Brett Martin Daylight Systems In-plane GRP Rooflights, 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 rooflights are acceptable when used in accordance with this Certificate. See the tinted areas in the <i>Durability</i> section of the accompanying Detail Sheets.

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Regulation:	<b>C4</b>	Resistance to ground moisture and weather
Comment:		When installed in accordance with the provisions stated in this Certificate, the rooflights will not adversely affect the resistance of the roof to the passage of moisture. See the tinted area in the <i>Weathertightness</i> section of these Front Sheets.
Regulation:	<b>D1</b>	Stability
Comment:		When installed in accordance with the provisions of this Certificate, the rooflights will have sufficient strength and stiffness to sustain the design loads. See the tinted areas in the <i>Resistance to wind loading</i> and <i>Resistance to snow loading</i> sections of these Front Sheets and the <i>Strength and stability</i> section of the accompanying Detail Sheets.
Regulation:	<b>E3</b>	Internal fire spread — Linings
Comment:		See the tinted areas in the <i>Performance in relation to fire</i> section of these Front Sheets.
Regulation:	<b>E5</b>	External fire spread
Comment:		See the tinted areas in the <i>Performance in relation to fire</i> section of these Front Sheets.
Regulation:	<b>F2</b>	Building fabric
Comment:		The U values shown in the tinted area of the <i>Thermal properties</i> section of the accompanying Detail Sheets should be used when showing compliance with the requirements of this Regulation.

## **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 sections: *2 Delivery and site handling* (2.2) of Detail Sheets 2 and 3 and (2.3 and 2.4) of Detail Sheets 4 and 5; *4 Strength and stability* (4.1 to 4.4) of Detail Sheets 2, 3, 4 and 5; and *6 General* (6.4) of Detail Sheets 2 and 4 and (6.2) of Detail Sheets 3 and 5.

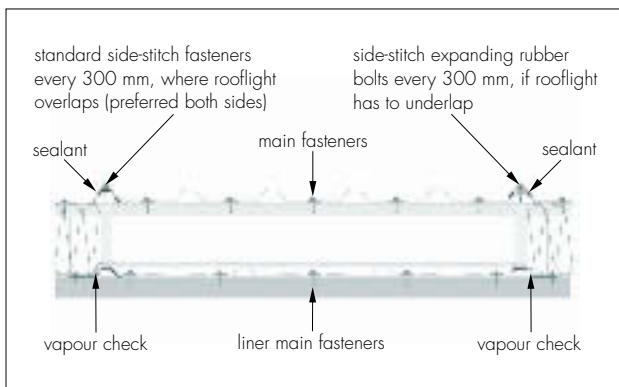
## Design Data

### 5 General

5.1 Brett Martin Daylight Systems In-plane GRP Rooflights are normally used in conjunction with roofing systems utilising profiled sheet materials. Rooflights are available as single-skin, double-skin or multi-skin configurations.

5.2 Site-assembled multi-skin rooflights consist of a Safelight or Trilite GRP liner and outer sheet with a flat structured polycarbonate Cleartherm layer added (see Figure 1).

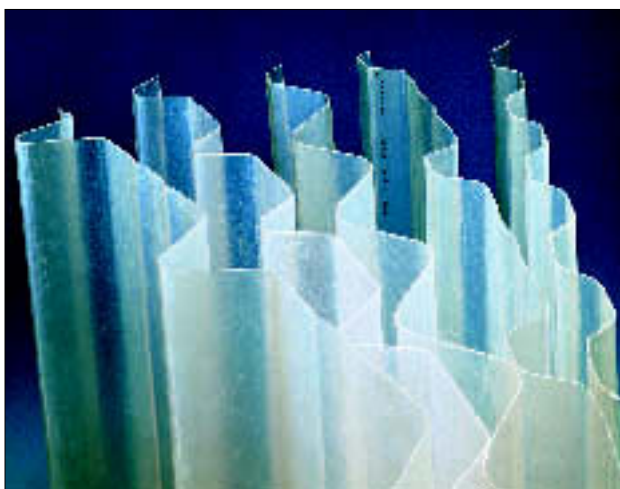
Figure 1 Cross-section of a Cleartherm rooflight



5.3 Factory-assembled Energysaver rooflights consist of a double-skin Safelight or Trilite Factory Assembled Insulated Rooflight (FAIR) with additional thermal membrane(s). Cleartherm and Energysaver reduce heat loss and minimise condensation.

5.4 All sheets are manufactured in sinusoidal, trapezoidal, or ribbed trapezoidal formats to match most fibre-cement, aluminium, and steel profiles. Flat sheet can also be supplied (see Figure 2).

Figure 2 Various formats of Brett Martin Daylight Systems In-plane panels



5.5 Sheets are supplied in lengths to suit customer requirements. Widths conform to those of the metal profile sheets to be matched.

5.6 Safelight and Trilite sheets are supplied in a natural translucent finish as standard.

5.7 Standard fasteners are available from specialist fastener manufacturers. Fillers and sealants are available from the Certificate holder. These are not covered by this Certificate.

#### Fasteners (not covered by this Certificate)

5.8 Fasteners should have an adequate strength to resist the design load, imposed load and wind loading and maintain weathertightness. Also, where required by the cladding and support design, to provide adequate lateral restraint to substructure elements such as purlins and spacers. Fasteners are divided into two groups, side-stitch fasteners and main fasteners.

5.9 It is essential that the watertightness of fixings with fasteners penetrating the sheeting should remain effective when the sheeting is subjected to the maximum inward imposed loading including wind. Under such loads, the sheeting and any insulating substrate will compress and thereby tend to loosen the seal in the fastener, increasing the risk of water penetration. It is therefore important to ensure that the sheeting, substrate, and fastener including sealing washer, can provide adequate performance under these conditions. For site-assembled rooflights, the use of support bar systems provide the necessary support. Hardpak fillers provide the support for Factory Assembled Rooflights (FAIRs).

5.10 Main fasteners should be positioned along and secured to the lines of purlins. End laps in profiled sheeting should be arranged to occur over a purlin, and secured by the same main fasteners.

5.11 Along the purlin, the main fasteners should be spaced so as to maintain a tight end lap, resist the wind suction loads on the cladding and fasteners, in accordance with the manufacturer's instructions and avoid vibration of the sheeting.

#### Side-stitch fasteners (not covered by this Certificate)

5.12 The main function of side-stitch fasteners is to maintain a tight lap and seal, but they are also required to transfer concentrated load to adjacent sheets.

5.13 When required, side-stitch fasteners should be positioned at side laps on the crown for roof cladding, depending on the profile. The fastener and method of installation should be able to accommodate and compress a seal in the lap joint where a seal is used. The spacing of fasteners depends on the thickness and the presence, or otherwise, of a sealant in the joint, but should generally not be more than 400 mm apart for Trilite rooflights or 600 mm apart for Safelight rooflights.

5.14 For Trilite rooflights all fixings should be of stainless steel. For Safelight or Trilite Ultra rooflights,

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a choice of carbon or stainless steel can be made, to match the fastener type on the surrounding roof. When fixing into or through aluminium, the Certificate holder recommends obtaining specialist advice from either the fastener supplier or manufacturer.

## 6 Weathertightness

6.1 To achieve weathertightness it is essential that the joints and fittings are correctly installed as described in the manufacturer's literature.



6.2 The rooflights will adequately resist the passage of moisture to the inside of the building and so meet the requirements of:

### England and Wales

Approved Document C, Section 6

### Scotland

Regulation 17, Standard G3.1

### Northern Ireland

Regulation C4.

6.3 The products are impervious to water and, when used in the systems described, will give a weathertight roofing capable of accepting minor structural movements without damage.

## 7 Resistance to wind loading



The rooflights are designed to have adequate resistance to wind loads calculated in accordance with BS 6399-2 : 1997.

## 8 Resistance to snow loading



The rooflights are designed to support a distributed load of  $1.5 \text{ kNm}^{-2}$ . The magnitude of the actual snow load imposed will depend upon a number of factors, such as height above sea level, geographical location, roof arrangement, type and configuration of rooflights. Therefore, it is recommended that methods from BS 6399-3 : 1988 are used to calculate actual snow load when the rooflight is used in situations where a load greater than  $1.5 \text{ kNm}^{-2}$  can be expected.

## 9 Performance in relation to fire



9.1 The sheet products are a thermoset material and available in grades SAB3, SAA1 and SAAO. Fire rating identification is

by means of coloured thread inserted into the product during manufacture.

Table 1 Identification thread colours according to fire rating

	Rating	Class	Identification thread
SAAO <sup>(1)</sup>	AA	1	red/yellow
SAA1 <sup>(2)</sup>	AA	1	red
SAB3 <sup>(3)</sup>	AB	3	blue

(1) SAA to BS 476-3 : 1958, Class 1 to BS 476-7 : 1997 and Class 0 as defined by the Building Regulations and BS 476-6 : 1989.

(2) SAA to BS 476-3 : 1958 and Class 1 to BS 476-7 : 1997.

(3) SAB to BS 476-3 : 1958 and Class 3 to BS 476-7 : 1997.

9.2 Guidance on the instructions for use of these products is given in the national Building Regulations:

### England and Wales

Approved Document B, Tables 11 and 18

### Scotland

Standards D7.1 and D9.1

### Northern Ireland

Technical Booklet E, Tables 2.2 and 4.8.

9.3 The product must not be used where the original roof surface is used as an escape route in a fire, or is below the level of an existing fire escape.

## Bibliography

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

BS 476-6 : 1989 *Fire tests on building materials and structures — Method of test for fire propagation for products*

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 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*

Advisory Committee for Roofwork, ACR[M]001 : 2000 *Test For Fragility of Roofing Assemblies* [second edition]

## Conditions of Certification

### 10 Conditions

10.1 This Certificate:

- (a) relates only to the product that is named, 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.

10.2 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.

10.3 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.

10.4 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.

10.5 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, Brett Martin Daylight Systems In-plane GRP Rooflights are fit for their intended use provided they are installed, used and maintained as set out in this Certificate. Certificate No 04/4114 is accordingly awarded to Brett Martin Daylight Systems.

On behalf of the British Board of Agrément

A handwritten signature in black ink, appearing to read 'P. C. Hewitt', is written over a light grey background.

Date of Second issue: 14th March 2005

Chief Executive

*\*Original Certificate issued on 29th June 2004. This amended version includes a revised layout of Front Sheets, clarification of cross-referencing to accompanying Detail Sheets and new Conditions of Certification.*



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For technical or additional information,  
contact the Certificate holder (see  
front page).  
For information about the Agrément  
Certificate, including validity and  
scope, tel: Hotline 01923 665400,  
or check the BBA website.



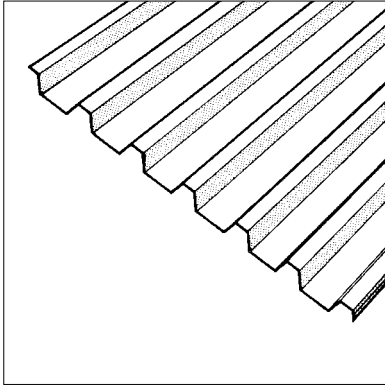


Brett Martin Daylight Systems

Certificate No 04/4114

**TRILITE AND TRILITE ULTRA SITE ASSEMBLED  
IN-PLANE GRP ROOFLIGHTS**
**DETAIL SHEET 2**  
*Second issue\**

## Product



• THIS DETAIL SHEET REFERS TO TRILITE<sup>(1)</sup> AND TRILITE ULTRA SITE ASSEMBLED IN-PLANE GRP ROOFLIGHTS, CONSISTING OF A FACTORY-PRODUCED, GLASS-FIBRE REINFORCED POLYESTER RESIN, PROFILED SHEET, AVAILABLE IN SINGLE-SKIN, DOUBLE-SKIN OR MULTI-SKIN CLEARTHERM<sup>(1)</sup> CONFIGURATIONS. THE ROOFLIGHT UNITS ARE MECHANICALLY FIXED AND JOINTED ON SITE.

- The rooflights are for use on pitched roofs of profiled sheet and are designed to admit daylight into non-domestic and commercial buildings.
- It is essential that the rooflights are installed and used in accordance with the relevant clauses of the Certificate holder's instructions.

(1) Registered trademark.

*This Detail Sheet must be read in conjunction with the Front Sheets, which give the system's position regarding the Building Regulations, general information relating to the system, and the Conditions of Certification.*

## Technical Specification

### 1 Description

1.1 The Trilite and Trilite Ultra Site Assembled In-plane GRP Rooflights profiled sheeting is manufactured on a continuous process and complies with BS 4154-1 : 1985 and BS 4154-2 : 1985, using thermosetting polyester resins, containing curing agents, and glass-fibre rovings or glass-fibre mat.

1.2 Surface protection is provided as standard to the weather sheets by a UV absorbing polyester film (eg Melinex 389 or other films approved for the purpose by the BBA) for enhanced UV protection.

1.3 The thermal insulation of the rooflights is enhanced by use of an internal triple layer known as Cleartherm<sup>(1)</sup> which is simply laid into position on the liner of a double-skinned application and secured with sealing tape along each side.

1.4 The rooflights are mechanically fixed to the roof construction using fastener types as recommended by the Certificate holder.

1.5 The Trilite GRP is available in three standard product weights, 1.8 kgm<sup>-2</sup>, 2.4 kgm<sup>-2</sup> and 3.0 kgm<sup>-2</sup>. Trilite Ultra GRP is available in two standard product weights, 3.6 kgm<sup>-2</sup> and 4.5 kgm<sup>-2</sup>.

1.6 Both Trilite and Trilite Ultra<sup>(1)</sup> are available in three grades of fire retardancy.

(1) Subsequent references to Trilite roof applications include Trilite and Trilite Ultra.

1.7 Ancillary items, not covered by this Certificate, but required for use with the system include:

- sealing tape — a UV stable pale-coloured, cross-linked, butyl sealant mastic for creating a waterproof seal, available from the Certificate holder

- foam fillers for closing off the profile (eg at ridge and eaves), available from the Certificate holder
- fasteners — main and side-stitch fasteners, available from specialist fastener manufacturers.

1.8 The raw materials are subject to a quality control system.

### 2 Delivery and site handling

2.1 Rooflight products are generally supplied in loose stacks. The GRP sheets should be stored on flat ground, on 75 mm battens (free from nails and debris) not more than 1.5 m apart. GRP sheets should not be exposed to weather before installation. If stored in outside conditions, the sheets must be protected from the weather by covering with waterproof covers. Sheets stored outside without protection could be damaged, and entrapped water will cause the sheets to discolour in prolonged sunlight. The sheets should be checked regularly whilst stored to ensure that moisture has not penetrated the protective cover and the GRP has not become discoloured.

2.2 GRP sheets should not be stacked more than 1.5 m high. Different profiles in the same stack must be separated with battens, located directly above each other.

## Design Data

### 3 Thermal properties

3.1 Tests were carried out for thermal transmittance using a Guarded Hot Box. When horizontal, the thermal transmittance<sup>(1)</sup> (U value) of a 1000 mm wide by 2100 mm long, GRP double-skin is 3.2 Wm<sup>-2</sup>K<sup>-1</sup>. Other sized rooflights within each range will have similar performances.

(1) Measured in accordance with BS 874-3.1 : 1987 and corrected for standard surface resistance.

3.2 Computer thermal simulations were carried out according to BS EN ISO 10211-1 : 1996 and BS EN 673 : 1998, and the U values of the rooflights are as shown in Table 1.

Table 1 Thermal properties of rooflights

Application (rooflight type)	U value (Wm <sup>-2</sup> K <sup>-1</sup> )
Double-skin	3.3
Triple-skin	2.0

## 4 Strength and stability

4.1 The GRP rooflight material has a good resistance to impact from soft bodies, such as a person slipping on the roof. Tests on typical rooflight samples showed that an impactor bag with an impact energy of 530J gave a category B non-fragile rating according to document ACR[M]001 : 2000.

4.2 Full details of non-fragility ratings to ACR[M]001 : 2000 for different weights and profiles of rooflights are given in Table 2.

Table 2 Non-fragility of site-assembled roofing assemblies<sup>(1)</sup>

Application (rooflight type)	Non-fragile classification	Minimum weight for non-fragility when new (kgm <sup>-2</sup> )
<b>Single-skin</b>		
Rigid trapezoidal profiles for use with single-skin metal sheeting	Class B	3.0
Rigid sinusoidal profiles for use with fibre-cement sheeting <sup>(2)</sup>	Class C	2.4
<b>Double-skin or Cleartherm, with flexible profile steel liners (typically 0.4 mm)</b>		
Liner panel assembly only	Class C	Liner: 2.4
Double-skin assembly (where Class C non-fragile liner is required eg when lining out)	Class B	Outer: 1.8 Liner: 2.4
Double-skin assembly (where there is no requirement for non-fragility of liner alone)	Class B	Outer: 2.4 Liner: 1.8
<b>Double-skin or Cleartherm, with rigid profile steel liners (typically 0.7 mm)</b>		
Liner panel assembly only	Class B	Liner: 3.0
Double-skin assembly	Class B	Outer: 1.8 Liner: 3.0

- (1) An assembly of a roof system incorporating rooflights of the minimum weight shown will achieve the relevant classification when new, provided it has already been demonstrated that the roof system (without rooflights) has an equal or better non-fragility classification.
- (2) For use with current reinforced fibre-cement sheeting — obsolete asbestos and fibre-cement profiles should always be regarded as fragile.

4.3 Based upon results of durability testing, the minimum weights necessary to satisfy that non-fragility ratings can be expected to be retained for a period of 25 years are given in Table 3 and apply to rooflights installed as detailed in section 6.1 of this Detail Sheet.

4.4 The GRP rooflight material has a good resistance to impact from hard bodies, such as hailstones, or impacts due to vandalism. Tests on typical rooflight samples showed that an impact energy of 5J did not cause damage when applied at various points on the rooflights.

Table 3 Minimum weights for expected 25-year non-fragility<sup>(1)(2)</sup>

Application (rooflight type)	Non-fragile classification	Minimum weight for expected 25-year non-fragility (Kgm <sup>-2</sup> )
<b>Single-skin</b>		
Rigid trapezoidal profiles for use with single-skin metal sheeting	Class B	3.6
Rigid sinusoidal profiles for use with fibre-cement sheeting <sup>(3)</sup>	Class C	3.0
<b>Double-skin or Cleartherm, with flexible profile steel liners (typically 0.4 mm)</b>		
Liner panel assembly only	Class C	Outer: 1.8 Liner: 2.4
Double-skin assembly (where Class C non-fragile liner is required eg when lining out)	Class B	Outer: 2.4 Liner: 2.4
Double-skin assembly (where there is no requirement for non-fragility of liner alone)	Class B	Outer: 3.0 Liner: 1.8
<b>Double-skin or Cleartherm with rigid profile steel liners (typically 0.7 mm)</b>		
Liner panel assembly only	Class B	Outer: 1.8 Liner: 3.0
Double-skin assembly	Class B	Outer: 1.8 Liner: 3.0

- (1) It can be expected that the non-fragile classification of a roof assembly incorporating these increased weight rooflights should be maintained for at least 25 years under all normal conditions, provided it has already been demonstrated that the roof system, without rooflights, will retain the same non-fragile classification for that period.
- (2) The non-fragility classification will only be retained where all other components have been specified accordingly — for example fasteners will usually need to be of stainless steel.
- (3) For use with current reinforced fibre-cement sheeting — obsolete asbestos and fibre-cement profiles should always be regarded as fragile.

## 5 Durability

5.1 On the basis of previous knowledge of the constituent materials and accelerated laboratory tests, the GRP material component of the system can be expected to perform satisfactorily for a period of at least 25 years.

5.2 Some slight colour change of the GRP material, due to prolonged exposure to UV radiation, may occur over the life of the product, but this would be minor and should not adversely effect the transmission of light in most applications.

## Installation

### 6 General

6.1 Application must be carried out in strict accordance with the relevant clauses of the Certificate holder's instructions and this Certificate.

6.2 Trilite site-assembled rooflights should be installed as shown in Figures 1 to 4.

Figure 1 Fixing detail for Trilite site-assembled rooflights (cross-section)

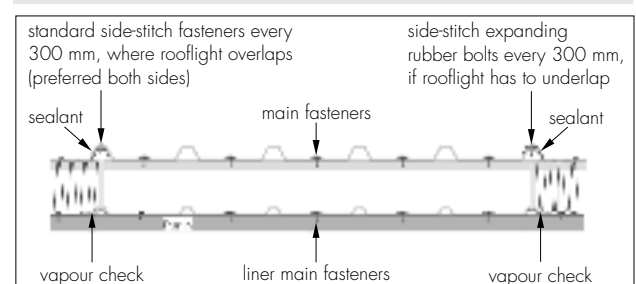


Figure 2 Fixing detail for endlap — cladding over rooflight

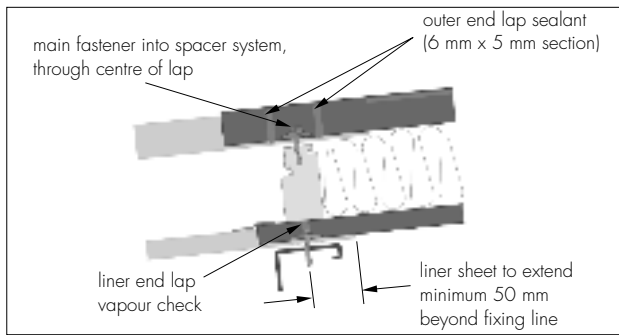


Figure 3 Fixing detail for endlap — rooflight to rooflight

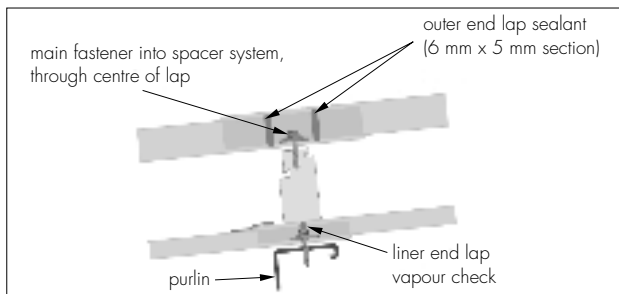
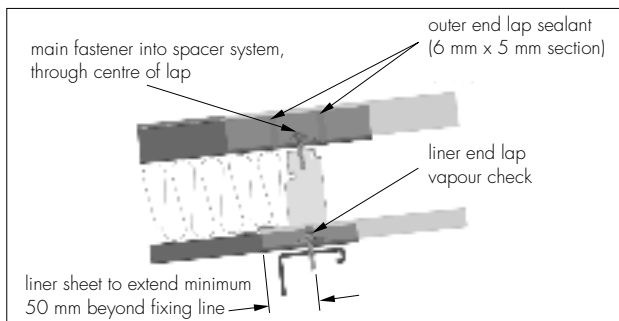


Figure 4 Fixing detail for endlap — rooflight over cladding



6.3 Trilite Ultra site-assembled rooflights should be installed in the same way as Safelight rooflights, as detailed in section 6 of Detail Sheet 3.

6.4 The product should not be laid in high winds as it is particularly hazardous to handle rooflights in windy conditions.

6.5 The GRP sheets have different properties to fibre cement, steel and aluminium sheets and they do not necessarily have the same span capabilities.

6.6 Trilite sheets are generally capable of spanning at least 1.8 m where wind loads do not exceed 1.5 kNm<sup>-2</sup>. For greater spans or higher wind loads the Certificate holder should be consulted.

## 7 Procedure

7.1 Typically, the Trilite sheet should be fastened with at least one main fastener in every trough on every purlin, at spacings of maximum 200 mm apart, using self-drilling and self-tapping fixings with minimum 29 mm self-sealing washers. For choice of carbon or stainless steel fasteners, refer to section 5 of the Front Sheets.

7.2 Side laps should be stitched at 300 mm to 400 mm centres and should be sealed with one run of 6 mm by 5 mm butyl mastic positioned on the crown of the sheet just outside the line of sidelap fasteners.

7.3 End laps should be sealed with two beads of 6 mm by 5 mm sealant (butyl mastic) positioned above and below the line of the fasteners, within 25 mm of the fixing line.

7.4 Trilite Ultra sheets should be fastened in the same way as Safelight sheets (see section 7 of Detail Sheet 3).

## Technical Investigations

The following is a summary of the technical investigations carried out on Trilite and Trilite Ultra Site Assembled In-plane GRP Rooflights.

### 8 Tests

8.1 Samples of the product and components of the system were obtained from the manufacturer for the purpose of testing. Tests performed by the BBA and other UKAS accredited laboratories on the GRP rooflight material, which give the typical results for the materials, are summarised in Table 4.

Table 4 Physical properties — general

Test (units)	Method <sup>(1)</sup>	Mean results		
		1.8 kgm <sup>-2</sup> sheet	2.4 kgm <sup>-2</sup> sheet	3.0 kgm <sup>-2</sup> sheet
Density (gcm <sup>-3</sup> )	BS 2872-6.620A	—	1.5	1.4
Hard body impact (5 joules)	MOAT 53	pass	—	—
Fixings pullthrough <sup>(2)</sup> (max load N)	BBA internal test specification T1/07 <sup>(3)</sup>	—	1645	—
UV aged <sup>(4)</sup>		—	1362	—
Light transmittance (T)	ASTM D 1003	67.0	—	68.3
Resin : glass ratio (% resin)	BS 2782-10.1006	63.1	59.9	61.1
Flexural strength [modulus (MPa)]	BS EN ISO 14125			
control		5944	—	5596
UV aged <sup>(5)</sup>		5172	—	5543
Charpy impact strength (kJm <sup>-2</sup> )	BS EN ISO 179			
control		45	—	50
UV aged <sup>(5)</sup>		57	—	56

(1) The test documents are detailed in the *Bibliography*. Numbers in the table refer to sections/parts of the various documents.

(2) Supplied with a 29 mm diameter washer.

(3) BBA Internal Test Specification T1/07 *Method for the determination of the effects of nailing and the resistance to nail pull-through*.

(4) UV aged 250 light hours in accordance with BS EN ISO 4892-3 : 2000 using QUV 313 lamps at a cycle of 4 hours UV at 50°C and 4 hours condensation at 50°C.

(5) UV aged 250 light hours in accordance with BS EN ISO 4892-3 : 2000 using QUV 340 lamps at a cycle of 4 hours UV at 50°C and 4 hours condensation at 50°C.

8.2 Tests on the resistance to snow loading were carried out, and found to be satisfactory.

8.3 A resistance to staining test was carried out using a number of staining agents, the results of which are summarised in Table 5.

Table 5 Resistance to staining

Stain <sup>(1)</sup>	Cleaning method	Result
Wild berries	detergent solution	no stain
Bitumen	scraped/white spirit	no stain
Water-based paint	scraped	no stain
Spirit-based paint	scraped	no stain
Charcoal	detergent solution	no stain
Cigarette butt	detergent solution	no stain
Chlorophyll	detergent solution	no stain
Silicone sealant	cut off with knife	thin layer remaining
Mortar/lime mix	detergent solution	no stain

(1) Stain was applied for one week.

8.4 Tests were carried out for thermal transmittance using a Guarded Hot Box.

8.5 Tests for soft body impact (fragility of roofing assemblies) to ACR[M]001 : 2000 were carried out on Trilite 3.0 kgm<sup>-2</sup> top sheet and achieved a fragility rating of Category B non-fragile assembly. Different weight Trilite sheets will achieve at least non-fragile classification as shown in Tables 2 and 3.

## 9 Investigations

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

9.2 Installation was examined in the preparation of test specimens to establish the practicability of the materials used.

9.3 An assessment was made of indicative fire data to BS 476-3 : 1958, BS 476-6 : 1989 and BS 476-7 : 1997.

## Bibliography

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

BS 476-6 : 1989 *Fire tests on building materials and structures — Method of test for fire propagation for products*

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 874-3.1 : 1987 *Methods for determining thermal insulating properties — Tests for thermal transmittance and conductance — Guarded hot-box method*

BS 2782-6.620A to 620D : 1991 *Methods of testing plastics — Dimensional properties — Determination of density and relative density of non-cellular plastics*  
BS 2782-10.1006 : 1978 *Methods of testing plastics — Glass reinforced plastics — Determination of volatile matter and resin content of synthetic resin impregnated textile glass fabric*

BS 4154-1 : 1985 *Corrugated translucent sheets made from thermo setting polyester resin (glass fibre reinforced) — Specification for material and performance requirements*

BS 4154-2 : 1985 *Corrugated translucent sheets made from thermo setting polyester resin (glass fibre reinforced) — Specification for profiles and dimensions*

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

BS EN ISO 179 : 1997 *Methods of testing plastics — Mechanical properties — Determination of Charpy impact strength*

BS EN ISO 4892-3 : 2000 *Plastics — Methods of exposure of laboratory light sources — Fluorescent UV lamps*

BS EN ISO 10211-1 : 1996 *Thermal bridges in building construction — Heat flows and surface temperatures — General calculation methods*

BS EN ISO 14125 : 1998 *Fibre-reinforced plastic composites — Determination of flexural properties*

Advisory Committee for Roofwork, ACR[M]001 : 2000 *Test For Fragility of Roofing Assemblies [second edition]*

ASTM D 1003 : 2000 *Test Method for Haze and Luminous Transmittance of Transparent Plastics*

MOAT No 53 : 1989 *UEAtc guide for the Agrément of continuous strip rooflights*



On behalf of the British Board of Agrément

A handwritten signature in black ink, appearing to read 'P. C. Hewson', is written over a light grey background.

Date of Second issue: 14th March 2005

Chief Executive

\*Original Detail Sheet issued on 29th June 2004. This amended version includes additional thermal data (section 3) and test data (sections 4 and 8).



**Brett Martin Daylight Systems**

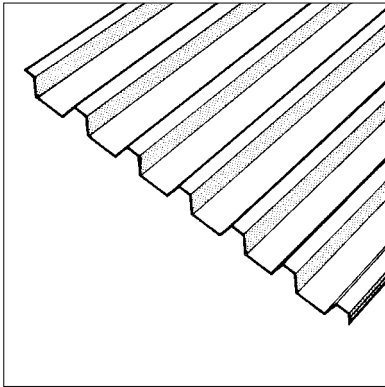
**SAFELIGHT SITE ASSEMBLED  
IN-PLANE GRP ROOFLIGHTS**

**Certificate No 04/4114**

**DETAIL SHEET 3**

*Second issue\**

## Product



• THIS DETAIL SHEET REFERS TO SAFELIGHT<sup>(1)</sup> SITE ASSEMBLED IN-PLANE GRP ROOFLIGHTS, CONSISTING OF A FACTORY-PRODUCED, GLASS-FIBRE REINFORCED POLYESTER RESIN PROFILED SHEET, AVAILABLE IN SINGLE-SKIN, DOUBLE-SKIN OR MULTI-SKIN CLEARTHERM<sup>(1)</sup> CONFIGURATION. THE ROOFLIGHT UNITS ARE MECHANICALLY FIXED AND JOINTED ON SITE.

- The rooflights are for use on pitched roofs of profiled sheet and are designed to admit daylight into non-domestic and commercial buildings.
- It is essential that the rooflights are installed and used in accordance with the relevant clauses of the Certificate holder's instructions.

(1) Registered trademark.

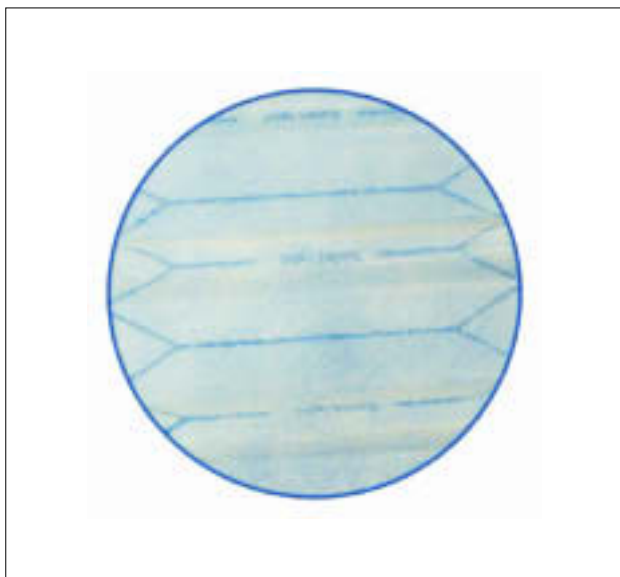
*This Detail Sheet must be read in conjunction with the Front Sheets, which give the system's position regarding the Building Regulations, general information relating to the system, and the Conditions of Certification, respectively.*

## Technical Specification

### 1 Description

1.1 The Safelight Site Assembled In-plane GRP Rooflights consist of a polyester profiled sheet, utilising the Safelight reinforcement system and a unique surface protection. A unique safety logo is incorporated into the heavyweight laminate, thus identifying this product (see Figure 1).

*Figure 1 Safety logo incorporated into the GRP for Safelight GRP sheets*



1.2 Surface protection is provided as standard to the weather sheets with Diamond<sup>(1)</sup> surface protection for enhanced UV protection. This provides improved UV protection to UV absorbing polyester films used on Trilite or Trilite Ultra GRP rooflights.

(1) Registered trademark.

1.3 The thermal insulation of the rooflights is enhanced by the use of an internal layer known as Cleartherm which is simply laid into position on the liner of a double-skinned application and secured with sealing tape along each side.

1.4 The rooflights are mechanically fixed to the roof construction using fastener types as recommended by the Certificate holder.

1.5 Safelight has a standard product weight of 5.5 kgm<sup>-2</sup> and three grades of fire retardancy.

1.6 Ancillary items, not covered by this Certificate, but required for use with the system include:

- sealing tape — a UV stable pale-coloured, cross-linked, butyl sealant mastic for creating a waterproof seal, available from the Certificate holder
- foam fillers for closing off the profile (eg at ridge and eaves), available from the Certificate holder
- fasteners — main and side-stitch fasteners, available from specialist fastener manufacturers.

1.7 The raw materials are subject to a quality control system.

## 2 Delivery and site handling

2.1 Rooflight products are generally supplied in loose stacks. The GRP sheets should be stored on flat, ground, on 75 mm battens (free from nails and debris) not more than 1.5 m apart. GRP sheets should not be exposed to weather before installation. If stored in outside conditions the sheets must be protected from the weather by covering with waterproof covers. Sheets stored outside without protection could be damaged, and entrapped water will cause the sheets to discolour in prolonged sunlight. The sheets should be checked regularly whilst stored to ensure that moisture has not penetrated the protective cover and the GRP has not become discoloured.

2.2 GRP sheets should not be stacked more than 1.5 m high. Different profiles in the same stack must be separated with battens, located directly above each other.

## Design Data

### 3 Thermal properties

3.1 Tests for thermal transmittance to BS 874-3.1 : 1987 using a Guarded Hot Box were not tested on Safelight Site Assembled Rooflights, but results are expected to achieve at least those described in section 3 of Detail Sheet 2 for Trilite Site Assembled Rooflights.

3.2 Computer thermal simulations were carried out according to BS EN ISO 102111 : 1996 and BS EN 673 : 1998, and the U values of the roof lights are as shown in Table 1.

Table 1 Thermal properties of rooflights

Application (rooflight type)	U value ( $Wm^{-2}K^{-1}$ )
Double-skin	3.3
Triple-skin	2.0

### 4 Strength and stability

4.1 The GRP rooflight material has a good resistance to impact from soft bodies, such as a person slipping on the roof. Tests for soft body impact (fragility of roofing assemblies) to ACR[M]001 : 2000 were carried out on lighter weight products. Safelight sheets will always achieve a Class B non-fragility rating to ACR[M]001 : 2000 when installed in a system which achieves the same rating.

4.2 Based upon the results of durability testing it can be expected that Safelight sheets will retain a Class B non-fragility rating for a period of at least 30 years.

4.3 The rooflights are designed to support an imposed load of 1.8 kN when correctly installed. Tests demonstrate that loads typical of occasional foot traffic or a falling person, would not cause any

damage to a Safelight sheet. However, it is not recommended that any rooflights are walked on.

4.4 The GRP rooflight material has a good resistance to impact from hard bodies, such as hailstones, or impacts due to vandalism. Tests on typical rooflight samples showed that an impact energy of 5J did not cause damage when applied at various points on the rooflights.

### 5 Durability

5.1 On the basis of previous knowledge of the constituent materials and accelerated laboratory tests, the GRP material component of the system can be expected to perform satisfactorily for a period of at least 30 years.

5.2 The rooflight weathersheet incorporates a Diamond surface protection for improved protection from UV exposure over the life of the product. This performs significantly better than the UV absorbing polyester films used on the Trilite and Trilite Ultra rooflights.

## Installation

### 6 General

6.1 Application must be carried out in strict accordance with the relevant clauses of the Certificate holder's instructions and this Certificate (see Figures 2, 3, 4 and 5).

Figure 2 Fixing detail for site-assembled rooflights (cross-section)

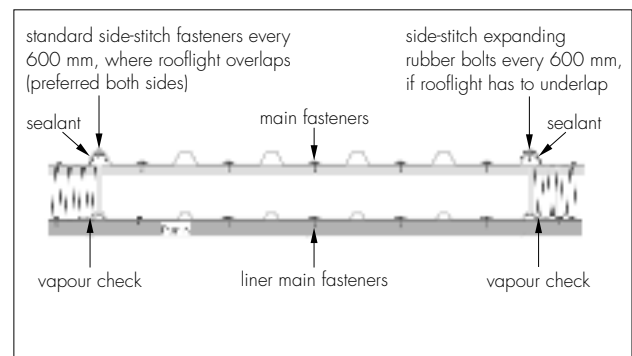


Figure 3 Fixing detail for endlap — cladding over rooflight

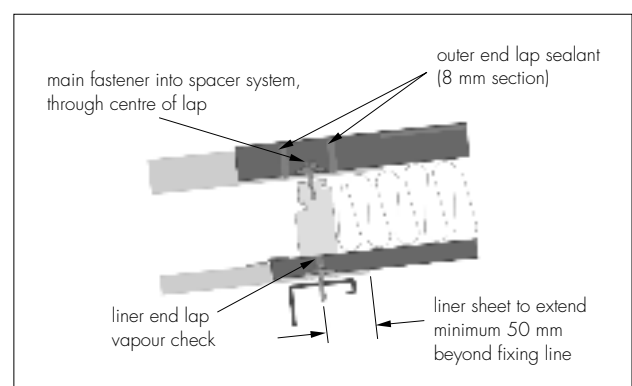


Figure 4 Fixing detail for endlap — rooflight to rooflight

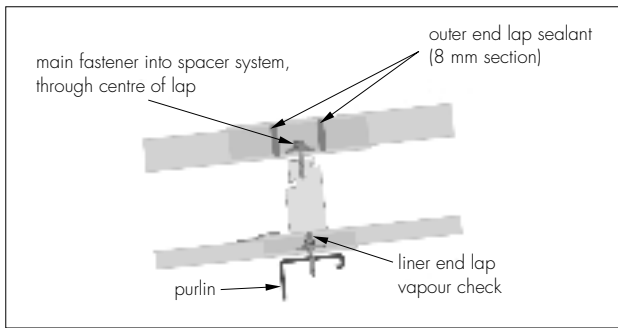
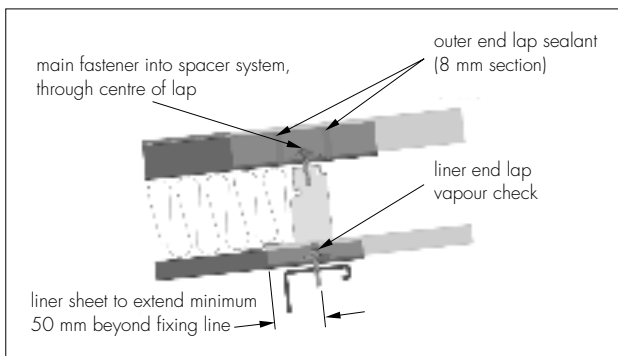


Figure 5 Fixing detail for endlap — rooflight over cladding



6.2 The system should not be laid in high winds as it is particularly hazardous to handle rooflights in windy conditions.

6.3 Safelight sheets are usually capable of spanning 3 m. For any spans in excess of 2 m, there may be other factors to consider and the advice of the Certificate holder should be sought.

## 7 Procedure

7.1 Typically the product should be fastened with at least one main fastener in every trough on every purlin, at spacings of maximum 250 mm apart, using self-drilling and self-tapping fixings with minimum 29 mm self-sealing washers. For choice of carbon or stainless steel fasteners, refer to section 5 of the Front Sheets.

7.2 Side laps should be stitched at 600 mm centres and should be sealed with one run of 6 mm by 5 mm butyl mastic positioned on the crown of the sheet just outside the line of sidelap fasteners.

7.3 End laps should be sealed with two beads of 8 mm diameter round section sealant (butyl mastic) positioned above and below the line of the fasteners, within 25 mm of the fixing line.

## Technical Investigations

The following is a summary of the technical investigations carried out on Safelight Site Assembled In-plane GRP Rooflights.

## 8 Tests

8.1 Samples of the product and components of the system were obtained from the manufacturer for the purpose of testing. Tests performed by the BBA and other UKAS accredited laboratories on the GRP rooflight material, are summarised in Table 2.

Table 2 Physical properties — general

Test (units)	Method <sup>(1)</sup>	Mean results
Density (gcm <sup>-3</sup> )	BS 2872-6.620A	1.5
Hard body impact (5 joules)	MOAT 53	pass
Fixings pull-through <sup>(2)</sup> (max load N) control	BBA internal test specification T1/07 <sup>(3)</sup>	3706
UV aged <sup>(4)</sup>		3773
Light transmittance ( $\tau$ )	ASTM D 1003	55.8
Resin : glass ratio (% resin)	BS 2782-10.1006	64.4
Flexural strength [modulus (MPa)] control	BS EN ISO 14125	7323
UV aged <sup>(5)</sup>		7497
Charpy impact strength (kJm <sup>-2</sup> ) control	BS EN ISO 179	88
UV aged <sup>(5)</sup>		81

(1) The test documents are detailed in the *Bibliography*. Numbers in the table refer to sections/parts of the various documents.

(2) Supplied with a 29 mm diameter washer.

(3) BBA Internal Test Specification T1/07 *Method for the determination of the effects of nailing and the resistance to nail pull-through*.

(4) UV aged 250 light hours in accordance with BS EN ISO 4892-3 : 2000 using QUV 313 lamps at a cycle of 4 hours UV at 50°C and 4 hours condensation at 50°C.

(5) UV aged 250 light hours in accordance with BS EN ISO 4892-3 : 2000 using QUV 340 lamps at a cycle of 4 hours UV at 50°C and 4 hours condensation at 50°C.

8.2 Tests on the resistance to snow loading and point loading were carried out, and found to be satisfactory.

8.3 A resistance to staining test was carried out using a number of staining agents, the results of which are summarised in Table 3.

Table 3 Resistance to staining

Stain <sup>(1)</sup>	Cleaning method	Result
Wild berries	detergent solution	no stain
Bitumen	scraped/white spirit	no stain
Water-based paint	scraped	no stain
Spirit-based paint	scraped	no stain
Charcoal	detergent solution	no stain
Cigarette butt	detergent solution	no stain
Chlorophyll	detergent solution	no stain
Silicone sealant	cut off with knife	thin layer remaining
Mortar/lime mix	detergent solution	no stain

(1) Stain was applied for one week.

## 9 Investigations

9.1 The manufacturing process was examined, including the methods adopted for quality control,

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and details were obtained of the quality and composition of the materials used.

9.2 Installation was examined in the preparation of test specimens to establish the practicability of the materials used.

9.3 An examination was made of indicative fire data to BS 476-3 : 1958, BS 476-6 : 1989 and BS 476-7 : 1997 and an assessment made.

## Bibliography

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

BS 476-6 : 1989 *Fire tests on building materials and structures — Method of test for fire propagation for products*

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 874-3.1 : 1987 *Methods for determining thermal insulating properties — Tests for thermal transmittance and conductance — Guarded hot-box method*

BS 2782-6.620A to 620D : 1991 *Methods of testing plastics — Dimensional properties — Determination of density and relative density of non-cellular plastics*

BS 2782-10.1006 : 1978 *Methods of testing plastics — Glass reinforced plastics — Determination of volatile matter and resin content of synthetic resin impregnated textile glass fabric*

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

BS EN ISO 179 : 1997 *Methods of testing plastics — Mechanical properties — Determination of Charpy impact strength*

BS EN ISO 4892-3 : 2000 *Plastics — Methods of exposure of laboratory light sources — Fluorescent UV lamps*

BS EN ISO 10211-1 : 1996 *Thermal bridges in building construction — Heat flows and surface temperatures — General calculation methods*

BS EN ISO 14125 : 1998 *Fibre-reinforced plastic composites — Determination of flexural properties*

Advisory Committee for Roofwork, ACR[M]001 : 2000 *Test For Fragility of Roofing Assemblies* [second edition]

ASTM D 1003 : 2000 *Test Method for Haze and Luminous Transmittance of Transparent Plastics*

MOAT No 53 : 1989 *UEAtc guide for the Agrément of continuous strip rooflights*



On behalf of the British Board of Agrément

Date of Second issue: 14th March 2005

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

Chief Executive

\*Original Detail Sheet issued on 29th June 2004. This amended version includes additional thermal data (section 3), a revised Durability statement (section 5) and additional test data (section 8).

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For technical or additional information, contact the Certificate holder (see front page).

For information about the Agrément Certificate, including validity and scope, tel: Hotline 01923 665400, or check the BBA website.



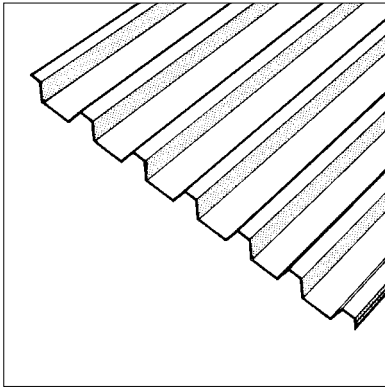


Brett Martin Daylight Systems

Certificate No 04/4114

**TRILITE AND TRILITE ULTRA FACTORY ASSEMBLED  
INSULATING ROOFLIGHTS (FAIRs)**
**DETAIL SHEET 4**  
*Second issue\**

## Product



• THIS DETAIL SHEET REFERS TO TRILITE<sup>(1)</sup> AND TRILITE ULTRA FACTORY ASSEMBLED INSULATING ROOFLIGHTS (FAIRs), CONSISTING OF A FACTORY-PRODUCED, GLASS-FIBRE REINFORCED POLYESTER RESIN, CONTOURED SHEET, MECHANICALLY FIXED, AND JOINTED IN HOUSE TO MATCH MOST COMPOSITE PANEL SYSTEMS.

• The rooflights are for use on pitched roofs of composite panels and are designed to admit controlled daylight into non-domestic and commercial buildings.

• It is essential that the rooflights are installed and used in accordance with the relevant clauses of the Certificate holder's instructions.

(1) Registered trademark.

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

## Technical Specification

### 1 Description

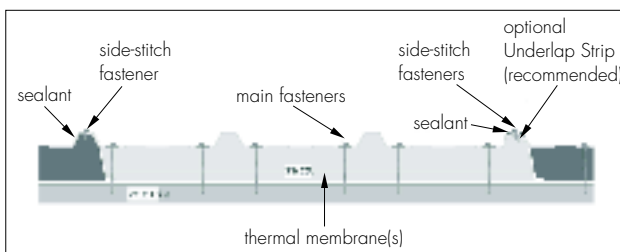
1.1 Trilite and Trilite Ultra Factory Assembled Insulating Rooflights (FAIRs) are normally used in conjunction with composite panels.

1.2 The rooflight comprises two skins of translucent Trilite or Trilite Ultra GRP sheet separated by rigid Hardpak foam fillers. The external sheet conforms to the roof sheet profile. Flat liners with an upstand to form a box are bonded to the underside of the external sheet.

1.3 Hardpak fillers are rigid fillers designed to prevent dishing of the outer sheet around fasteners, ensuring simple fixing without risk of leakage.

1.4 In Energysaver FAIRs, the cavity created contains thermal membrane(s) for improved thermal performance (see Figure 1).

Figure 1 Illustration of Energysaver FAIRs



1.5 Surface protection is provided as standard to the weather sheets by a UV absorbing polyester film (eg Melinex 389) for enhanced UV protection.

1.6 The rooflights are mechanically fixed to the roof construction using fastener types as recommended by the Certificate holder. These are not covered by this Detail Sheet.

1.7 All FAIRs are available with optional angled Underlap Strip, allowing use of standard side-stitch

fasteners to improve ease of installation. Underlap Strip is made of galvanized steel preventing electrolytic corrosion.

1.8 The Trilite GRP is available in three standard product weights, 1.8 kgm<sup>-2</sup>, 2.4 kgm<sup>-2</sup> and 3.0 kgm<sup>-2</sup>. Trilite Ultra GRP is available in two standard product weights, 3.6 kgm<sup>-2</sup> and 4.5 kgm<sup>-2</sup>.

1.9 Both Trilite and Trilite Ultra<sup>(1)</sup> are available in three grades of fire retardancy.

(1) Subsequent references to Trilite roof applications include Trilite and Trilite Ultra.

1.10 Ancillary items, not covered by this Certificate, but required for use with the system include:

- sealing tape — a UV stable pale-coloured, cross-linked, butyl sealant mastic for creating a waterproof seal, available from the Certificate holder
- foam fillers for closing off the profile (eg at ridge and eaves), available from the Certificate holder
- fasteners — main and side-stitch fasteners, available from specialist fastener manufacturers.

1.11 The raw materials are subject to a quality control system.

### 2 Delivery and site handling

2.1 FAIRs are delivered on pallets. If removed from the pallets, they should be stacked horizontally on 75 mm battens (free from nails and debris) aligned with the internal supports. FAIRs should be stored in separate stacks if internal supports cannot be aligned. The stack height should also not exceed 2 m or no more than 24 rooflights.

2.2 Exposure of FAIRs to weather before installation may cause water infiltration and subsequent condensation. During storage, therefore, if unable to be under cover, suitable waterproofing should be used.

2.3 Handling rooflights in windy conditions should be avoided, FAIRs should be tied down to secure against wind. Securing weights must never be put on FAIRs.

2.4 FAIRs should be carried evenly and not carried at each end. Long units should be carried vertically by one side, not horizontally.

## Design Data

### 3 Thermal properties

Computer thermal simulations were carried out according to BS EN ISO 10211-1 : 1996 and BS EN 673 : 1998 and the U values of the rooflights are as shown in Table 1.

Table 1 Thermal properties of rooflights

Application (rooflight type)	U value ( $Wm^{-2}K^{-1}$ )
Double-skin FAIR	3.0
Triple-skin FAIR	1.9

### 4 Strength and stability

4.1 The GRP rooflight material has a good resistance to impact from soft bodies, such as a person slipping on the roof. Tests on typical rooflight samples showed that an impactor bag with an impact energy of 530J gave a category B non-fragile rating according to document ACR[M]001 : 2000.

4.2 Full details of non-fragility ratings for different weights and profiles of rooflights are given in Table 2.

Table 2 Non-fragility of FAIRS roofing assemblies<sup>(1)</sup>

Application (rooflight type)	Non-fragile classification	Minimum weight for non-fragility when new ( $kgm^{-2}$ )
<b>Double-skin or Energysaver</b>		
Medium/low flexibility outer profile for use with composite panels, continuous box	Class B	Outer: 2.4 Liner: 1.5
Medium/low flexibility outer profile, separate boxes between purlins	Class B	Outer: 3.0 Liner: 1.5

(1) An assembly of a roof system incorporating rooflights of the minimum weight shown will achieve the relevant classification when new, provided it has already been demonstrated that the roof system (without rooflights) has an equal or better non-fragility classification.

4.3 Based upon results of durability testing, the minimum weights necessary to satisfy that non-fragility ratings can be expected to be retained for a period of 25 years are given in Table 3 and apply to rooflights installed as detailed in section 6.1 of this Detail Sheet.

Table 3 Minimum weights for expected 25-year non-fragility<sup>(1)(2)</sup>

Application (rooflight type)	Non-fragile classification	Minimum weight for expected 25-year non-fragility ( $kgm^{-2}$ )
<b>Double-skin or Energysaver</b>		
Medium/low flexibility outer profile for use with composite panels, continuous box	Class B	Outer: 3.0 Liner: 1.5
Medium/low flexibility outer profile, separate boxes between purlins	Class B	Outer: 3.6 Liner: 1.5

(1) It can be expected that the non-fragile classification of a roof assembly incorporating these increased weight rooflights should be maintained for at least 25 years under all normal conditions, provided it has already been demonstrated that the roof system, without rooflights, will retain the same non-fragile classification for that period.

(2) The non-fragility classification will only be retained where all other components have been specified accordingly — for example fasteners will usually need to be of stainless steel.

4.4 The GRP rooflight material has a good resistance to impact from hard bodies, such as hailstones, or impacts due to vandalism. Tests on typical rooflight samples showed that an impact energy of 5J did not cause damage when applied at various points on the rooflights.

### 5 Durability

5.1 On the basis of previous knowledge of the constituent materials and accelerated laboratory tests, the FAIR rooflight can be expected to perform satisfactorily for a period of at least 25 years.

5.2 Some slight colour change of the GRP material, due to prolonged exposure to UV radiation, may occur over the life of the product, but this would be minor and should not adversely effect the transmission of light in most applications.

## Installation

### 6 General

6.1 Application must be carried out in strict accordance with the relevant clauses of the Certificate holder's instructions and this Certificate.

6.2 Trilite FAIR rooflights should be installed as shown in Figures 2 to 6.

Figure 2 Fixing detail for factory-assembled rooflights (cross-section)

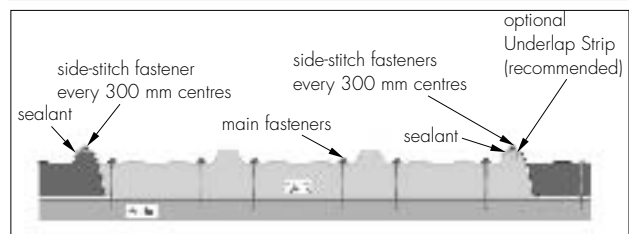


Figure 3 Fixing detail for endlap — composite over FAIR

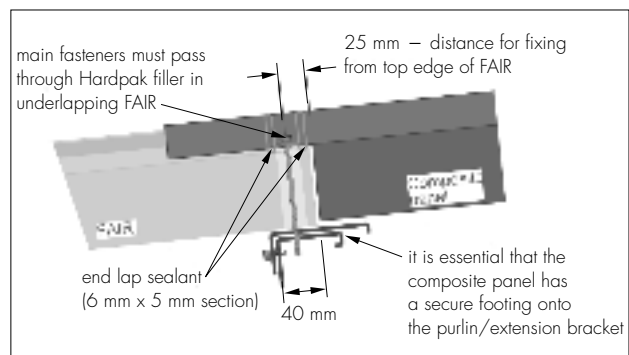


Figure 4 Fixing detail for endlap — FAIR over composite

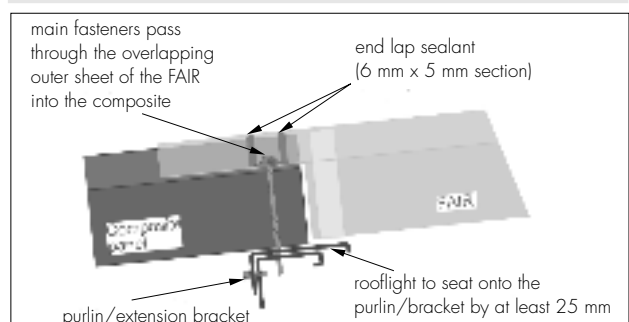


Figure 5 Fixing detail for endlap — FAIR to FAIR

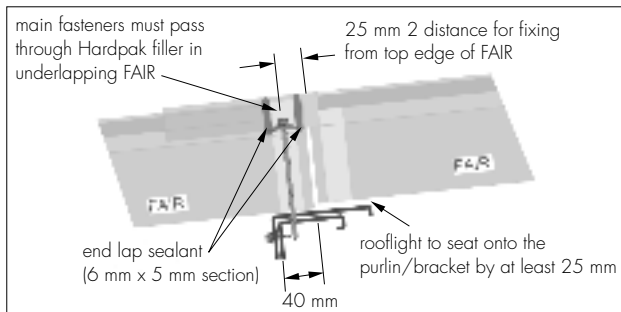
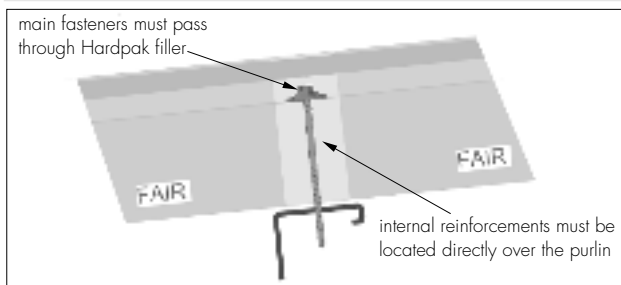


Figure 6 Fixing detail for mid span arrangement



6.3 Trilite Ultra FAIR rooflights should be installed in the same way as Safelight FAIRs, as detailed in section 6 of Detail Sheet 5.

6.4 The product should not be laid in high winds as it is particularly hazardous to handle rooflights in windy conditions.

6.5 Trilite sheets are generally capable of spanning at least 2.0 m where wind loads do not exceed 1.5 kNm<sup>-2</sup>. For greater spans or higher wind loads the Certificate holder should be consulted.

6.6 Although FAIRs are more rigid than single-skin applications, recommended purlin centres should not be exceeded, as any excessive deflection could strain or weaken bonding joints.

6.7 Where there is an end lap condition it is recommended that a landing/spreader plate is used, to accommodate potential on-site variations from the nominal position.

## 7 Procedure

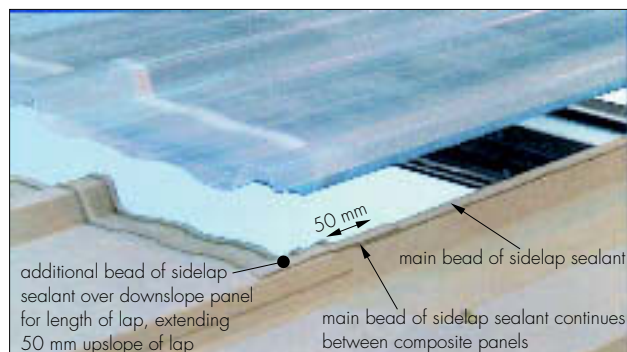
7.1 The Trilite sheet should be fastened to the steelwork structure in every trough of the profile using self-drilling and self-tapping fixings with minimum 29 mm self-sealing washers. There should be at least five main fixings per purlin, maximum 200 mm apart, typically this necessitates one or two fixings per trough. For choice of carbon or stainless steel fasteners, refer to section 5 of the Front Sheets.

7.2 Sidelaps should be stitched at 300 mm to 400 mm centres and should be sealed with a single bead of 6 mm by 5 mm butyl mastic.

7.3 End laps should be sealed with two beads of 6 mm by 5 mm butyl mastic and should be positioned above and below the line of fixings, no more than 25 mm from the line of the fixings.

7.4 At all three- and four-way joints sealant is required between all lapping components to ensure a weathertight seal. All roofing panels, including Trilite FAIRs require an extra sealant bead in the two positions shown in Figure 7. These details should be used at all endlaps.

Figure 7 Showing position of additional sealant



7.5 Trilite Ultra sheets should be fastened in the same way as Safelight FAIRs (see section 7 of Detail Sheet 5).

## Technical Investigations

The following is a summary of the technical investigations carried out on Trilite and Trilite Ultra Factory Assembled Insulating Rooflights (FAIRs).

## 8 Tests

8.1 Samples of the product, and components of the system, were obtained from the manufacturer for the purpose of testing. Tests carried out on the GRP top sheet give typical results for the material and are summarised in Table 4.

Table 4 Physical properties — general

Test (units)	Method <sup>(1)</sup>	Mean results		
		1.8 kgm <sup>-2</sup> sheet	2.4 kgm <sup>-2</sup> sheet	3.0 kgm <sup>-2</sup> sheet
Density (gcm <sup>-3</sup> )	BS 2872-6.620A	—	1.5	1.4
Hard body impact (5 joules)	MOAT 53	pass	—	—
Fixings pullthrough <sup>(2)</sup> (max load N)	BBA internal test specification T1 /07 <sup>(3)</sup>			
control		—	1645	—
UV aged <sup>(4)</sup>		—	1362	—
Light transmittance (τ)	ASTM D 1003	67.0	—	68.3
Resin : glass ratio (% resin)	BS 2782-10.1006	63.1	59.1	61.1
Flexural strength [modulus (MPa)]	BS EN ISO 14125			
control		5944	—	5596
UV aged <sup>(5)</sup>		5172	—	5543
Charpy impact strength (kJm <sup>-2</sup> )	BS EN ISO 179			
control		45	—	50
UV aged <sup>(5)</sup>		57	—	56

(1) The test documents are detailed in the *Bibliography*. Numbers in the table refer to sections/parts of the various documents.

(2) Supplied with a 29 mm diameter washer.

(3) BBA Internal Test Specification T1 /07 *Method for the determination of the effects of nailing and the resistance to nail pull-through*.

(4) UV aged 250 light hours in accordance with BS EN ISO 4892-3 : 2000 using QUV 313 lamps at a cycle of 4 hours UV at 50°C and 4 hours condensation at 50°C.

(5) UV aged 250 light hours in accordance with BS EN ISO 4892-3 : 2000 using QUV 340 lamps at a cycle of 4 hours UV at 50°C and 4 hours condensation at 50°C.

8.2 Tests on the resistance to thermal shock (wet/heat cycling) were carried out, and found to be satisfactory.

8.3 A resistance to staining test was carried out on Trilite top sheets using a number of staining agents, the results of which are summarised in Table 5.

Table 5 Resistance to staining

Stain <sup>(1)</sup>	Cleaning method	Result
Wild berries	detergent solution	no stain
Bitumen	scraped/white spirit	no stain
Water-based paint	scraped	no stain
Spirit-based paint	scraped	no stain
Charcoal	detergent solution	no stain
Cigarette butt	detergent solution	no stain
Chlorophyll	detergent solution	no stain
Silicone sealant	cut off with knife	thin layer remaining
Mortar/lime mix	detergent solution	no stain

(1) Stain was applied for one week.

8.4 Tests for soft body impact (fragility of roofing assemblies) to ACR[M]001 : 2000 were not tested on FAIRs, but results are expected to achieve those as shown in Tables 2 and 3

## 9 Investigations

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

9.2 Installation was examined in the preparation of test specimens to establish the practicability of the materials used.

9.3 An examination was made of indicative fire data to BS 476-3 : 1958, BS 476-6 : 1989 and BS 476-7 : 1997 and an assessment made.

## Bibliography

- BS 476-3 : 1958 *Fire tests on building materials and structures — External fire exposure roof test*  
 BS 476-6 : 1989 *Fire tests on building materials and structures — Method of test for fire propagation for products*  
 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 2782-6.620A to 620D : 1991 *Methods of testing plastics — Dimensional properties — Determination of density and relative density of non-cellular plastics*  
 BS 2782-10.1006 : 1978 *Methods of testing plastics — Glass reinforced plastics — Determination of volatile matter and resin content of synthetic resin impregnated textile glass fabric*  
 BS EN 673 : 1998 *Glass in building — Determination of thermal transmittance (U value) — Calculation method*  
 BS EN ISO 179 : 1997 *Methods of testing plastics — Mechanical properties — Determination of Charpy impact strength*  
 BS EN ISO 4892-3 : 2000 *Plastics — Methods of exposure of laboratory light sources — Fluorescent UV lamps*  
 BS EN ISO 10211-1 : 1996 *Thermal bridges in building construction — Heat flows and surface temperatures — General calculation methods*  
 BS EN ISO 14125 : 1998 *Fibre-reinforced plastic composites — Determination of flexural properties*  
 Advisory Committee for Roofwork, ACR[M]001 : 2000 *Test For Fragility of Roofing Assemblies [second edition]*  
 ASTM D 1003 : 2000 *Test Method for Haze and Luminous Transmittance of Transparent Plastics*  
 MOAT No 53 : 1989 *UEAtc guide for the Agrément of continuous strip rooflights*



On behalf of the British Board of Agrément

Date of Second issue: 14th March 2005

Chief Executive

\*Original Detail Sheet issued on 29th June 2004. This amended version includes additional thermal data (section 3) and test data (sections 4 and 8).



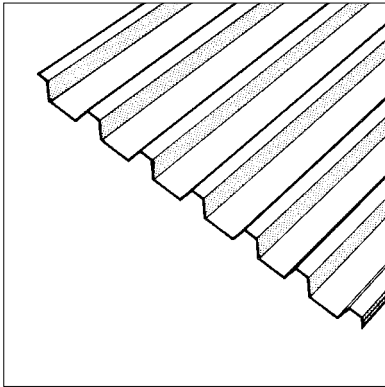
**Brett Martin Daylight Systems**

**Certificate No 04/4114**

**SAFELIGHT FACTORY ASSEMBLED  
INSULATING ROOFLIGHTS (FAIRs)**

**DETAIL SHEET 5**  
Second issue\*

## Product



• THIS DETAIL SHEET REFERS TO SAFELIGHT<sup>(1)</sup> FACTORY ASSEMBLED INSULATING ROOFLIGHTS (FAIRs), CONSISTING OF A FACTORY-PRODUCED, GLASS-FIBRE REINFORCED POLYESTER RESIN, CONTOURED SHEET, MECHANICALLY FIXED, AND JOINTED IN HOUSE TO MATCH MOST COMPOSITE PANEL SYSTEMS.

- The rooflights are for use on pitched roofs of composite panel and are designed to admit daylight into non-domestic and commercial buildings.
- It is essential that the rooflights are installed and used in accordance with the relevant clauses of the Certificate holder's instructions.

(1) Registered trademark.

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

## Technical Specification

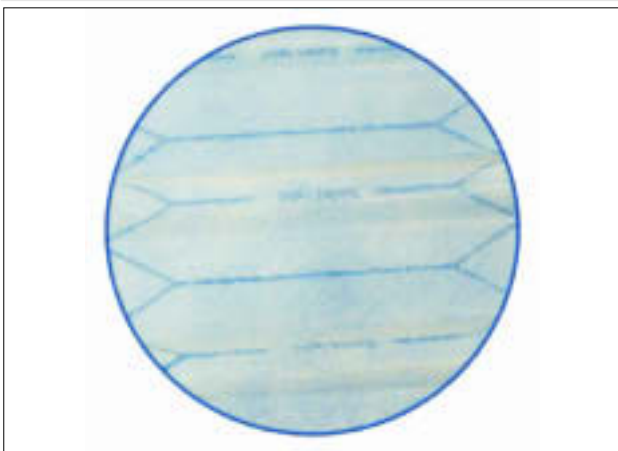
### 1 Description

1.1 Safelight Factory Assembled Insulating Rooflights (FAIRs) are normally used in conjunction with composite panels.

1.2 The rooflight comprises two skins of translucent GRP sheet separated by rigid Hardpak foam fillers. The external Safelight sheet conforms to the roof sheet profile. Flat Trilite liners with an upstand to form a box are bonded to the underside of the Safelight sheet.

1.3 The rooflight consists of a polyester profiled sheet, utilising the Safelight reinforcement system and a unique surface protection. A unique safety logo is incorporated into the heavyweight laminate, thus identifying this product (see Figure 1).

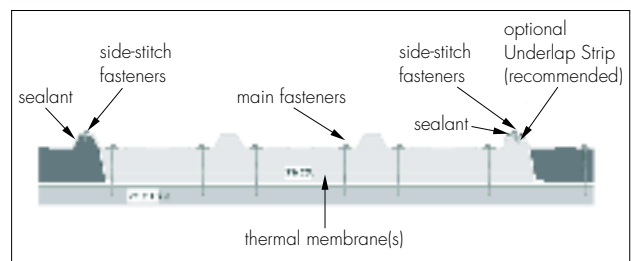
Figure 1 Safety logo incorporated into the GRP for Safelight GRP sheets



1.4 Hardpak fillers are rigid fillers designed to prevent dishing of the outer sheet around fasteners, ensuring simple fixing without risk of leakage.

1.5 In Safelight Energysaver FAIRs, the cavity created contains thermal membrane(s) for improved thermal performance (see Figure 2).

Figure 2 Illustration of Safelight Energysaver FAIRs



1.6 Surface protection is provided as standard to the weather sheets with Diamond<sup>(1)</sup> surface protection for enhanced UV protection. This provides improved UV protection to UV absorbing polyester films used on Trilite or Trilite Ultra GRP rooflights.

(1) Registered trademark.

1.7 The rooflights are mechanically fixed to the roof construction using fastener types as recommended by the Certificate holder. These are not covered by this Detail Sheet.

1.8 All FAIRs are available with optional angled Underlap Strip, allowing use of standard side-stitch fasteners to improve ease of installation. Underlap Strip is made of galvanized steel preventing electrolytic corrosion.

1.9 Safelight has a standard product weight of 5.5 kgm<sup>-2</sup> and three grades of fire retardancy.

1.10 Ancillary items, not covered by this Certificate, but required for use with the system include:

- sealing tape — a UV stable pale-coloured, cross-linked, butyl sealant mastic for creating a waterproof seal, available from the Certificate holder
- foam fillers for closing off the profile (eg at ridge and eaves), available from the Certificate holder

- fasteners — main and side-stitch fasteners, available from specialist fastener manufacturers.

1.11 The raw materials are subject to a quality control system.

## 2 Delivery and site handling

2.1 Safelight FAIRs are delivered on pallets. If removed from the pallets, they should be stacked horizontally on 75 mm battens (free from nails and debris) aligned with the internal supports. FAIRs should be stored in separate stacks if internal supports cannot be aligned. The stack height should also not exceed 2 m or no more than 24 rooflights.

2.2 FAIRs must not be exposed to weather before installation as exposure to water can cause leakage into the FAIR and cause condensation. Suitable waterproofing should cover the FAIRs if external storage is unavoidable.

2.3 Handling rooflights in windy conditions should be avoided, FAIRs should be tied down to secure against wind. Securing weights must never be put on FAIRs.

2.4 FAIRs should be carried evenly and not carried at each end. Long units should be carried vertically by one side, not horizontally.

## Design Data

### 3 Thermal properties

Computer thermal simulations were carried out according to BS EN ISO 10211-1 : 1996 and BS EN 673 : 1998, and the U values of the roof lights are as shown in Table 1.

Table 1 Thermal properties of rooflights

Application (rooflight type)	U value (Wm <sup>-2</sup> K <sup>-1</sup> )
Doubleskin FAIR	3.0
Tripleskin FAIR	1.9

### 4 Strength and stability

4.1 The GRP rooflight material has a good resistance to impact from soft bodies, such as a person slipping on the roof. Tests for soft body impact (fragility of roofing assemblies) to ACR[M]001 : 2000 were carried out on lighter weight products. Safelight sheets will always achieve a Class B non-fragility rating to ACR[M]001 : 2000 when installed in a system which achieves the same rating.

4.2 Based upon the results of durability testing it can be expected that Safelight sheets will retain a Class B non-fragility rating for a period of at least 30 years.

4.3 The rooflights are designed to support an imposed load of 1.8 kN when correctly installed. Tests demonstrate that loads typical of occasional foot traffic or a falling person, would not cause any damage to a Safelight sheet. However, it is not recommended that any rooflights are walked on.

4.4 The GRP rooflight material has a good resistance to impact from hard bodies, such as hailstones, or impacts due to vandalism. Tests on typical rooflight samples showed that an impact energy of 5J did not cause damage when applied at various points on the rooflights.

## 5 Durability

5.1 On the basis of previous knowledge of the constituent materials and accelerated laboratory tests, the FAIR can be expected to perform satisfactorily for a period of at least 30 years.

5.2 The rooflight weathersheet incorporates a Diamond surface protection for improved protection from UV exposure over the life of the product. This performs significantly better than the UV absorbing polyester films used on the Trilite and Trilite Ultra rooflights.

## Installation

### 6 General

6.1 Application must be carried out in strict accordance with the relevant clauses of the Certificate holder's instructions and this Certificate (see Figures 3 to 7).

Figure 3 Fixing detail for factory-assembled rooflights (cross-section)

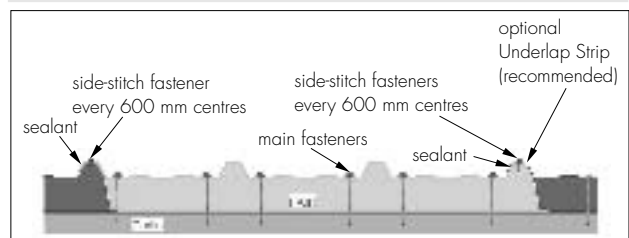


Figure 4 Fixing detail for endlap — composite over FAIR

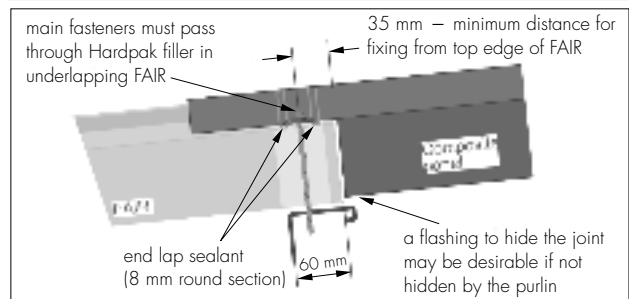


Figure 5 Fixing detail for endlap — FAIR over composite

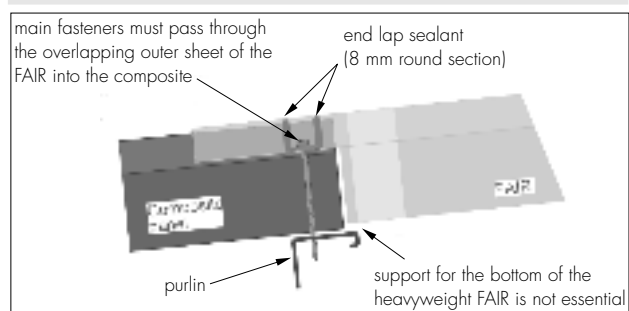


Figure 6 Fixing detail for endlap — FAIR to FAIR

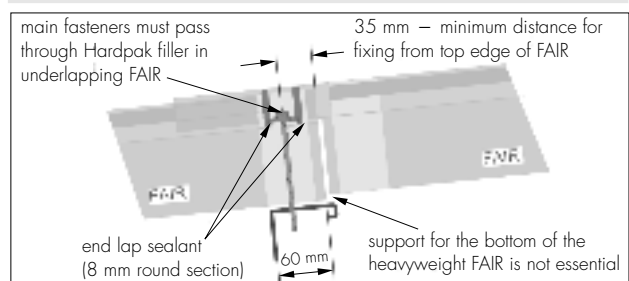
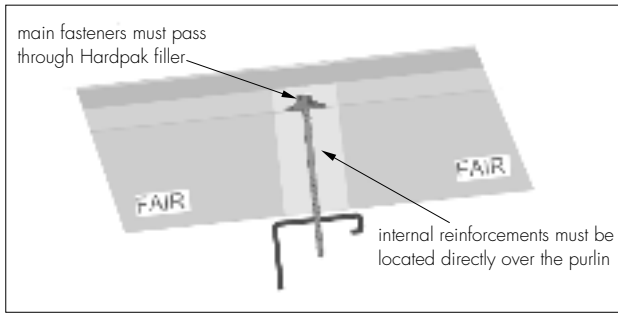


Figure 7 Fixing detail for mid span arrangement



6.2 The product should not be laid in high winds as it is particularly hazardous to handle rooflights in windy conditions.

6.3 Safelight sheets are usually capable of spanning 3 m. For any spans in excess of 2 m, there may be other factors to consider and the advice of the Certificate holder should be sought.

6.4 Where there is an end lap condition it is recommended that a landing/spreader plate is used, to accommodate potential on-site variations from the nominal position.

## 7 Procedure

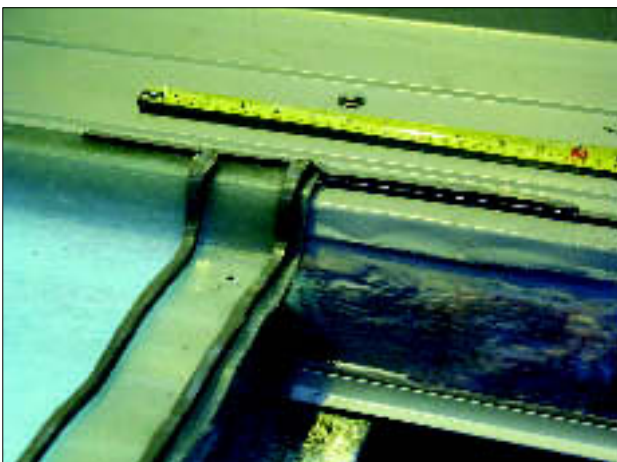
7.1 The product should be fastened to the steelwork structure in every trough of the profile using self-drilling and self-tapping fixings with minimum 29 mm self-sealing washers. There should be at least five main fixings per purlin, maximum 250 mm apart, typically this necessitates one or two fixings per trough. For choice of carbon or stainless steel fasteners, refer to section 5 of the Front Sheets.

7.2 Side laps should be stitched at 600 mm centres and should be sealed with a single bead of 6 mm by 5 mm butyl mastic or equivalent.

7.3 End laps should be sealed using two beads of 8 mm diameter round section butyl mastic and should be positioned above and below the line of fixings, no more than 25 mm from the line of the fixings.

7.4 At all three- and four-way joints sealant is required between all lapping components to ensure a weathertight seal. Rooflight laps also require an extra sealant bead in the two positions shown in Figure 8. These details should be used at all FAIR endlaps.

Figure 8 Showing position of additional sealant



## Technical Investigations

The following is a summary of the technical investigations carried out on Safelight Factory Assembled Insulating Rooflights (FAIRs).

### 8 Tests

8.1 Samples of the product, and components of the system, were obtained from the manufacturer for the purpose of testing. Tests carried out on the GRP top sheet give typical results for the material and are summarised in Table 2.

Table 2 Physical properties — general

Test (units)	Method <sup>(1)</sup>	Mean results
Density (gcm <sup>-3</sup> )	BS 2872-6.620A	1.5
Hard body impact (5 joules)	MOAT 53	pass
Fixings pull-through <sup>(2)</sup> (max load N) control	BBA internal test specification T1/07 <sup>(3)</sup>	3706
UV aged <sup>(4)</sup>		3773
Light transmittance (τ)	ASTM D 1003	55.8
Resin : glass ratio (% resin)	BS 2782-10.1006	64.4
Flexural strength [modulus (MPa)] control	BS EN ISO 14125	7323
UV aged <sup>(5)</sup>		7497
Charpy impact strength (kJm <sup>-2</sup> ) control	BS EN ISO 179	88
UV aged <sup>(5)</sup>		81

(1) The test documents are detailed in the *Bibliography*. Numbers in the table refer to sections/parts of the various documents.

(2) Supplied with a 29 mm diameter washer.

(3) BBA Internal Test Specification T1/07 *Method for the determination of the effects of nailing and the resistance to nail pull-through*.

(4) UV aged 250 light hours in accordance with BS EN ISO 4892-3 : 2000 using QUV 313 lamps at a cycle of 4 hours UV at 50°C and 4 hours condensation at 50°C.

(5) UV aged 250 light hours in accordance with BS EN ISO 4892-3 : 2000 using QUV 340 lamps at a cycle of 4 hours UV at 50°C and 4 hours condensation at 50°C.

8.2 A resistance to staining test was carried out on Safelight top sheets using a number of staining agents, the results of which are summarised in Table 3.

Table 3 Resistance to staining

Stain <sup>(1)</sup>	Cleaning method	Result
Wild berries	detergent solution	no stain
Bitumen	scraped/white spirit	no stain
Water-based paint	scraped	no stain
Spirit-based paint	scraped	no stain
Charcoal	detergent solution	no stain
Cigarette butt	detergent solution	no stain
Chlorophyll	detergent solution	no stain
Silicone sealant	cut off with knife	thin layer remaining
Mortar/lime mix	detergent solution	no stain

(1) Stain was applied for one week.

8.3 Tests on the resistance to snow loading and point loading were carried out, and found to be satisfactory.

### 9 Investigations

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

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9.2 Installation was examined in the preparation of test specimens to establish the practicability of the materials used.

9.3 An examination was made of indicative fire data to BS 476-3 : 1958, BS 476-6 : 1989 and BS 476-7 : 1997 and an assessment made.

## Bibliography

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ASTM D 1003 : 2000 *Test Method for Haze and Luminous Transmittance of Transparent Plastics*

MOAT No 53 : 1989 *UEAtc guide for the Agrément of continuous strip rooflights*



On behalf of the British Board of Agrément

Date of Second issue: 14th March 2005

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

Chief Executive

*\*Original Detail Sheet issued on 29th June 2004. This amended version includes additional thermal data (section 3), a revised Durability statement (section 5) and additional test data (section 8).*

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For information about the Agrément Certificate, including validity and scope, tel: Hotline 01923 665400, or check the BBA website.