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Agrément Certificate
09/4691
Product Sheet 1

WHITESALES ROOFLIGHTS AND CURBS

EM-DOME POLYCARBONATE ROOFLIGHTS AND CURBS

PRODUCT SCOPE AND SUMMARY OF CERTIFICATE

This Certificate relates to Em-Dome Polycarbonate Rooflights and Curbs, for use on flat roofs of new and existing, domestic and commercial buildings, to provide natural light and ventilation.

AGRÉMENT CERTIFICATION INCLUDES:

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

KEY FACTORS ASSESSED

Light and solar transmittance — the products provide natural lighting to the interior of a building (see section 5).

Thermal properties — for a typical roof opening 1.2 m by 1.2 m, the products can achieve U values between 1.4 and 4.8 $W \cdot m^{-2} \cdot K^{-1}$ (see section 6).

Condensation risk — the risk of surface condensation on the products' internal surface will depend on the product selected and the building type (see section 7).

Strength and stability — the products will resist imposed snow loads and wind loads (see section 8).

Weathertightness — the products are weathertight (see section 9).

Behaviour in relation to fire — the rigid, solid, 3 mm thick polycarbonate rooflight is classified as TP(a) rigid (see section 10).

Safety — the products are resistant to impact (see section 11).

Ventilation — opening rooflights can provide rapid ventilation and background ventilation can be provided by the incorporation in the upstand of a suitably-sized trickle ventilator (see section 12).

Durability — the polycarbonate material and the other components should have a life of at least 25 and 20 years respectively in most non-corrosive environments (see section 15).



The BBA has awarded this Agrément Certificate to the company named above for the products described herein. These products have been assessed by the BBA as being fit for their intended use provided they are installed, used and maintained as set out in this Certificate.

On behalf of the British Board of Agrément

Date of First issue: 20 October 2009

Chris Hunt
Head of Approvals — Physics

Greg Cooper
Chief Executive

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

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

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Regulations

In the opinion of the BBA, Em-Dome Polycarbonate Rooflights and Curbs, if used in accordance with the provisions of this Certificate, will meet or contribute to meeting the relevant requirements of the following Building Regulations:



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

Requirement: A1	Loading
Comment:	The products will have sufficient strength and stiffness to sustain the design loads. See sections 8.1 to 8.3 of this Certificate.
Requirement: B2	Internal fire spread (linings)
Comment:	The products may not be used over protected stairways but are otherwise unrestricted by this Requirement. See section 10.1 of this Certificate.
Requirement: B4(2)	External fire spread
Comment:	The products may not be used over a protected stairway or less than 6 m from a relevant boundary, with some minor exceptions, but are otherwise unrestricted by this Requirement. See section 10.2 of this Certificate.
Requirement: C2(b)	Resistance to moisture
Comment:	The rooflights will not adversely affect the resistance of the roof to the passage of moisture. The products provide adequate resistance to the ingress of precipitation. See section 9.1 of this Certificate.
Requirement: C2(c)	Resistance to moisture
Comment:	The risk of surface condensation on the product will depend on the building humidity class and the product selected. See sections 7.1 to 7.3 of this Certificate.
Requirement: F1	Means of ventilation
Comment:	Opening rooflights can provide purge ventilation. See section 12.1 of this Certificate.
Requirement: L1(a)(i)	Conservation of fuel and power
Comment:	See sections 5.2 and 6.1 to 6.7 of this Certificate.
Requirement: Regulation 7	Materials and workmanship
Comment:	The products are acceptable when used in accordance with this Certificate. See section 15 and the <i>Installation</i> part of this Certificate.



The Building (Scotland) Regulations 2004 (as amended)

Regulation: 8(1)(2)	Fitness and durability of materials and workmanship
Comment:	The use of the products satisfies the requirements of this Regulation. See sections 14.1, 15 and the <i>Installation</i> part of this Certificate.
Regulation: 9	Building standards – construction
Standard: 1.1(b)	Structure
Comment:	The products will have sufficient strength and stiffness to sustain design loads, with reference to clause 1.1.1 ⁽¹⁾⁽²⁾ . See sections 8.1 to 8.3 of this Certificate.
Standard: 2.5	Internal linings
Comment:	The products must not be used over a protected zone or a fire-fighting shaft but are otherwise unrestricted by this Standard. See section 10.1 of this Certificate.
Standard: 2.8	Spread from neighbouring buildings
Comment:	The external glazing is classified 'low vulnerability' and the products are unrestricted by this Standard, with reference to clauses 2.8.1 ⁽¹⁾⁽²⁾ and 2.8.3 ⁽¹⁾⁽²⁾ . See section 10.2 of this Certificate.
Standard: 3.10	Precipitation
Comment:	The products provide adequate resistance to the ingress of precipitation, with reference to clause 3.10.1 ⁽¹⁾⁽²⁾ . See section 9.1 of this Certificate.
Standard: 3.14	Ventilation
Comment:	Opening rooflights can provide opening areas for natural ventilation, with reference to clauses 3.14.1 ⁽¹⁾⁽²⁾ and 3.14.2 ⁽¹⁾⁽²⁾ . See section 12.1 of this Certificate.
Standard: 3.15	Condensation
Comment:	The risk of surface condensation will depend on the rooflight and upstand assembly, and the building humidity class, with reference to clauses 3.15.1 ⁽¹⁾ and 3.15.4 ⁽¹⁾ . See sections 7.1 to 7.3 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 ⁽¹⁾ and 3.16.3 ⁽¹⁾ to this Standard, the area of glazing given in the Tables 1 and 2 in section 1 of this Certificate can be used.
Standard: 6.1(b)	Carbon dioxide emissions
Standard: 6.2	Building insulation envelope
Comment:	With reference to clauses 6.1.1 ⁽¹⁾ , 6.1.2 ⁽¹⁾⁽²⁾ , 6.1.3 ⁽²⁾ , 6.2.1 ⁽¹⁾⁽²⁾ , 6.2.7 ⁽¹⁾ , 6.2.8 ⁽²⁾ , 6.2.9 ⁽¹⁾ and 6.2.10 ⁽²⁾ . See sections 5.2 and 6.1 to 6.7 of this Certificate.
	(1) Technical Handbook (Domestic).
	(2) Technical Handbook (Non-Domestic).



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

Regulation:	B2	Fitness of materials and workmanship
Comment:		The products are acceptable. See section 15 and the <i>Installation</i> part of this Certificate.
Regulation:	B3(2)	Suitability of certain materials
Comment:		The products are acceptable. See section 14.1 of this Certificate.
Regulation:	C4(b)	Resistance to ground moisture and weather
Comment:		The products will not adversely affect the resistance of the roof to the passage of moisture. See section 9.1 of this Certificate.
Regulation:	D1	Stability
Comment:		The products have sufficient strength and stiffness to sustain the design loads. See sections 8.1 to 8.3 of this Certificate.
Regulation:	E3	Internal fire spread – Linings
Comment:		The products may not be used over protected stairways but are otherwise unrestricted by this Regulation. See section 10.1 of this Certificate.
Regulation:	E5(b)	External fire spread
Comment:		The products may not be used over a protected stairway or less than 6 m from a relevant boundary, with some minor exceptions, but are otherwise unrestricted by this Regulation. See section 10.2 of this Certificate.
Regulation:	F2(a)(i)	Conservation measures
Regulation:	F3(2)	Target carbon dioxide Emissions Rate
Comment:		See sections 5.2 and 6.1 to 6.7 of this Certificate.
Regulation:	K2	Means of ventilation
Comment:		Opening rooflights can provide purge ventilation. See section 12.1 of this Certificate.

Construction (Design and Management) Regulations 2007

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

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

See section: 2 *Delivery and site handling* (2.5) of this Certificate.

Non-regulatory Information

NHBC Standards 2008

NHBC accepts the use of Em-Dome Polycarbonate Rooflights and Curbs, when installed and used in accordance with this Certificate, in relation to *NHBC Standards*, Chapter 7.1 *Flat roofs and balconies*.

Zurich Building Guarantee Technical Manual 2007

In the opinion of the BBA, Zurich accepts the use of Em-Dome Polycarbonate Rooflights and Curbs, when installed and used in accordance with this Certificate, satisfy the requirements of the *Zurich Building Guarantee Technical Manual*, Section 4 *Superstructure*, Sub-section *External walls – doors, windows and roof lights* (page 172).

General

This Certificate relates to Em-Dome Polycarbonate Rooflights and Curbs (upstands), individual polycarbonate dome rooflights with glass-reinforced polyester (GRP) or PVC-U upstands.

The products are suitable for use on flat roofs of domestic and commercial buildings, to provide natural light and ventilation.

1 Description

1.1 Em-Dome Polycarbonate fixed and opening dome rooflights are thermoformed from 3 mm minimum thick, clear polycarbonate (PC) sheets (coated on both sides with a co-extruded UV stabilised PC resin layer) for use as described in this Certificate. The dimensions, skin thicknesses, roof opening, internal rise and the daylight dimensions (see Figure 1) are given in Table 1 for GRP and Table 2 for PVC-U upstands respectively.

1.2 The polycarbonate rooflights are available as single-, double- or triple-skin, in a clear, smooth finish and are fixed through factory-drilled holes onto the upstands or frames. The exterior polycarbonate skin has a 40 mm deep drip flange.

1.3 Assembly of double- or triple-skin polycarbonate rooflights is made using a double-sided adhesive rubber tape. Single-skin and assembled skins are fixed using the Em-Dome screw system (see Figure 2). Polycarbonate rooflights are delivered with pre-drilled holes (diameter 14 mm). Fixings (diameter 6 mm) are pre-mounted in the factory and delivered with the polycarbonate rooflights. A single-sided tape is fixed to the underside of the polycarbonate rooflight for sealing against the upstand.

1.4 The upstands (see Tables 1 and 2 and Figure 3) are available in two materials, GRP and PVC-U:

- GRP with bevelled sides available as twin walled. It comprises a gel coat on the interior face, a 2 mm to 2.5 mm thick inner wall; 10 mm and 20 mm thick, closed-cell polyurethane foam (density $35 \text{ kg}\cdot\text{m}^{-3}$) for the Standard and the Special models respectively; a 0.5 mm to 1 mm thick outer wall and a white topcoat on the exterior surface:
 - Standard models, 150 mm high, angled at 45° (see Figure 3)
 - Special models (see Figure 3) are available in three sizes: 150 mm, 300 mm and 500 mm high.

Other GRP upstands

In addition, the following special-construction upstands can be supplied:

- corrugated sheet to fit profiled roofing sheets (type 130/30 or 177/51)
- North facing.
- PVC-U in white finish with welded joints, (see Figure 3) and available in three sizes: 160/S (160 mm high), 160/V (160 mm high) and 300/S (300 mm high).

1.5 Opening frames are available in aluminium, type Al MgSi 0.5 F22, and white PVC-U (see Figure 4). Only manually-operated wormgear is covered by this Certificate:

Aluminium opening rooflight frame

- This consists of an L-shaped lower frame (profile 20/40/3), a U-shaped top frame (profile 20/40 30/3) joined together with two hinges and rubber foam sealant between the two. This assembly incorporating the polycarbonate rooflight is supplied ready for fixing onto the upstands on site.

PVC-U opening rooflight frame

- This is available for ventilation (300 mm max). The polycarbonate rooflights are factory-fixed into the PVC-U opening frame, equipped with stainless steel interlocking hinges. The frames are reinforced with galvanized steel reinforcement where their size exceeds 1 m^2 .

1.6 Roof coverings are applied up to external face of the upstand flange.

1.7 Quality control is exercised over the raw materials used, during production and on the final products.

Figure 1 Cross-section of typical rooflight

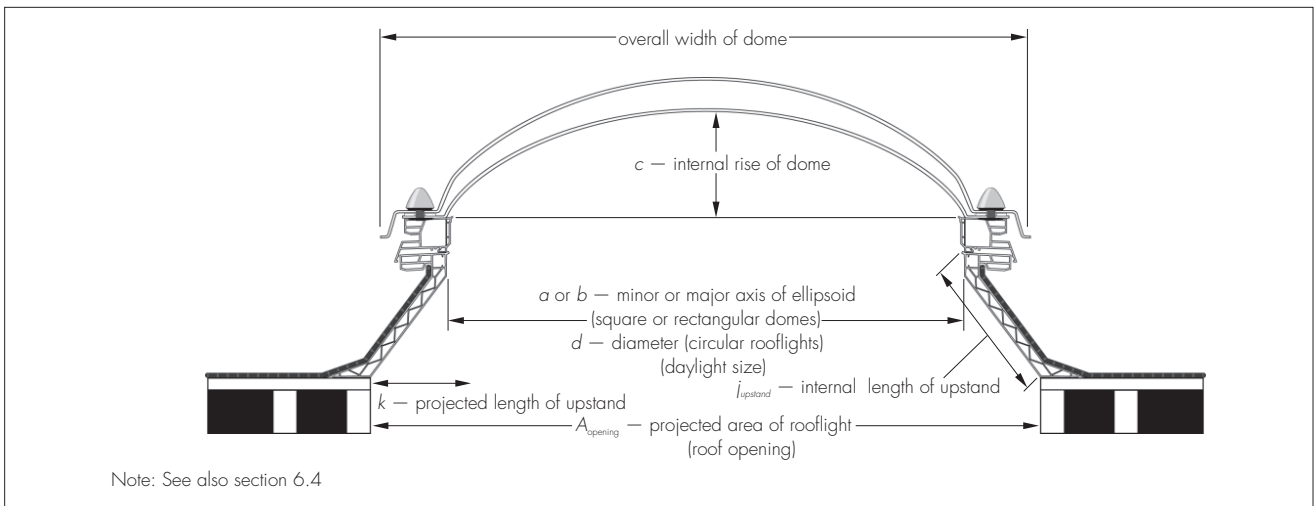


Figure 2 Em-Dome screw system

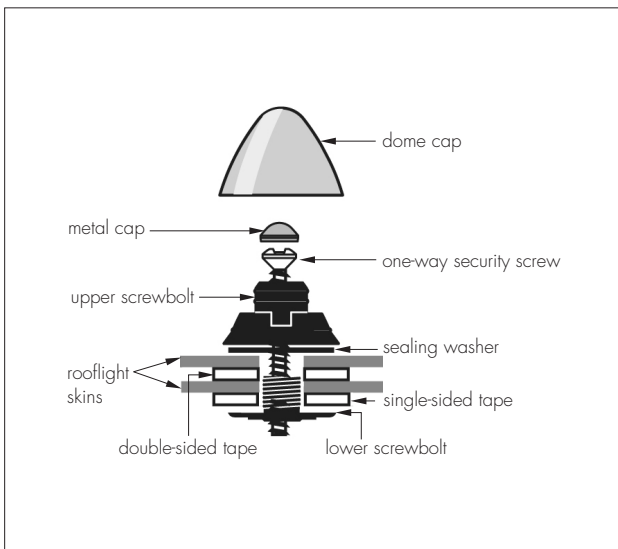


Figure 3 Upstands (all dimensions in mm)

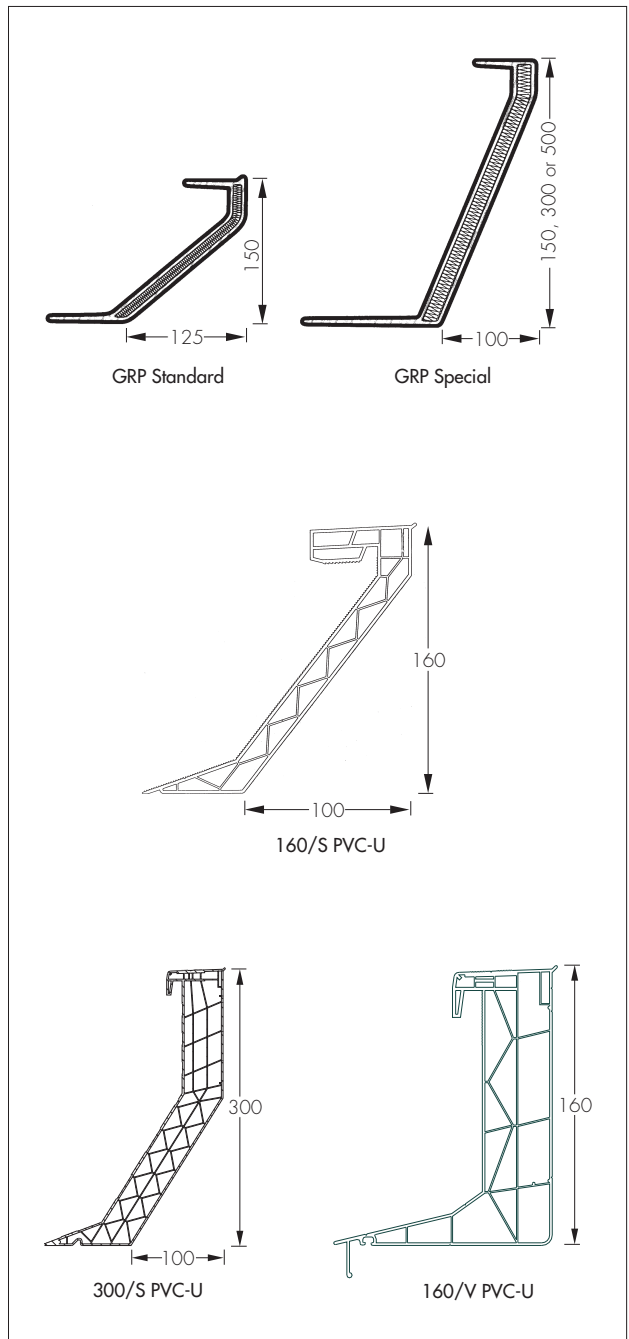


Figure 4 Typical opening frames

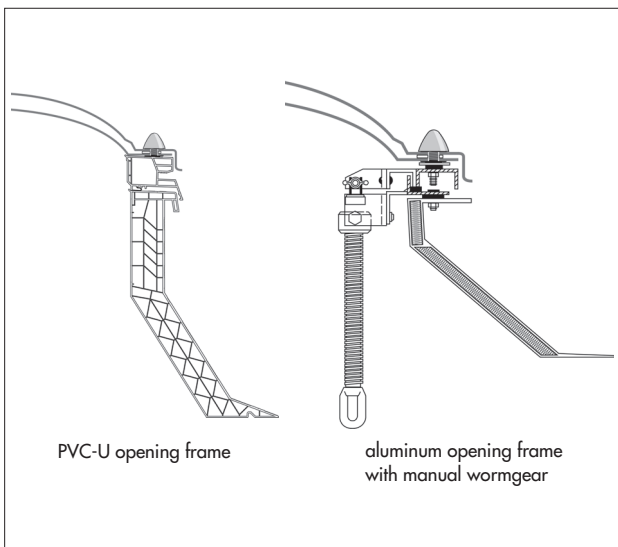


Table 1 Dimensions and selection of upstands — GRP

Size (mm)		Roof opening (mm)		Upstand ⁽¹⁾ (mm)				Internal rise (mm) tolerance (±5 mm)		
Overall	Daylight	GRP		GRP				Single-skin	Double-skin	Triple-skin
		Standard	Special	Standard	Special					
					150	150, 300, 500	150			
560 x 560	400 x 400	650 x 650	600 x 600	o	o	o	o	120	90	50
660 x 660	500 x 500	750 x 750	700 x 700	o	o	o	o	140	100	60
710 x 710	550 x 550	800 x 800	750 x 750		o	o	o	160	120	80
760 x 760	600 x 600	850 x 850	800 x 800	o	o	o	o	160	120	80
860 x 860	700 x 700	950 x 950	900 x 900	o	o	o	o	180	150	120
910 x 910	750 x 750	1000 x 1000	950 x 950	o				180	150	120
960 x 960	800 x 800	1050 x 1050	1000 x 1000	o	o	o	o	180	140	100
1060 x 1060	900 x 900	1150 x 1150	1100 x 1100	o	o			180	140	100
1160 x 1160	1000 x 1000	1250 x 1250	1200 x 1200	o	o	o	o	180	150	120
1210 x 1210	1050 x 1050	1300 x 1300	1250 x 1250		o	o	o	180	140	100
1360 x 1360	1200 x 1200	1450 x 1450	1400 x 1400	o	o	o	o	200	160	120
1460 x 1460	1300 x 1300	1550 x 1550	1500 x 1500	o	o	o	o	200	160	120
1560 x 1560	1400 x 1400	1650 x 1650	1600 x 1600	o				200	160	120
1660 x 1660	1500 x 1500	1750 x 1750	1700 x 1700	o				240	200	160
1760 x 1760	1600 x 1600	1850 x 1850	1800 x 1800	o	o	o	o	240	200	160
1960 x 1960	1800 x 1800	2050 x 2050	2000 x 2000	o	o	o	o	240	200	160
2160 x 2160	2000 x 2000	2250 x 2250	2200 x 2200	o	o	o	o	290	230	180
460 x 960	300 x 800	500 x 1050	500 x 1000		o			120	90	50
460 x 1460	300 x 1300	500 x 1550	500 x 1500		o	o	o	120	90	50
560 x 860	400 x 700	650 x 950	600 x 900	o	o	o	o	120	90	50
560 x 1160	400 x 1000	650 x 1250	600 x 1200	o	o	o		120	90	50
660 x 860	500 x 700	750 x 950	700 x 900	o				140	100	60
660 x 1160	500 x 1000	750 x 1250	700 x 1200	o				140	100	60
760 x 1060	600 x 900	850 x 1150	800 x 1100	o				160	120	80
760 x 1360	600 x 1200	850 x 1450	800 x 1400	o				160	120	80
760 x 1460	600 x 1300	850 x 1550	800 x 1500	o	o			160	120	80
760 x 1960	600 x 1800	850 x 2050	800 x 2200			o		160	120	80
860 x 1160	700 x 1000	950 x 1250	900 x 1200	o	o	o	o	180	150	120
860 x 1460	700 x 1300	950 x 1550	900 x 1500	o				180	150	120
910 x 1410	750 x 1250	1000 x 1500	950 x 1450	o				180	140	100
910 x 1910	750 x 1750	1000 x 2000	950 x 1950	o				180	140	100
910 x 2410	750 x 2250	1000 x 2500	950 x 2450	o				180	140	100
960 x 1460	800 x 1300	1050 x 1550	1000 x 1500	o	o	o	o	180	140	100
960 x 1760	800 x 1600	1050 x 1850	1000 x 1800			o		180	140	100
960 x 1960	800 x 1800	1000 x 2050	1000 x 2000		o	o	o	180	140	100
960 x 2360	800 x 2200	1050 x 2450	1000 x 2400		o			180	140	100
960 x 2460	800 x 2300	1050 x 2550	1000 x 2500		o	o	o	180	140	100
960 x 2960	800 x 2800	1050 x 3050	1000 x 3000		o	o	o	180	140	100
1060 x 1360	900 x 1200	1150 x 1450	1100 x 1400	o				180	140	100
1060 x 1660	900 x 1500	1150 x 1750	1100 x 1700	o				180	140	100
1160 x 1460	1000 x 1300	1250 x 1550	1200 x 1500	o	o	o	o	180	140	100
1160 x 1760	1000 x 1600	1250 x 1850	1200 x 1800	o	o	o	o	180	140	100
1160 x 2060	1000 x 1900	1250 x 2150	1200 x 2100		o	o		180	140	100
1160 x 2160	1000 x 2000	1250 x 2250	1200 x 2200	o	o	o	o	180	140	100
1160 x 2360	1000 x 2200	1250 x 2450	1200 x 2400	o	o	o	o	180	140	100
1160 x 2460	1000 x 2300	1250 x 2550	1200 x 2500		o	o	o	180	140	100
1160 x 2660	1000 x 2500	1250 x 2750	1200 x 2700	o	o	o		180	140	100
1360 x 1660	1200 x 1500	1450 x 1750	1400 x 1700	o				200	160	120
1360 x 2260	1200 x 2100	1450 x 2350	1400 x 2300	o				200	160	120
1460 x 1760	1300 x 1600	1550 x 1850	1500 x 1800	o	o	o	o	200	160	120
1460 x 2060	1300 x 1900	1550 x 2150	1500 x 2100	o	o	o	o	200	160	120
1460 x 2160	1300 x 2000	1550 x 2250	1500 x 2200	o				200	160	120
1460 x 2360	1300 x 2200	1550 x 2450	1500 x 2400	o	o	o	o	200	160	120
1460 x 2460	1300 x 2300	1550 x 2550	1500 x 2500		o	o		200	160	120
1460 x 2660	1300 x 2500	1550 x 2750	1500 x 2700	o	o	o	o	200	160	120
1460 x 2960	1300 x 2800	1550 x 3050	1500 x 3000	o	o	o		200	160	120
1610 x 1860	1450 x 1700	1700 x 1950	1650 x 1900	o				240	200	160
1760 x 2160	1600 x 2000	1850 x 2250	1800 x 2200	o				240	200	160
1760 x 2360	1600 x 2200	1850 x 2450	1800 x 2400	o	o	o	o	240	200	160
1760 x 2660	1600 x 2500	1850 x 2750	1800 x 2700	o	o	o	o	240	200	160
1760 x 2960	1600 x 2800	1850 x 3050	1800 x 3000	o	o	o	o	240	200	160
Ø560	Ø400	Ø650	Ø600	o	o	o	o	120	90	50

Table 1 Dimensions and selection of upstands — GRP (continued)

Size (mm)		Roof opening (mm)		Upstand ⁽¹⁾ (mm)			Internal rise (mm) tolerance (±5 mm)		
Overall	Daylight	GRP		GRP			Single-skin	Double-skin	Triple-skin
		Standard	Special	Standard	Special				
		150	150, 300, 500		150	150, 300, 500			
Ø660	Ø500	Ø750	Ø700	o			140	100	60
Ø760	Ø600	Ø850	Ø800	o		o o	180	140	100
Ø860	Ø700	Ø950	Ø900	o	o o o		180	140	100
Ø960	Ø800	Ø1050	Ø1000	o	o o o		180	140	100
Ø1060	Ø900	Ø1150	Ø1100	o			180	140	100
Ø1160	Ø1000	Ø1250	Ø1200	o	o o o		180	140	100
Ø1260	Ø1100	Ø1350	Ø1300	o			180	140	100
Ø1360	Ø1200	Ø1450	Ø1400		o o		180	140	100
Ø1460	Ø1300	Ø1550	Ø1500	o	o o o		200	160	120
Ø1560	Ø1400	Ø1650	Ø1600	o	o o o		200	160	120
Ø1760	Ø1600	Ø1850	Ø1800	o	o o o		240	200	160
Ø1860	Ø1700	Ø1950	Ø1900	o			240	200	160

(1) o = option available.

Table 2 Dimensions and selection of upstands — PVC-U

Size (mm)		Roof opening (mm)		Upstand ⁽¹⁾			Internal rise (mm) tolerance (±5 mm)		
Overall	Daylight	PVC-U		PVC-U			Single-skin	Double-skin	Triple-skin
		160/S, 300/S	160/V	160/V	160/S	300/S			
560 x 560	400 x 400	600 x 600	400 x 400	o	o	o	120	90	50
660 x 660	500 x 500	700 x 700	500 x 500	o	o	o	140	100	60
710 x 710	550 x 550	750 x 750	550 x 550	o	o	o	160	120	80
760 x 760	600 x 600	800 x 800	600 x 600	o	o	o	160	120	80
860 x 860	700 x 700	900 x 900	700 x 700	o	o	o	180	150	120
910 x 910	750 x 750	950 x 950	750 x 750	o	o	o	180	150	120
960 x 960	800 x 800	1000 x 1000	800 x 800	o	o	o	180	150	120
1060 x 1060	900 x 900	1100 x 1100	900 x 900	o	o	o	180	140	100
1160 x 1160	1000 x 1000	1200 x 1200	1000 x 1000	o	o	o	180	150	120
1210 x 1210	1050 x 1050	1250 x 1250	1050 x 1050	o	o	o	180	140	100
1260 x 1260	1100 x 1100	1300 x 1300	1100 x 1100	o	o	o	180	140	100
1360 x 1360	1200 x 1200	1400 x 1400	1200 x 1200	o	o	o	200	160	120
1460 x 1460	1300 x 1300	1500 x 1500	1300 x 1300	o	o	o	200	160	120
1560 x 1560	1400 x 1400	1600 x 1600	1400 x 1400	o	o	o	200	160	120
1660 x 1660	1500 x 1500	1700 x 1700	1500 x 1500	o	o	o	200	160	120
1710 x 1710	1550 x 1550	1750 x 1750	1500 x 1550	o	o	o	200	160	120
1760 x 1760	1600 x 1600	1800 x 1800	1600 x 1600	o	o	o	240	200	160
1860 x 1860	1700 x 1700	1900 x 1900	1700 x 1700	o	o	o	240	200	160
1960 x 1960	1800 x 1800	2000 x 2000	1800 x 1800	o	o	o	240	200	160
2160 x 2160	2000 x 2000	2200 x 2200	2000 x 2000	o	o	o	290	230	180
460 x 960	300 x 800	500 x 1000	300 x 800	o	o		120	90	50
460 x 1060	300 x 900	500 x 1100	300 x 900	o	o		120	90	50
460 x 1460	300 x 1300	500 x 1500	300 x 1300	o	o		120	90	50
560 x 860	400 x 700	600 x 900	400 x 700	o	o	o	120	90	50
560 x 1160	400 x 1000	600 x 1200	400 x 1000	o	o	o	120	90	50
560 x 1460	400 x 1300	600 x 1500	400 x 1300	o	o	o	120	90	50
560 x 1760	400 x 1600	600 x 1800	400 x 1600	o	o	o	120	90	50
560 x 2060	400 x 1900	600 x 2100	400 x 1900	o	o	o	120	90	50
560 x 2360	400 x 2200	600 x 2400	400 x 2200	o	o	o	120	90	50
560 x 2960	400 x 2800	600 x 3000	400 x 2800	o	o	o	120	90	50
610 x 910	450 x 750	650 x 950	450 x 750	o	o	o	120	90	50
610 x 1210	450 x 1050	650 x 1250	450 x 1050	o	o	o	120	90	50
660 x 860	500 x 700	700 x 900	500 x 700	o	o	o	140	100	60
660 x 960	500 x 800	700 x 1000	500 x 800	o	o	o	140	100	60
660 x 1160	500 x 1000	700 x 1200	500 x 1000	o	o	o	140	100	60
660 x 1260	500 x 1100	700 x 1300	500 x 1100	o	o	o	140	100	60
660 x 1560	500 x 1400	700 x 1600	500 x 1400	o	o	o	140	100	60
660 x 1860	500 x 1700	700 x 1900	500 x 1700	o	o	o	140	100	60
660 x 2160	500 x 2000	700 x 2200	500 x 2000	o	o	o	140	100	60
660 x 2460	500 x 2300	700 x 2500	500 x 2300	o	o	o	140	100	60

Table 2 Dimensions and selection of upstands — PVC-U (continued)

Overall	Size (mm)	Roof opening (mm)		Upstand ⁽¹⁾			Internal rise (mm) tolerance (±5 mm)		
	Daylight	PVC-U		PVC-U			Single-skin	Double-skin	Triple-skin
		160/S, 300/S	160/V	160/V	160/S	300/S			
760 x 960	600 x 800	800 x 1000	600 x 800	o	o	o	160	120	80
760 x 1060	600 x 900	800 x 1100	600 x 900	o	o	o	160	120	80
760 x 1360	600 x 1200	800 x 1400	600 x 1200	o	o	o	160	120	80
760 x 1460	600 x 1300	800 x 1500	600 x 1300	o	o	o	160	120	80
760 x 1660	600 x 1500	800 x 1700	600 x 1500	o	o	o	160	120	80
760 x 1960	600 x 1800	800 x 2000	600 x 1800	o	o	o	160	120	80
760 x 2160	600 x 2000	800 x 2200	600 x 2000	o	o	o	160	120	80
860 x 1160	700 x 1000	900 x 1200	700 x 1000	o	o	o	180	150	120
860 x 1460	700 x 1300	900 x 1500	700 x 1300	o	o	o	180	140	100
860 x 1660	700 x 1500	900 x 1700	700 x 1500	o	o	o	180	140	100
860 x 1760	700 x 1600	900 x 1800	700 x 1600	o	o	o	180	140	100
860 x 2160	700 x 2000	900 x 2200	700 x 2000	o	o	o	180	140	100
860 x 2360	700 x 2200	900 x 2400	700 x 2200	o	o	o	180	140	100
910 x 1210	750 x 1050	950 x 1250	750 x 1050	o	o	o	180	140	100
910 x 1410	750 x 1250	950 x 1450	750 x 1250	o	o	o	180	140	100
910 x 1810	750 x 1650	950 x 1850	750 x 1650	o	o	o	180	140	100
910 x 1910	750 x 1750	950 x 1950	750 x 1750	o	o	o	180	140	100
910 x 2410	750 x 2250	950 x 2450	750 x 2250	o	o	o	180	140	100
960 x 1260	800 x 1100	1000 x 1300	800 x 1100	o	o	o	180	140	100
960 x 1460	800 x 1300	1000 x 1500	800 x 1300	o	o	o	180	140	100
960 x 1560	800 x 1400	1000 x 1600	800 x 1400	o	o	o	180	140	100
960 x 1760	800 x 1600	1000 x 1800	800 x 1600	o	o	o	180	140	100
960 x 1860	800 x 1700	1000 x 1900	800 x 1700	o	o	o	180	140	100
960 x 1960	800 x 1800	1000 x 2000	800 x 1800	o	o	o	180	140	100
960 x 2160	800 x 2000	1000 x 2200	800 x 2000	o	o	o	180	140	100
960 x 2360	800 x 2200	1000 x 2400	800 x 2200	o	o	o	180	140	100
960 x 2460	800 x 2300	1000 x 2500	800 x 2300	o	o	o	180	140	100
960 x 2660	800 x 2500	1000 x 2700	800 x 2500	o	o	o	180	140	100
960 x 2960	800 x 2800	1000 x 3000	800 x 2800	o	o	o	180	140	100
1060 x 1360	900 x 1200	1100 x 1400	900 x 1200	o	o	o	180	140	100
1060 x 1660	900 x 1500	1100 x 1700	900 x 1500	o	o	o	180	140	100
1060 x 1960	900 x 1800	1100 x 2000	900 x 1800	o	o	o	180	140	100
1160 x 1460	1000 x 1300	1200 x 1500	1000 x 1300	o	o	o	180	140	100
1160 x 1660	1000 x 1500	1200 x 1700	1000 x 1500	o	o	o	180	140	100
1160 x 1760	1000 x 1600	1200 x 1800	1000 x 1600	o	o	o	180	140	100
1160 x 2060	1000 x 1900	1200 x 2100	1000 x 1900	o	o	o	180	140	100
1160 x 2160	1000 x 2000	1200 x 2200	1000 x 2000	o	o	o	180	140	100
1160 x 2360	1000 x 2200	1200 x 2400	1000 x 2200	o	o	o	180	140	100
1160 x 2460	1000 x 2300	1200 x 2500	1000 x 2300	o	o	o	180	140	100
1160 x 2660	1000 x 2500	1200 x 2700	1000 x 2500	o	o	o	180	140	100
1210 x 1810	1050 x 1650	1250 x 1850	1050 x 1650	o	o	o	180	140	100
1210 x 2410	1050 x 2250	1250 x 2450	1050 x 2250	o	o	o	180	140	100
1260 x 1560	1100 x 1400	1300 x 1600	1100 x 1400	o	o	o	180	140	100
1260 x 1860	1100 x 1700	1300 x 1900	1100 x 1700	o	o	o	180	140	100
1260 x 2460	1100 x 2300	1300 x 2500	1100 x 2300	o	o	o	180	140	100
1360 x 1560	1200 x 1400	1400 x 1600	1200 x 1400	o	o	o	200	160	120
1360 x 1660	1200 x 1500	1400 x 1700	1200 x 1500	o	o	o	200	160	120
1360 x 1960	1200 x 1800	1400 x 2000	1200 x 1800	o	o	o	200	160	120
1360 x 2260	1200 x 2100	1400 x 2300	1200 x 2100	o	o	o	200	160	120
1460 x 1760	1300 x 1600	1500 x 1800	1300 x 1600	o	o	o	200	160	120
1460 x 2060	1300 x 1900	1500 x 2100	1300 x 1900	o	o	o	200	160	120
1460 x 2160	1300 x 2000	1500 x 2200	1300 x 2000	o	o	o	200	160	120
1460 x 2360	1300 x 2200	1500 x 2400	1300 x 2200	o	o	o	200	160	120
1460 x 2460	1300 x 2300	1500 x 2500	1300 x 2300	o	o	o	200	160	120
1460 x 2660	1300 x 2500	1500 x 2700	1300 x 2500	o	o	o	200	160	120
1460 x 2960	1300 x 2800	1500 x 3000	1300 x 2800	o	o	o	200	160	120
1610 x 1860	1450 x 1700	1650 x 1900	1450 x 1700	o	o	o	240	200	160
1760 x 2160	1600 x 2000	1800 x 2200	1600 x 2000	o	o	o	240	200	160
1760 x 2360	1600 x 2200	1800 x 2400	1600 x 2200	o	o	o	240	200	160
1760 x 2460	1600 x 2300	1800 x 2500	1600 x 2300	o	o	o	240	200	160
1760 x 2660	1600 x 2500	1800 x 2700	1600 x 2500	o	o	o	240	200	160
1760 x 2960	1600 x 2800	1800 x 3000	1600 x 2800	o	o	o	240	200	160

(1) o = option available.

2 Delivery and site handling

- 2.1 The Certificate holder's recommendations for site handling and installation are provided with each delivery.
- 2.2 The rooflights and upstands are delivered to site ready assembled, wrapped in bubble wrap protective sheet. Each rooflight carries a label bearing the company's mark and the BBA identification mark incorporating the number of this Certificate.
- 2.3 If the rooflights 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 plastic rooflights must not be nested at any time.
- 2.4 Before installation, the upstands should be laid on timber packers placed on a level surface to avoid damage to finishes and accessories.
- 2.5 Smaller units may be manhandled to roof level but larger units will require crange.

Assessment and Technical Investigations

The following is a summary of the assessment and technical investigations carried out on Em-Dome Polycarbonate Rooflights and Curbs.

Design Considerations

3 Use

- 3.1 Em-Dome Polycarbonate Rooflights and Curbs are suitable for use on the flat roofs of domestic or commercial buildings, to provide natural light and ventilation. New roofs should be designed in accordance with BS 6229 : 2003.
- 3.2 The polycarbonate rooflights and upstands are suitable for most existing roofs but it is important that the roof is checked by a suitably-qualified person to ensure that the possible removal of roof supporting members will not cause any problems and that it can bear any possible additional loads imposed upon it by the installation of the products.
- 3.3 The polycarbonate rooflights are suitable for replacing existing polycarbonate rooflights. The suitability of existing upstands must be checked and be replaced if necessary. The rooflights should not be used without an upstand. The use of upstands other than those described in section 1.4 is outside the scope of this Certificate.

4 Practicability of installation

The plastic rooflights and upstands are practicable to install using the methods and procedures within this Certificate and in accordance with the recommendations given in the Certificate holder's installation guide.

5 Light and solar transmittance

5.1 For design purposes, the approximate light and solar transmittance characteristics of new material at normal incidence are given in Table 3. These figures and the daylight opening areas given in Tables 1 and 2 of this Certificate may be used in SAP and SBEM⁽¹⁾ calculations.

- (1) Further guidance is given in *Designing with rooflights* supporting the guidance given in Approved Documents L2A and L2B (issue 1, September 2006, published by NARM).

	Light transmittance ⁽¹⁾	Solar transmittance (g_t) ⁽¹⁾
Single-skin	0.8	0.8
Double-skin	0.7	0.7
Triple-skin	0.5	0.5

(1) Default values taken from SBEM.



5.2 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 presents a significant heat input.

6 Thermal properties



- 6.1 When considering rooflight requirements, designers should refer to the detailed guidance contained in the documents supporting the national Building Regulations. The U values shown in Table 4 or derived in accordance with section 6.4 of this Certificate, indicate that typical design U values referred to in those supporting documents can be met (see section 6.5).
- 6.2 The thermal transmittance (U values) of the standard size (1.2 m by 1.2 m) daylight opening are given in Table 4.

Table 4 Rooflight U values ($Wm^{-2}K^{-1}$) – roof openings 1.2 m by 1.2 m⁽¹⁾

	Single-skin	Double-skin	Triple-skin
Rooflight glazing (no upstand)	6.5	3.0	1.9
GRP (Special 150 mm)	4.5	2.3	1.6
GRP (Special 300 mm)	3.7	2.0	1.4
GRP (Special 500 mm)	3.1	1.8	1.3
GRP (Standard 150 mm)	4.8	2.6	2.0
PVC-U 160/S	5.0	2.7	1.9
PVC-U 160/V	5.2	3.1	2.4
PVC-U 300/S	4.0	2.3	1.7

(1) Rooflight U values are with upstands with fixed frames.

6.3 The thermal transmittance value (U value) of an Em-Dome fixed rooflight 980 mm wide by 980 mm deep, incorporating PVC-U upstand 300/S and triple-skin polycarbonate/PMMA/polycarbonate, when measured by the Guarded Hot Box Method according to BS EN ISO 12567-2 : 2005, is $2.3 W \cdot m^{-2} \cdot K^{-1}$ and refers to the opening in the roof. In the opinion of the BBA, the U value of the opening for an identical rooflight incorporating a triple-skin, comprising polycarbonate/polycarbonate/polycarbonate, would be similar.

6.4 For rooflights with dimensions different to those given in section 6.2, the U values can be calculated using the following equations and glazing U values (see Table 4) (see also Figure 1):

Rooflight U value suitable for SBEM input is given by:

$$(1) \quad U_{\text{rooflight}} = \frac{\psi_{\text{upstand}} l_{\text{upstand}} + U_{\text{glazing}} A_{\text{glazing}}}{A_{\text{internal}}}$$

Opening area U value suitable for SAP input is given by:

$$(2) \quad U_{\text{opening}} = U_{\text{rooflight}} \times S$$

Internal area of the rooflight is given by:

$$(3) \quad A_{\text{internal}} = A_{\text{glazing}} + l_{\text{upstand}} \times i_{\text{upstand}}$$

The surface area ratio of internal and projected areas of the rooflight is given by:

$$(4) \quad S = \frac{A_{\text{internal}}}{A_{\text{roof opening}}}$$

where:

ψ_{upstand} is the linear thermal transmittance of upstand (given in Table 5)

l_{upstand} is the perimeter of upstand over which the linear thermal transmittance is taken. Calculated to equation (5) for circular domes or equation (8) for square or rectangular domes

U_{glazing} is the thermal transmittance of the polycarbonate sheet(s) (given in section 6.1)

A_{glazing} is the internal area of the glazing. Calculated to equation (6) for circular domes or equation (9) for square or rectangular domes.

A_{internal} is the overall internal area of the rooflight (including upstand, glazing and opening frame)

S is the surface area ratio between the internal and projected areas of the rooflight

$A_{\text{roof opening}}$ is the projected area of the rooflight. Calculated to equation (7) for circular domes or equation (10) for square or rectangular domes

i_{upstand} is the internal length of the upstand (given in Table 5).

Table 5 Linear thermal transmittance of upstands and opening frames

	Height (mm)	Linear thermal transmittance (W·m ⁻¹ ·K ⁻¹)	Internal length of upstand, l_{upstand} (m)	Projected length of upstand, k (m)
GRP upstand Special model	150	0.2	0.180	0.1
GRP upstand Special model and aluminium opening frame	150 + 33	0.4	0.209	0.1
GRP upstand Special model and PVC-U opening frame	150 + 50	0.3	0.224	0.1
GRP upstand Special model	300	0.3	0.316	0.1
GRP upstand Special model and aluminium opening frame	300 + 33	0.5	0.348	0.1
GRP upstand Special model and PVC-U opening frame	300 + 50	0.4	0.364	0.1
GRP upstand Special model	500	0.5	0.510	0.1
GRP upstand Special model and aluminium opening frame	500 + 33	0.7	0.542	0.1
GRP upstand Special model and PVC-U opening frame	500 + 50	0.6	0.559	0.1
GRP upstand Standard model	150	0.4	0.195	0.125
GRP upstand Standard model and aluminium opening frame	150 + 33	0.5	0.213	0.125
GRP upstand Standard model and PVC-U opening frame	150 + 50	0.5	0.236	0.125
PVC-U 160/S upstand	160	0.6	0.189	0.1
PVC-U 160/S upstand and PVC-U opening frame	160 + 50	0.7	0.233	0.1
PVC-U 160/V upstand	160	0.3	0.160	0
PVC-U 160/V upstand and PVC-U opening frame	160 + 50	0.4	0.205	0
PVC-U 300/S upstand	300	0.5	0.319	0.1
PVC-U 300/S upstand and PVC-U opening frame	300 + 50	0.6	0.364	0.1

Dome (circular)

$$(5) l_{\text{upstand}} = 2\pi (d/2 + k/2)$$

$$(6) A_{\text{glazing}} = 2\pi \left[\left\{ (d/2)^{2p} + 2(d/2)^p \right\} / 3 \right]^{1/p}$$

$$(7) A_{\text{roof opening}} = \pi (d/2 + k)^2$$

Dome (square and rectangular)

$$(8) l_{\text{upstand}} = 2(a + 2k + b)$$

$$(9) A_{\text{glazing}} = ab - \pi (ab/4) + 2\pi \left[\left\{ (a/2)^p (b/2)^p + (a/2)^p c^p + (b/2)^p c^p \right\} / 3 \right]^{1/p}$$

$$(10) A_{\text{roof opening}} = ab + 2k(a+b) + 4k^2$$

where:

d is the diameter of the circular rooflight (see Tables 1 and 2 for rooflight ranges)

k is the projected length of the upstand (given in Table 5)

a is the major axis of the ellipsoid (see Tables 1 and 2 for rooflight ranges)

b is the minor axis of the ellipsoid (see Tables 1 and 2 for rooflight ranges)

c is the internal rise of the dome (see Table 1 for rooflight ranges)

p is a constant = 1.6075

π is a constant = 3.14159.

Note: for square domes $a = b$

6.5 Rooflights with U values lower than (or the same as, for dwellings in Scotland) the relevant 'notional' value specified in Table 6 or 7 of this Certificate will contribute to a building meeting its Target Emission Rate. Rooflights with higher U values may require additional energy saving measures in the building envelope and/or services. For existing buildings, extensions, conversions, etc, rooflights will be acceptable where they do not exceed the relevant U value in Table 6 or 7.

6.6 Rooflight assemblies are permeable to air at the junction between rooflight and upstand, particularly where an opening mechanism is present. Air permeability is beneficial for control of condensation but can also have an effect on thermal insulation properties. This may affect the airtightness of the building envelope.

6.7 Care must be taken in the design and detailing of upstand/roof junctions to minimise excessive heat loss.

Table 6 Typical design U values⁽¹⁾ for rooflights ($W \cdot m^{-1} \cdot K^{-1}$) — England, Wales and Northern Ireland

Double-skin glazing	Triple-skin glazing	Construction type
2.3	2.1	Mean for rooflights in domestic and non-domestic extensions ⁽²⁾ and material change of use ⁽²⁾
2.5	2.3	Mean for replacement rooflights in dwellings and material change of use and consequential improvements ⁽²⁾
2.7	2.5	Maximum area weighted mean for rooflights 'notional' buildings, domestic and non-domestic new-build and large non-domestic extensions
3.8	3.6	Maximum individual value for rooflights in domestic and non-domestic new-build

(1) Includes a correction (section 11.1 of BR 443) for horizontal ($\leq 20^\circ$) use.

(2) Alternative or flexible approaches are given in relevant documents supporting the national Building Regulations.

Table 7 Typical design U values⁽¹⁾ for rooflights ($W \cdot m^{-1} \cdot K^{-1}$) — Scotland

Double-skin glazing	Triple-skin glazing	Construction type
		Average for all openings for 'notional' domestic and the Simplified Approach for domestic:
1.5 ⁽²⁾	1.5 ⁽²⁾	— package 6
1.7 ⁽²⁾	1.7 ⁽²⁾	— package 3
1.8 ⁽²⁾	1.8 ⁽²⁾	— packages 1, 2, 4 and 5
2.3	2.1	Maximum area weighted mean for domestic extensions, replacement and alterations
2.7	2.5	Maximum area weighted mean for a rooflight in new domestic and non-domestic and non-domestic 'notional'
3.8	3.6	Maximum individual value for rooflights in domestic new-build and extensions and non-domestic new-build

(1) Includes a correction (section 11.1 of BR 443) for horizontal ($\leq 20^\circ$) use.

(2) Average for all openings and does not include note (1) corrections.

7 Condensation risk



7.1 Modelling of the rooflights in accordance with BS EN ISO 10211-1 : 1996 and BS EN ISO 10211-2 : 2001 indicates the minimum temperature factors shown in Table 8.

Table 8 Minimum temperature factors for Em-Dome rooflights

Construction	Minimum temperature factor		
	Single-skin	Double-skin	Triple-skin
Upstands ⁽¹⁾ with and without PVC-U opening frame	0.30	0.55	0.55
Upstands ⁽¹⁾ with and without aluminium opening frame	0.27	0.27	0.27
160/V PVC-U upstand with fixed rooflight	0.30	0.57	0.63
160/V PVC-U upstand with PVC-U opening frame	0.30	0.57	0.62
300/S PVC-U upstand with fixed rooflight	0.30	0.59	0.62
300/S PVC-U upstand with PVC-U opening frame	0.30	0.57	0.62

(1) Standard (150 mm), Special (150 mm, 300 mm and 500 mm) and 160/S PVC-U upstands.

7.2 The risk of condensation forming on an internal surface of the rooflight is dependent on its temperature and the temperature and humidity of the adjacent air. The risk will be minimal when the rooflight's minimum temperature factor (see Table 8) exceeds that shown in Table 9, for the relevant building type.

Table 9 Minimum temperature factors⁽¹⁾ to minimise the risk of surface condensation

Humidity Class	Building type	Temperature factors 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.

7.3 Where the temperature factors given in Table 8 are less than those given in Table 9 for the relevant building type, there is a risk of surface condensation forming. However, limited intermittent condensation, appearing initially on the upstand, will not be detrimental to the rooflight. By way of comparison, minimum temperature factors for typical PVC-U windows are between 0.50 and 0.65.

7.4 In all cases, the risk of surface condensation can be reduced by limiting activities which produce large amounts of moisture and providing means for adequate ventilation; in particular air flow from upstand mounted trickle ventilators, when fitted (outside the scope of this Certificate), can alleviate localised surface condensation.

8 Strength and stability


 8.1 Tests have shown that resistance to imposed wind loads by the rooflights is dependent on size and configuration. As a guide, small domed rooflights are more resistant to imposed loads. Rooflights, therefore, should be selected according to the loads expected for a particular location. Results for selected rooflights tested as part of the assessment leading to the issue of ATG 98/1804 are given in Table 10. As a guide, the nearest equivalent grading according to BS EN 1873 : 2005 is given in parentheses.

Table 10 Resistance to loads

Rooflight size (mm)	Downward load (N·m ⁻²)	Upward load (N·m ⁻²)
1960 x 1960	2000 (DL 1750)	2000 (UL 1500)
1760 x 2660	—	1500 (UL 1500)
1160 x 2360	1500 (DL 1125)	—

8.2 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 and type of rooflights. Therefore, it is recommended that BS 6399-3 : 1988 is used to calculate the actual snow load. The appropriate safety factors must be applied by the building designer.


8.3 The products can be selected to have adequate resistance to wind loads calculated in accordance with BS 6399-2 : 1997.

8.4 Fixing the rooflight to the upstand is described in section 17 of this Certificate. Adequate resistance to wind uplift is achieved by this type of fixing.

8.5 Details of the connections between the upstand and the roof must be entrusted to a suitably-qualified person. Guidance is available from the Certificate holder.

8.6 The polycarbonate 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 20 J did not cause damage when applied at various points of the rooflights. The product has adequate resistance to soft-body impacts, such as a person accidentally falling against a rooflight.

9 Weathertightness

 9.1 When tested in accordance with prEN 1873 : 2000, in a horizontal position, a rooflight and upstand assembly remained watertight.

9.2 Rooflights, upstands and opening frames, if used, when installed in accordance with the manufacturer's instructions and sections 16 and 17 of this Certificate, will provide adequate resistance to the ingress of precipitation.

9.3 Particular attention must be paid to the correct fitting of all components. The roof waterproofing system must be carefully dressed up the upstand to provide a watertight joint between the upstand and the roofdeck.

9.4 The installation of vents⁽¹⁾ will affect the weathertightness performance. The type of vent specified should take into account the prevailing weather conditions. For example, in locations where driving snow is likely, the selection of a closable vent is recommended.

(1) Outside the scope of this Certificate.

10 Behaviour in relation to fire



10.1 For the purposes of classifying the performance of ceiling linings, the rooflights' internal glazing is classified as TP(a) rigid and the frames and upstands need not be considered.

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

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

Scotland — The products are unrestricted by Mandatory Standard 2.8, with reference to clauses 2.8.1⁽¹⁾⁽²⁾ and 2.D.3⁽¹⁾⁽²⁾.

(1) Technical Handbook (Domestic).

(2) Technical Handbook (Non-Domestic).

10.3 The external rating of the upstand will depend on the performance of the roof weatherproofing finish covering it. The performance of individual roof weatherproofings is outside the scope of this Certificate.

11 Safety

11.1 If the rooflight is located on a roof 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 rooflight, the polycarbonate material shows good resistance to impact (see section 8.6).

11.2 When subjected to normal conditions of use, movement of the structure, hygrothermal stresses, or vibrations, the polycarbonate rooflights will not collapse or result in falling debris that could cause injury to occupants or passers-by.

12 Ventilation



12.1 Opening rooflights can contribute to providing purge (natural) ventilation. This contribution will depend on the daylight area of the rooflight (see Figure 1), the accessibility of wormgear and the floor area of the ventilated space.

12.2 If fitted, ventilators⁽¹⁾ 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.

(1) Outside the scope of this Certificate. Details of ventilators covered by an Agrément Certificate can be found on the BBA website.

13 Security against intrusion

13.1 The rooflights are supplied with tamper-proof fixings to make removal of the rooflight from the upstand more difficult (see Figure 2).

13.2 Polycarbonate rooflights have a good resistance to impact, making breakage very difficult.

14 Maintenance



14.1 If damage occurs, the rooflights 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.

14.2 Cleaning of the rooflights should be carried out using water containing non-detergent soap. To avoid scratching of the surface, only soft cloths should be used when cleaning.

14.3 Under no circumstances should anyone venture onto a polycarbonate rooflight. The external surface of the rooflights cannot normally be cleaned from the inside of the building. For maintenance and cleaning purposes special precautions must be taken, such as the provision of a catwalk, to allow safe access and to prevent the possibility of falling through the polycarbonate rooflight although the rooflights will have sufficient resistance in the event of an accidental fall.

15 Durability



Available test data and knowledge of the materials suggest that the products, when installed in accordance with this Certificate, should have a life of at least 25 years for the polycarbonate material and 20 years for other components in most non-corrosive environments. Minor changes in surface appearance and a reduction in light transmission may occur during this period.

16 General

16.1 Installation of the Em-Dome Polycarbonate Rooflights and Curbs should be carried out in accordance with the Certificate holder's installation instructions.

16.2 Prior to installation of the 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 person.

16.3 The rooflight upstand should be checked dimensionally to ensure the fit, and the rooflight should be checked for size before the unit is lifted to the roof.

16.4 A rooflight should never be left in position without ensuring all its fixings are present and fully tightened.

16.5 Where the roof covering is dressed below the rooflight and on top of a timber or concrete upstand, precautions should be taken to prevent bitumen damaging internal finishes.

16.6 Fixings for fixing the upstands onto the roof structure are not supplied by the Certificate holder.

17 Procedure

17.1 The base flange of all Em-Dome Curbs is placed on the roof deck and holes are drilled at least 75 mm from corners and at approximately 300 mm centres for inserting fixings.

Fixing Em-Dome Curbs to timber roofs

17.2 They are fixed with suitable woodscrews and washers or spiral nails.

Fixing Em-Dome Curbs to metal roofs

17.3 They are fixed with suitable self-tapping screws and washers.

Fixing Em-Dome Curbs to concrete roofs

17.4 Rawlplugs must be inserted into concrete and secured with suitable screws and washers.

17.5 Before applying roof covering it must be ensured that the upstands are prepared in accordance with the roof covering manufacturer's recommendations. The roof covering should be dressed to the underside of the top flange of the upstands.

17.6 The polycarbonate rooflights are fixed to upstands and frames using a screwbolt fixing assembly (see Figure 2) comprising:

- dome cap
- metal cap
- one-way security screw
- upper screwbolt in polyacetal
- EPDM sealing washer
- rooflight skins
- lower screwbolt in polyacetal.

Fixing Em-Dome Polycarbonate Rooflights to Em-Dome Curbs

17.7 Em-Dome-Polycarbonate Rooflights are fixed to Em-Dome GRP and PVC-U Curbs as standard using one-way security screws (type BS EN ISO 2009 : 1995).

Fixing Em-Dome opening PVC-U frame onto Em-Dome Curbs

17.8 The polycarbonate rooflight and PVC-U assembly is equipped with a pair of stainless steel interlocking hinges. The GRP upstand Standard 150, which forms part of the assembly supplied, is equipped with the other piece of the interlocking hinge. To assemble on site, the polycarbonate rooflight with the PVC-U frame is held vertically, to allow the hinges to interlock. The opening system (manual wormgear) is fitted in the factory.

Fixing Em-Dome aluminium opening frame onto Em-Dome Curbs

17.9 The lower metal frame is fixed onto the upstand using bolts (type BS EN ISO 2009 : 1995 A2 M6 x 40, 40 mm long) and nuts (type DIN 934-M6), placed at least 15 mm in from the outer edge. The number of fixings is the same as for direct fixing of polycarbonate rooflights. Sealing between the upstand and the metal frame is achieved by use of butyl mastic or acid-free silicone. The sealant should be compatible with adjoining materials, bond onto the supporting structure and be sufficiently flexible to withstand differential movement between different materials. The opening system (manual wormgear) is fixed onto the metal frame and the upstand.

Mounting Em-Dome Polycarbonate Rooflights onto Em-Dome PVC-U opening frames

17.10 Em-Dome Polycarbonate Rooflights are fixed onto Em-Dome PVC-U frames using galvanized steel screws (type HILLO 5.3 x 40 mm, 40 mm long).

Mounting Em-Dome Polycarbonate Rooflights onto Em-Dome aluminium opening frames

17.11 Em-Dome Polycarbonate Rooflights are fixed onto Em-Dome aluminium opening frames using stainless steel bolts (type BS EN ISO 2009 : 1995 A2 M6 x 40, 40 mm long) and nuts (type BS EN ISO 4032 : 2001).

18 Tests

Tests were carried out to determine:

- resistance to upward load (MOAT No 54 : 1989)
- resistance to downward load (MOAT No 54 : 1989)
- hard body impact resistance (MOAT No 54 : 1989)
- tensile strength after ageing (MOAT No 54 : 1989)
- suitability and durability of materials (MOAT No 54 : 1989)
- watertightness (BS 5368-1 : 1976)
- effect of impacts (prEN 1873 : 2000)
- resistance to intrusion (BBA *ad-hoc* method).

19 Investigations

19.1 The manufacturing process was examined including the methods adopted for quality control.

19.2 An examination was made of existing data on performance in fire.

Bibliography

- BS 476-3 : 1958 *Fire tests on building materials and structures — External fire exposure roof test*
- BS 476-7 : 1971 *Fire tests on building materials and structures — Surface spread of flame tests for materials*
- BS 5368-1 : 1976 *Methods of testing windows — Air permeability test*
- BS 6229 : 2003 *Flat roofs with continuously supported coverings — Code of practice*
- BS 6399-2 : 1997 *Loading for buildings — Code of practice for wind loads*
- BS 6399-3 : 1988 *Loading for buildings — Code of practice for imposed roof loads*
- BS 6993-1 : 1989 *Thermal and radiometric properties of glazing — Method for calculation of the steady state U-value (thermal transmittance)*
- BS EN 673 : 1998 *Glass in building — Determination of thermal transmittance (U value) — Calculation method*
- BS EN 1873 : 2005 *Prefabricated accessories for roofing — Individual roof lights of plastics — Specification and test methods*
- BS EN ISO 2009 : 1995 *Slotted countersunk flat head screws (common head style) — Product Grade A*
- BS EN ISO 4032 : 2001 *Hexagon nuts, style 1 — Product grades A and B*
- BS EN ISO 10211-1 : 1996 *Thermal bridges in building construction — Heat flows and surface temperatures — General calculation methods*
- BS EN ISO 10211-2 : 2001 *Thermal bridges in building construction — Calculation of heat flows and surface temperatures — Linear thermal bridges*
- BS EN ISO 12567-2 : 2005 *Thermal performance of windows and doors — Determination of thermal transmittance by hot box method — Roof windows and other projecting windows*
- 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*
- prEN 1873 : 2000 *Roof coverings — Individual rooflights of plastics with upstands*
- MOAT No 54 : 1989 *UEAtc guide for the Agrément of individual rooflights*

20 Conditions

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- relates only to the product/system that is named and described on the front page
- is granted only to the company, firm or person named on the front page — no other company, firm or person may hold or claim any entitlement to this Certificate
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