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Agrément Certificate  
**06/4385**  
Product Sheet 4

### BRETT MARTIN MARDOME ROOFLIGHTS AND KERBS

### THE MARDOME REFLEX POLYCARBONATE GLAZING UNIT

This Agrément Certificate Product Sheet<sup>(1)</sup> relates to The Mardome Reflex Polycarbonate Glazing Unit, for use on flat roofs of domestic and non-domestic buildings, to provide natural light and ventilation.

(1) Hereinafter referred to as 'Certificate'.

#### CERTIFICATION INCLUDES:

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



#### KEY FACTORS ASSESSED

**Light and solar transmittance** — the product provides natural lighting to the interior of a building (see section 6).

**Thermal properties** — the U value of a double-skinned product is  $3.0 \text{ W}\cdot\text{m}^{-2}\cdot\text{K}^{-1}$  and for a triple-skinned product is  $1.9 \text{ W}\cdot\text{m}^{-2}\cdot\text{K}^{-1}$  (see section 7).

**Condensation risk** — the risk of condensation on the product's internal surface will depend on the building type and ventilator used (see section 8).

**Strength and stability** — the product can withstand wind and snow loads typical in the UK (see section 9).

**Weather-tightness** — the product is weather-tight (see section 10).

**Behaviour in relation to fire** — the product can be classified as Tp(a) rigid in accordance with national Building Regulations. When tested to European classification EN 13501-1 : 2002, the product achieved a European Class B, s1, d0 (see section 11).

**Safety** — the product is rated a Class B non-fragile assembly (see section 12).

**Ventilation** — when fitted, ventilators can provide background ventilation (see section 13).

**Durability** — the product will have a life of at least 15 years (see section 16).

The BBA has awarded this Agrément Certificate to the company named above for the product described herein. This product has been assessed by the BBA as being fit for its intended use provided it is installed, used and maintained as set out in this Certificate.

On behalf of the British Board of Agrément

Sean Moriarty — Head of Approvals  
Energy and Ventilation

Greg Cooper  
Chief Executive

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Originally certificated on 29 June 2007

*The BBA is a UKAS accredited certification body — Number 1113. 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](http://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 Mardome Reflex Polycarbonate Glazing Unit, if installed, used and maintained in accordance with this Certificate, will meet or contribute to meeting the relevant requirements of the following Building Regulations (the presence of a UK map indicates that the subject is related to the Building Regulations in the region or regions of the UK depicted):



## The Building Regulations 2010 (England and Wales) (as amended)

<b>Requirement:</b> A1	<b>Loading</b>
Comment:	When installed in accordance with the provisions of this Certificate, the product will have sufficient strength and stiffness to sustain the design load. See sections 9.1 and 9.2 of this Certificate.
<b>Requirement:</b> B2(1)	<b>Internal fire spread (linings)</b>
Comment:	The product can be classified as Tp(a) rigid material. Under European classifications the polycarbonate material achieved a European Class B, s1, d0 and will adequately resist the spread of flame over its surface. See sections 11.1 and 11.3 of this Certificate.
<b>Requirement:</b> B4(2)	<b>External fire spread</b>
Comment:	The product can be taken as classified Tp(a) material. Under European classifications the polycarbonate sheets can be regarded as having a B <sub>ROOF</sub> (t4) classification and will adequately resist the spread of flame over the roof and from one building to another. See sections 11.1, 11.2 and 11.4 of this Certificate.
<b>Requirement:</b> C2(b)	<b>Resistance to moisture</b>
Comment:	When installed in accordance with this Certificate, the product will not adversely affect the resistance of the roof to the passage of moisture. The product provides adequate resistance to the ingress of precipitation. See section 10.1 and 10.3 of this Certificate.
<b>Requirement:</b> C2(c)	<b>Resistance to moisture</b>
Comment:	The risk of surface condensation on the product will depend on the building humidity class. Ventilators incorporated in the rooflight kerbs will provide airflow to alleviate surface condensation. See sections 8.1 to 8.4 of this Certificate.
<b>Requirement:</b> F1	<b>Means of ventilation</b>
Comment:	When fitted, ventilators incorporated in any kerbs of this rooflight product can meet or contribute to meeting this Requirement. See section 13 of this Certificate.
<b>Requirement:</b> L1(a)(i)	<b>Conservation of fuel and power</b>
Comment:	The U values of the product will contribute to meeting the U values given in the Approved Documents, but will depend on the whole rooflight itself. See section 7 of this Certificate. The product can also contribute to daylighting and solar transmittance. See section 6.1 of this Certificate.
<b>Requirement:</b> N4	<b>Safe access for cleaning windows etc</b>
Comment:	Provisions must be made regarding the safe cleaning of rooflights (see section 15.3 of this Certificate). This requirement does not apply to dwellings.
<b>Regulation:</b> 7	<b>Materials and workmanship</b>
Comment:	The product is acceptable when used in accordance with this Certificate. See sections 15.1, 15.3, 16 and the <i>Installation</i> part of this Certificate.
<b>Regulation:</b> 26	<b>CO<sub>2</sub> emission rates for new buildings</b>
Comment:	The U values of the product will contribute to meeting the U values given in the Approved Documents, but will depend on the whole rooflight itself. See section 7 of this Certificate. The product can also contribute to daylighting and solar transmittance. See section 6.1 of this Certificate.



## The Building (Scotland) Regulations 2004 (as amended)

<b>Regulation:</b> 8(1)(2)	<b>Fitness and durability of materials and workmanship</b>
Comment:	The product can contribute to a construction satisfying this Regulation. See sections 15.1, 15.3, 16 and the <i>Installation</i> part of this Certificate.
<b>Regulation:</b> 9	<b>Building standards applicable to construction</b>
<b>Standard:</b> 1.1(b)	<b>Structure</b>
Comment:	When installed in accordance with the provisions of this Certificate, the product will have sufficient strength and stiffness to sustain design loads, with reference to clause 1.1.1 <sup>(1)(2)</sup> . See sections 9.1 and 9.2 of this Certificate.
<b>Standard:</b> 2.5	<b>Internal linings</b>
Comment:	The product can be classified as Tp(a) rigid material, with reference to clauses 2.5.4 <sup>(1)(2)</sup> and 2.5.6 <sup>(1)(2)</sup> . See sections 11.1 and 11.3 of this Certificate.
<b>Standard:</b> 2.8	<b>Spread from neighbouring buildings</b>
Comment:	The product has been assessed as 'low vulnerability' [B <sub>ROOF</sub> (t4)] and is unrestricted by this Standard, with reference to clauses 2.8.1 <sup>(1)(2)</sup> , 2.C.3 <sup>(1)</sup> and 2.F.3 <sup>(2)</sup> . See sections 11.1 to 11.4 of this Certificate.
<b>Standard:</b> 3.10	<b>Precipitation</b>
Comment:	When installed in accordance with the provisions stated in this Certificate, the product provides adequate resistance to the ingress of precipitation, with reference to clause 3.10.1 <sup>(1)(2)</sup> . See sections 10.1 and 10.3 of this Certificate.

Standard:	3.14	Ventilation
Comment:		When fitted, ventilators incorporated in any kerbs can meet or contribute to meeting this Standard, with reference to clauses 3.14.2 <sup>(1)(2)</sup> and 3.14.3 <sup>(1)(2)</sup> . See section 13 of this Certificate.
Standard:	3.15	Condensation
Comment:		The risk of surface condensation will depend on the environmental conditions. When fitted, ventilators incorporated in any kerbs will provide airflow to alleviate surface condensation on the rooflights, with reference to clauses 3.15.1 <sup>(1)</sup> and 3.15.4 <sup>(1)</sup> . See sections 8.1 to 8.4 of this Certificate.
Standard:	3.16	Natural lighting
Comment:		In calculating the contribution of the product to natural lighting, with reference to clauses 3.16.1 <sup>(1)</sup> and 3.16.3 <sup>(1)</sup> to this Standard, the area of glazing given in Table 1 of this Certificate can be used.
Standard:	4.8(c)	Danger from accidents
Comment:		The provisions described in clause 4.8.3 <sup>(1)(2)</sup> of this Standard, regarding the safe cleaning of rooflights, must be taken into account. See section 15.3 of this Certificate.
Standard:	6.1(b)	Carbon dioxide emissions
Standard:	6.2	Building insulation envelope
Comment:		With reference to clauses 6.1.2 <sup>(1)</sup> , 6.1.4 <sup>(1)(2)</sup> , 6.2.1 <sup>(1)(2)</sup> , 6.2.2 <sup>(1)</sup> , 6.2.3 <sup>(1)(2)</sup> , 6.2.4 <sup>(2)</sup> , 6.2.5 <sup>(2)</sup> , 6.2.6 <sup>(2)</sup> , 6.2.7 <sup>(1)</sup> , 6.2.9 <sup>(1)(2)</sup> , 6.2.10 <sup>(1)</sup> , 6.2.11 <sup>(2)</sup> and 6.2.12 <sup>(2)</sup> , see sections 6.1 and 7 of this Certificate.
Standard:	7.1(a)(b)	Statement of sustainability
Comment:		The product can contribute to meeting the relevant requirements of Regulation 9, Standards 1 to 6 and therefore contribute to a construction meeting a bronze level of sustainability as defined in this Standard. In addition the product can contribute to a construction meeting a higher level of sustainability as defined in this Standard, with reference to clauses 7.1.4 <sup>(1)(2)</sup> [Aspects 1 <sup>(1)(2)</sup> and 2 <sup>(1)</sup> ], 7.1.6 <sup>(1)(2)</sup> [Aspects 1 <sup>(1)(2)</sup> and 2 <sup>(1)</sup> ] and 7.1.7 <sup>(1)(2)</sup> [Aspect 1 <sup>(1)(2)</sup> ]. See section 7 of this Certificate.
Regulation:	12	<b>Building standards applicable to conversions</b>
Comment:		All comments given for the product under Regulation 9, Standards 1 to 6, also apply to this Regulation, with reference to clause 0.12.1 <sup>(1)(2)</sup> and Schedule 6 <sup>(1)(2)</sup> . (1) Technical Handbook (Domestic). (2) Technical Handbook (Non-Domestic).



## The Building Regulations (Northern Ireland) 2012

Regulation:	23(a)(b)	<b>Fitness of materials and workmanship</b>
Comment:		The product is acceptable when used in accordance with this Certificate. See sections 15.1, 15.3, 16 and the <i>Installation</i> part of this Certificate.
Regulation:	28(b)	<b>Resistance to moisture and weather</b>
Comment:		When installed in accordance with the provisions stated in this Certificate, the product will not adversely affect the resistance of the roof to the passage of moisture. See sections 10.1 and 10.3 of this Certificate.
Regulation:	30	<b>Stability</b>
Comment:		When installed in accordance with the provisions of this Certificate, the product will have sufficient strength and stiffness to sustain the design loads. See sections 9.1 and 9.2 of this Certificate.
Regulation:	34	<b>Internal fire spread – Linings</b>
Comment:		The product can be classified as Tp(a) rigid material. Under European classifications the product achieved a European Class B, s1, d0 and will adequately resist the spread of flame over its surface. See sections 11.1 and 11.3 of this Certificate.
Regulation:	36(b)	<b>External fire spread</b>
Comment:		The product can be classified as Tp(a) rigid material. Under European classifications the polycarbonate material achieved a European Class B, s1, d0 and will adequately resist the spread of flame over the roof and from one building to another. See sections 11.1 and 11.4 of this Certificate.
Regulation:	39(a)(i)	<b>Conservation measures</b>
Regulation:	40(2)	<b>Target carbon dioxide emission rate</b>
Comment:		The U values of the product will contribute to meeting the U values given in the technical booklets, but will depend on the whole rooflight itself. See section 7 of this Certificate. The product can contribute to daylighting and solar transmittance. See section 6.1 of this Certificate.
Regulation:	65	<b>Means of ventilation</b>
Comment:		When fitted, ventilators incorporated in any kerbs can meet or contribute to meet the requirements of this Regulation. See section 13 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: 3 *Delivery and site handling* (3.1 and 3.3) of this Certificate.

## Additional Information

## NHBC Standards 2013

In the opinion of the BBA, the use of Mardome Reflex Polycarbonate Glazing Unit, in relation to this Certificate, is not subject to the requirements of these Standards.

## General

This Certificate relates to The Mardome Reflex Polycarbonate Glazing Unit, an individual polycarbonate dome glazing unit designed for refurbishment projects. The product is suitable for use on flat roofs of domestic and commercial buildings, to provide natural light and ventilation.

## Technical Specification

### 1 Description

1.1 The Mardome Reflex Polycarbonate Glazing Unit is a 'glazing only' rooflight option, consisting of a wide flanged polycarbonate glazing unit designed for refurbishment projects where only the glazing is being replaced.

1.2 Available in 80 mm and 100 mm flat flanges, Mardome Reflex means that the rooflight can be mechanically fixed to existing kerbs of varying dimensions without the use of a kerb adaptor. A 60 mm sloped flange is also available and covered by this Certificate.

1.3 The polycarbonate glazing is available in a curved dome, circular dome or a pyramid profile in either clear, bronze or opal tints or a textured glazing option. A range of sizes in single-, double- and triple-skin polycarbonate glazing are listed in Table 1 and shown in Figure 1.

*Table 1 Sizes and styles of Reflex Polycarbonate Glazing Units*

	Dome rectangular base (mm)	Pyramid (mm)
Square	600 x 600	600 x 600
	750 x 750	750 x 750
	900 x 900	900 x 900
	1050 x 1050	1050 x 1050
	1200 x 1200	1200 x 1200
	1350 x 1350	1350 x 1350
	1500 x 1500	1500 x 1500
	1800 x 1800	—
Rectangular	600 x 900	600 x 900
	600 x 1500	600 x 1500
	750 x 900	750 x 900
	900 x 1800	—
	1050 x 1500	1050 x 1500
	1200 x 600	1200 x 600
	1200 x 900	1200 x 900
	1200 x 1500	1200 x 1500
	1200 x 1800	—
1200 x 2400	—	
Circular	600	—
	750	—
	900	—
	1050	—
	1200	—
	1350	—
	1500	—
	1800	—

*Figure 1 Mardome Reflex Polycarbonate Glazing Unit*



1.4 The product is designed and thermoformed from 3 mm minimum thick polycarbonate sheets with a co-extruded Marlon FSX UV protection for use in exposure conditions described in this Certificate.

1.5 The full specification and drawings for the materials and components covered by this Certificate are retained by the BBA.

## 2 Manufacture

2.1 Polycarbonate sheets are vacuum formed to the appropriate size.

2.2 As part of the assessment and ongoing surveillance of product quality, the BBA has:

- agreed with the manufacturer the quality control procedures and product testing to be undertaken
- assessed and agreed the quality control operated over batches of incoming materials
- monitored the production process and verified that it is in accordance with the documented process
- evaluated the process for management of nonconformities
- checked that equipment has been properly tested and calibrated
- undertaken to carry out the above measures on a regular basis through a surveillance process, to verify that the specifications and quality control operated by the manufacturer are being maintained.

2.3 The management system of Brett Martin Daylight Systems Ltd has been assessed and registered as meeting the requirements of BS EN ISO 9001 : 2008 by SGS (Certificate GB92/1201).

## 3 Delivery and site handling

3.1 The Certificate holder's recommendations for site handling and installation are provided with each delivery.

3.2 The glazing units are delivered to site in kit form, wrapped in bubble wrap protective sheet ready for installation. Each glazing unit carries a label bearing the company's mark and the job identification mark.

3.3 Smaller units may be manhandled to roof level but larger units will require lifting by crane.

3.4 If the glazing units are to be stored on site they should be stacked on edge with an air gap between each unit on a dry, flat, level surface under cover. Multi-skin glazing units must not be nested at any time.

# Assessment and Technical Investigations

The following is a summary of the assessment and technical investigations carried out on The Mardome Reflex Polycarbonate Glazing Unit.

## Design Considerations

### 4 General

4.1 The Mardome Reflex Polycarbonate Glazing Unit is suitable for use on flat roofs of domestic or commercial buildings to provide natural light and ventilation. Roofs should be designed in accordance with BS 6229 : 2003.

4.2 The glazing panels are suitable for most existing roofs with upstands but it is important that the roof is checked by a suitably qualified and experienced individual to ensure that the possible removal of roof supporting members will not cause any problems and that it can bear additional loads imposed upon it by the installation of the product.

4.3 The glazing panels are suitable for replacing existing rooflights with an upstand. The suitability of existing upstands must be checked and be replaced if necessary. The glazing panels should not be used without an upstand. The use of upstands is outside the scope of this Certificate.

### 5 Practicability of installation

The product is designed to be installed by a competent general builder, or a contractor, experienced with this type of product.

### 6 Light and solar transmittance

6.1 For design purposes, the approximate light and solar transmission characteristics of new material at normal incidence are given in Table 2. These figures and the daylight opening areas given or directed in the *Thermal properties* section of this Certificate may be used in SAP and SBEM<sup>(1)</sup> calculations.

(1) Further guidance is given in *Designing with rooflights supporting the guidance in AD L2A and AD L2B* (2010), published by NARM (National Association of Rooflight Manufacturers). For guidance the reference AD in this document refers to Approved Document.

Table 2 Light and solar transmittance


Polycarbonate finish	Light transmittance (%)			Solar transmittance <sup>(1)</sup> (g <sub>1</sub> )		
	Single-skin <sup>(2)</sup>	Double-skin	Triple-skin	Single-skin	Double-skin	Triple-skin
Clear	88	77	68	0.8	0.7	0.5
Opal	38	33	29	–	–	–
Bronze	58	51	45	–	–	–
Clear/textured	80	70	62	–	–	–

(1) Default values taken from SBEM.

(2) In accordance with BS EN ISO 13468-1 : 1997.

6.2 The methods outlined in CIBSE Guide A (2006) *Environmental design*, Sections 5.7 and 5.8 and Appendix 5 should be used if the total solar gain of the building incorporating the products present a significant heat input.

## 7 Thermal properties

 7.1 The thermal transmittance (U value) of the product according to BS EN 673 : 1998, when horizontal, is  $3.0 \text{ W}\cdot\text{m}^{-2}\cdot\text{K}^{-1}$  for double-skin options and  $1.9 \text{ W}\cdot\text{m}^{-2}\cdot\text{K}^{-1}$  for the triple-skin option (assuming average 25 mm wide cavity between skins). Calculations of rooflight U values must take into account the internal surface area and linear transmittance of upstands. Linear thermal transmittance values and temperature factors are found by thermal modelling upstands in accordance with BS EN ISO 10211-2 : 2012.

7.2 Any rooflight U value exceeding the limiting values in Table 3 do not comply with the requirements. When showing compliance, the U values and areas given in the relevant tables may be used to calculate the area-weighted U values for windows, rooflights and doors, which will need to be better than  $2.2 \text{ W}\cdot\text{m}^{-2}\cdot\text{K}^{-1}$ .

Table 3 Typical design U values<sup>(1)</sup> (developed areas) for rooflights


Building type	England and Wales <sup>(2)</sup>	Scotland <sup>(3)</sup>	Northern Ireland <sup>(2)</sup>
Notional dwelling	2.0	1.5	2.2
New build limit (dwellings)	2.0	1.8	2.2
Existing dwelling	1.6	1.6	2.0
Notional non-dwelling	1.8	2.2	2.2
New build limit (non-dwellings)	2.2	2.0	2.2
New non-dwelling	1.8	1.6	2.2

(1) Flexible approaches on existing buildings and individual limit values are given in the Approved Documents (England and Wales), Technical Handbooks (Scotland), and Technical Booklet (Northern Ireland).

(2) Values to be compared with rooflights in the vertical plane.

(3) Values to be compared with rooflights in the horizontal plane.

## 8 Condensation risk

 8.1 The risk of condensation forming on a surface is dependent on its temperature and the temperature and humidity of the adjacent air. This risk can be minimised by providing means for adequate ventilation and limiting activities which produce large amounts of moisture.

8.2 Optional configurations (eg rooflights with vents) include additional framing material which can increase the temperature factor.

8.3 Table 3 from BRE Information Paper IP 1/06 *Assessing the effects of thermal bridging at junctions and around openings* gives critical temperature factors for limiting the risk of surface condensation at potential cold spots due to thermal bridging. The product will adequately limit the risk of surface condensation when it is used in buildings or parts of buildings where the temperature factors ( $f_{Rsi}$ ) are not less than the critical temperature factors ( $f_{CRsi}$ ) given in Table 4.


8.4 If condensation occurs (eg in a particularly high-humidity environment), it would likely appear initially on areas of glazing and would not be detrimental to the product as these materials are non-absorbent and will not promote mould growth.

Table 4 Minimum temperature factors<sup>(1)</sup> to minimise the risk of surface condensation

Humidity Class	Building type	Temperature factors ( $f_{CRsi}$ ) for 20°C internal temperature and humidity range in EN ISO 13788 : 2002, Figure A.1 (section 5.4)
1	Storage areas	≤0.20
2	Office, shops	0.21–0.40
3	Dwellings with low occupancy	0.41–0.57
4	Dwellings with high occupancy, sports halls, kitchens, canteens; buildings heated with unflued gas heaters	0.58–0.71
5	Special buildings, eg laundry, brewery, swimming pools	≥0.72

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

## 9 Strength and stability

 9.1 The product can be selected to have adequate resistance to wind loads calculated in accordance with BS EN 1991-1-4 : 2005.

9.2 Test conditions showed that glazing panels withstood an imposed load of  $1125 \text{ N}\cdot\text{m}^{-2}$ . 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 BS EN 1991-1-3 : 2003 is used to calculate the actual snow load when the roof is used in situations where a load greater than  $1125 \text{ N}\cdot\text{m}^{-2}$  can be expected.

9.3 Details of the connections between the upstand and the roof must be entrusted to a suitably qualified and experienced individual. Guidance is available from the Certificate holder.

9.4 The polycarbonate glazing material has a good resistance to impact from hard bodies, such as hailstones, or impacts due to vandalism. Tests on typical Polycarbonate Glazing Unit samples showed that an impact energy of 2.5 J did not cause damage when applied at various points of the unit.

9.5 Tests have shown that resistance to imposed snow loads and wind loads by the glazing unit is dependent on size and configuration. As a guide, small pyramid-shaped rooflights are more resistant to imposed loads, whilst large, domed rooflights are the least resistant. Rooflights, therefore, should be selected according to the loads expected for a particular location. The results of tests for selected rooflights carried out in accordance with BS EN 1873 : 2005 are given in Table 5.

*Table 5 Resistance to snow and wind loads*

Rooflight type	Dimensions (mm)	Snow load (N·m <sup>-2</sup> )	Wind load (N·m <sup>-2</sup> )
Domed	1200 x 2400	1125 <sup>(1) (2)</sup>	1500 <sup>(3)</sup>
Pyramid	1500 x 1500	1750 <sup>(1)</sup>	3000 <sup>(3)</sup>

(1) Downward load.  
 (2) Buckling occurred at this load, but the shape of the rooflight was restored after the load was removed. Snow load was simulated by the use of air pressure.  
 (3) Upward load.


9.6 Fixing the rooflight to the kerb is described in the *Installation* part of this Certificate. Adequate resistance to wind uplift is achieved by this type of fixing.

9.7 The product has adequate resistance to softbody impacts, such as a person accidentally falling against a rooflight. The results of tests for selected rooflights, carried out in accordance with ACR[M]001 : 2005, are given in Table 6.


*Table 6 Resistance to soft-body impact*

Rooflight type	Dimensions (mm)	Classification (non-fragility)
Domed polycarbonate	1200 x 2400	Class B
Pyramid polycarbonate	605 x 605	Class B


## 10 Weathertightness


 10.1 When installed in accordance with the manufacturer's instructions and sections 18 and 19 of this Certificate the product will provide a weatherproof construction.


10.2 Particular attention must be paid to the correct fitting of all components and to the detailing of sealants and roofing materials.

 10.3 The installation of vents to the final rooflight product will affect the air permeability performance. The type of vent specified should take into account the prevailing weather conditions. For example, in locations when driving snow is likely, the selection of a closable vent is recommended.

## 11 Behaviour in relation to fire

 11.1 When tested to European classification EN 13501-1 : 2002 the product achieved a European Class B, s1, d0.

 11.2 Under European classifications the product can be regarded as having a B<sub>ROOF</sub>(t4) classification and will adequately resist the spread of flame over the roof and from one building to another.

 11.3 For the purposes of classifying the performance of ceiling linings, the rooflights' internal glazing is classified as TP(a) rigid.

11.4 In respect of external fire spread on roofs, the product is classified as TP(a) rigid (and low vulnerability in Scotland). The product may therefore be used as follows:

**England and Wales and Northern Ireland** — The product may not be used over a protected stairway or less than 6 m from a relevant boundary, except over spaces described in Approved Documents B, Volumes 1 and 2, Tables 7 and 18, 2a or b respectively and in Technical booklet E, Table 4.8, 2a, b or c, but otherwise is unrestricted by these Requirements/Regulations

**Scotland** — The product is unrestricted by Mandatory Standard 2.8, with reference to clauses 2.8.1<sup>(1) (2)</sup>, 2.C.3<sup>(1)</sup> and 2.F.3<sup>(2)</sup>.

(1) Technical Handbook (Domestic)

(2) Technical Handbook (Non-Domestic).

## 12 Safety

12.1 If the Polycarbonate Glazing Unit in a rooflight is located on a roof which is generally accessible to the public, provision must be made to prevent people falling onto the glazed part (eg guard rails). If, as the result of an accidental fall, contact is made with the polycarbonate unit, the polycarbonate material shows good resistance to impact and the product is rated a Class B non-fragile assembly (see section 7.7).

12.2 When subjected to normal atmospheric agents, movement of the structure, hygrothermal stresses, or vibrations, the product will not collapse or result in falling debris that would cause injury to occupants or passers-by.

## 13 Ventilation



If fitted, ventilators installed in pairs on opposite sides of the long edges of upstands will provide ventilation to the room below the rooflight. The ventilator openings can provide or contribute to providing the background ventilation (trickle ventilation) open area requirements given in the documents supporting the national Building Regulations.

## 14 Security against intrusion

Polycarbonate Glazing Units have a good resistance to impact, making breakage very difficult.

## 15 Maintenance



15.1 If damage occurs, the product can be re-glazed and the fixings replaced, but these operations should be carried out using the materials recommended by the Certificate holder and approved by the BBA.

15.2 Cleaning of the product should be carried out using water containing household non-abrasive, neutral detergent. To avoid scratching of the surface, only soft cloths should be used when cleaning.



15.3 Under no circumstances should anyone venture onto a Polycarbonate Glazing Unit or rooflight. For maintenance purposes special precautions must be taken to prevent the possibility of falling through the Polycarbonate Glazing Unit, even though the product in a rooflight may support such a load.

## 16 Durability



Available test data and knowledge of the materials suggest that the product, when installed in accordance with this Certificate, should have a life of at least 15 years. Minor changes in surface appearance and light transmission may occur during this period.

## 17 Reuse and recyclability

The product is manufactured from polycarbonate which can be recycled.

# Installation

## 18 General

18.1 Installation of The Mardome Reflex Polycarbonate Glazing Unit must be carried out in accordance with the Certificate holder's installation instructions.

18.2 Prior to installation of the Polycarbonate Glazing Unit into a rooflight, the roof must be checked by means of calculations or testing to ensure that it can carry the additional loads the installation may impose, strengthening the roof if necessary. This work must be carried out by a suitably qualified and experienced individual.

18.3 The upstand used, should be checked dimensionally to ensure the fit of the Mardome glazing unit.

18.4 Fixings for securing the product onto the rooflight upstand are supplied by the Certificate holder.

## 19 Procedure

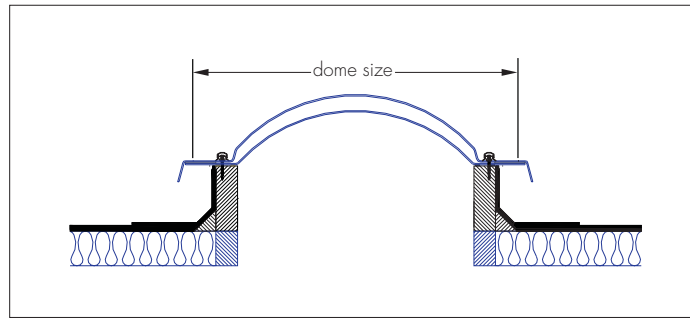
19.1 Mardome Reflex Polycarbonate Glazing Units are designed to be fitted directly onto existing builders' upstands using a Direct fix method (see Figure 2).

19.2 It is important that the builders' upstand is constructed within the dimensions shown in Table 1 and Figure 2.

19.3 Once foam sealant is applied to either the top surface of the upstand or the underside of the dome fixing flange, the Polycarbonate Glazing Unit is aligned squarely and pre-drilled through all layers of polycarbonate at each fixing point using 5 mm to 6 mm diameter drill bits. The fixings should be evenly spaced along each side.



Figure 2 Direct fix installation method

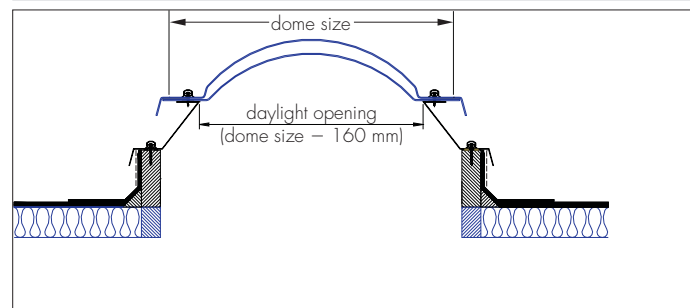


### Standard kerb adaptor (see Figure 3)

19.4 Where an existing builders' upstand dimensions do not allow for direct fixing, Mardome Reflex Polycarbonate Glazing Units can be fitted using standard kerb adaptors.

19.5 Once foam sealant is applied to either the top surface of the upstand or the underside of the kerb adaptor lower fixing flange, the kerb adaptor is pre-drilled and secured to the upstand using 55 mm screws with a clear plastic washer and cap. This method is repeated to attach the Polycarbonate Glazing Unit to the kerb adaptor.

Figure 3 Kerb adaptor installation method



## Technical Investigations

### 20 Tests

Tests were carried out on The Mardome Reflex Polycarbonate Glazing Unit in accordance with BS EN 1873 : 2005 to determine:

- light transmission and haze
- effect of impacts
- suitability of materials.

### 21 Investigations

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

21.2 An examination was made of existing data in relation to the polycarbonate material and performance in fire.

21.3 The polycarbonate was assessed for resistance to xenon ageing.

## Bibliography

BS 6229 : 2003 *Flat roofs with continuously supported coverings — Code of practice*

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

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

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

BS EN 1873 : 2005 *Prefabricated accessories for roofing — Individual roof lights of plastics — Specification and test methods*

BS EN ISO 9001 : 2008 *Quality management systems — Requirements*

BS EN ISO 10211-2 : 2012 *Thermal bridges in building construction — Calculation of heat flows and surface temperatures — Linear thermal bridges*

BS EN ISO 13468-1 : 1997 *Plastics — Determination of the total luminous transmittance of transparent materials — Single-beam instrument*

EN 13501-1 : 2002 *Fire classification of construction products and building elements — Classification using test data from reaction to fire tests*

EN ISO 13788 : 2002 *Hygrothermal performance of building components and building elements — Internal surface temperature to avoid critical surface humidity and interstitial condensation — Calculation methods*

Advisory Committee for Roofwork, ACR[M]001 : 2005 *Test For Non-Fragility of Profiled Sheeted Roofing Assemblies [third edition]*

## Conditions of Certification

### 22 Conditions

22.1 This Certificate:

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

22.2 Publications, documents, specifications, legislation, regulations, standards and the like referenced in this Certificate are those that were current and/or deemed relevant by the BBA at the date of issue or reissue of this Certificate.

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

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

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

22.5 In issuing this Certificate, the BBA is not responsible and is excluded from any liability to any company, firm, organisation or person, for any matters arising directly or indirectly from:

- the presence or absence of any patent, intellectual property or similar rights subsisting in the product/system or any other product/system
- the right of the Certificate holder to manufacture, supply, install, maintain or market the product/system
- actual installations of the product/system, including their nature, design, methods, performance, workmanship and maintenance
- any works and constructions in which the product/system is installed, including their nature, design, methods, performance, workmanship and maintenance
- any loss or damage, including personal injury, howsoever caused by the product/system, including its manufacture, supply, installation, use, maintenance and removal
- any claims by the manufacturer relating to CE marking.

22.6 Any information relating to the manufacture, supply, installation, use, maintenance and removal of 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, maintained and removed. It does not purport in any way to restate the requirements of the Health and Safety at Work etc. Act 1974, or of any other statutory, common law or other duty which may exist at the date of issue or reissue of this Certificate; nor is conformity with such information to be taken as satisfying the requirements of the 1974 Act or of any statutory, common law or other duty of care.