BS EN 1873:2014

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BSI Standards Publication

Prefabricated accessories for roofing — Individual rooflights of plastics — Product specification and test methods

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National foreword

This British Standard is the UK implementation of EN 1873:2014. It supersedes BS EN 1873:2005 which is withdrawn.

The UK participation in its preparation was entrusted by Technical Committee B/542, Roofing and cladding products for discontinuous laying, to Subcommittee B/542/8, Light transmitting plastics sheeting for roofing and cladding.

A list of organizations represented on this subcommittee can be obtained on request to its secretary.

This publication does not purport to include all the necessary provisions of a contract. Users are responsible for its correct application.

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Compliance with a British Standard cannot confer immunity from legal obligations.

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Date	Text affected
30 September 2014	Implementation of CEN Correction Notice 30 April 2014: CEN Title page replaced

EUROPEAN STANDARD

NORME EUROPÉENNE

EUROPÄISCHE NORM

EN 1873

May 2014

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Supersedes EN 1873:2005

English Version

Prefabricated accessories for roofing - Individual rooflights of plastics - Product specification and test methods

Accessoires préfabriqués pour couverture - Lanterneaux ponctuels en matière plastique - Spécifications des produits et méthodes d'essais

Vorgefertigte Zubehörteile für Dacheindeckungen - Lichtkuppeln aus Kunststoff - Produktfestlegungen und Prüfverfahren

This European Standard was approved by CEN on 23 February 2014.

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COMITÉ EUROPÉEN DE NORMALISATION
EUROPÄISCHES KOMITEE FÜR NORMUNG

CEN-CENELEC Management Centre: Avenue Marnix 17, B-1000 Brussels

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Foreword

This document (EN 1873:2014) has been prepared by Technical Committee CEN/TC 128 “Roof covering products for discontinuous laying and products for wall cladding”, the secretariat of which is held by NBN.

This European Standard shall be given the status of a national standard, either by publication of an identical text or by endorsement, at the latest by October 2014, and conflicting national standards shall be withdrawn at the latest by October 2014.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. CEN [and/or CENELEC] shall not be held responsible for identifying any or all such patent rights.

This document supersedes EN 1873:2005.

This document has been prepared under a mandate given to CEN by the European Commission and the European Free Trade Association, and supports essential requirements of EU Directive(s).

For relationship with the EU Regulation concerning the CPR, see informative Annex ZA, which is an integral part of this document.

In comparison to the previous edition, the following clauses have been changed: Clause 1, 2, 3, 4, 5, 6, 7, 8, Annex C, Annex D, Annex E and Annex ZA.

According to the CEN-CENELEC Internal Regulations, the national standards organizations of the following countries are bound to implement this European Standard: Austria, Belgium, Bulgaria, Croatia, Cyprus, Czech Republic, Denmark, Estonia, Finland, Former Yugoslav Republic of Macedonia, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden, Switzerland, Turkey and the United Kingdom.

1 Scope

This European Standard specifies requirements for rooflights made of plastic materials (e.g. GF-UP, PC, PMMA, PVC) and rooflights with upstands made of e.g. GF-UP, PVC, steel, aluminium or wood for installation in roofs. These rooflights serve the purpose of introducing daylight.

This European Standard applies to rooflights with a rectangular or circular ground plan (see Figures 1 and 2), with an opening span (width) or diameter not larger than 2,5 m and an opening length not larger than 3,0 m in roof pitches up to 25°. This document does not cover rooflights which contribute to the load-bearing or stiffness of the roof itself.

This European Standard applies to rooflights and rooflights with upstand, where a single manufacturer provides all components of the rooflight with upstand, which are bought in a single purchase.

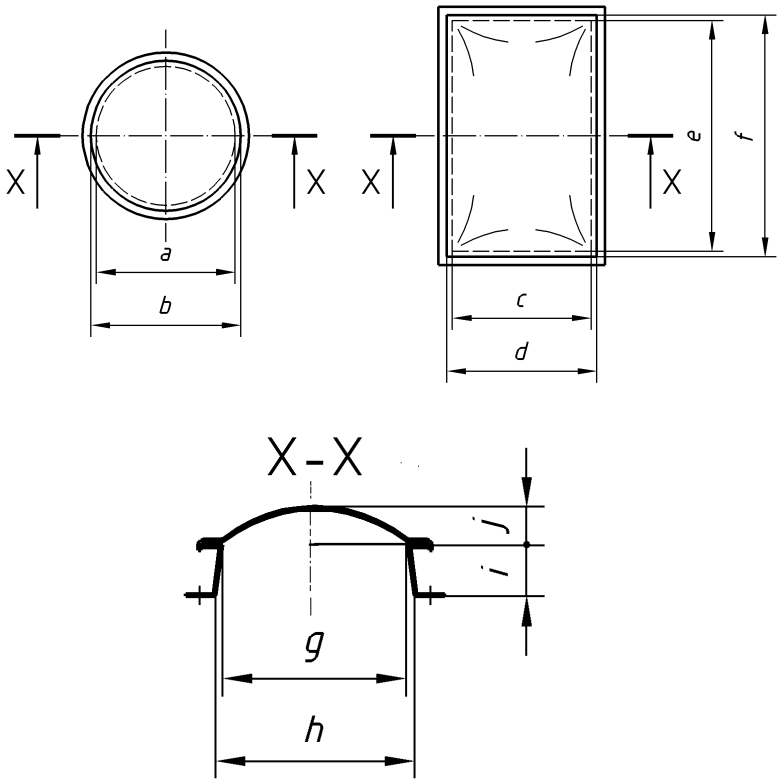
This European Standard applies to rooflights with one or several translucent parts.

Rooflights may be opened by means of opening devices in one or more parts for ventilation.

The possible additional functions of day to day ventilation, smoke and heat ventilation e.g. in case of fire in accordance with EN 12101-2, roof access, and/ or slinging point e.g. in accordance with EN 795 are outside the scope of this document.

This European Standard does not include calculations with regard to construction, design requirements and installation techniques.

NOTE Guidelines for safety, application, use and maintenance of individual rooflights are presented in Annex A.

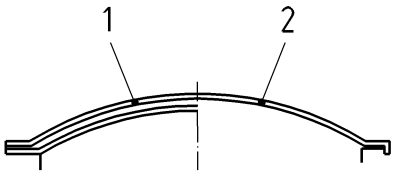


Section X –X without and with additional horizontal skin

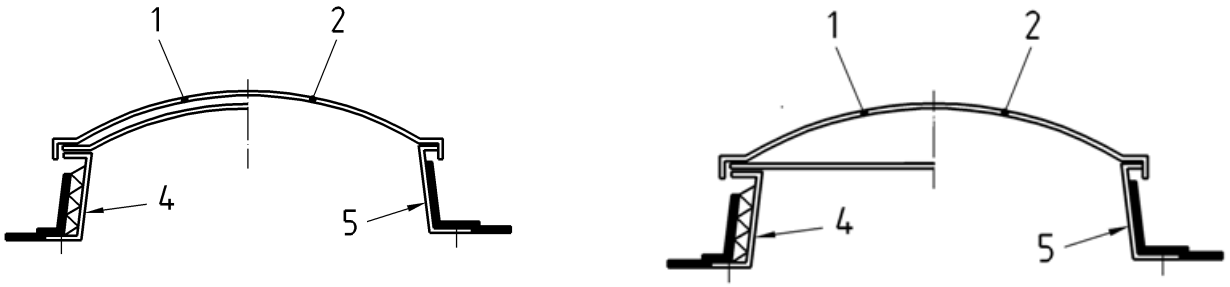
Key

a	daylight diameter	f	roof opening length
b	roof opening diameter	g	daylight size
c	daylight width	h	roof opening size
d	roof opening width	i	upstand height
e	daylight length	j	rooflight height

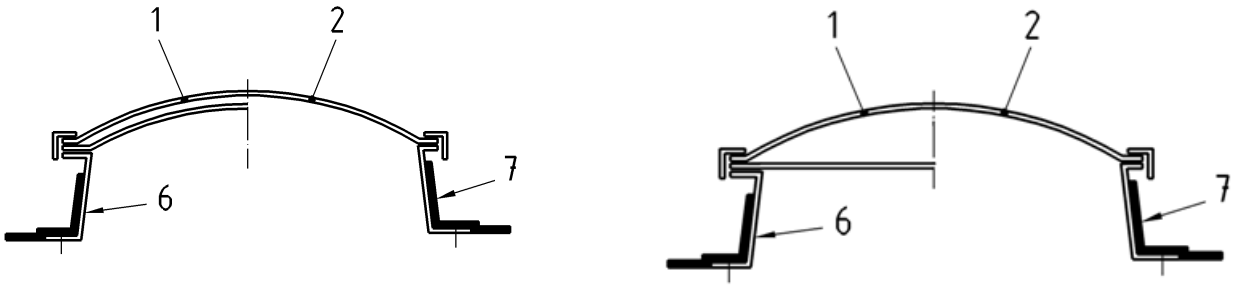
Figure 1 — Typical individual rooflights



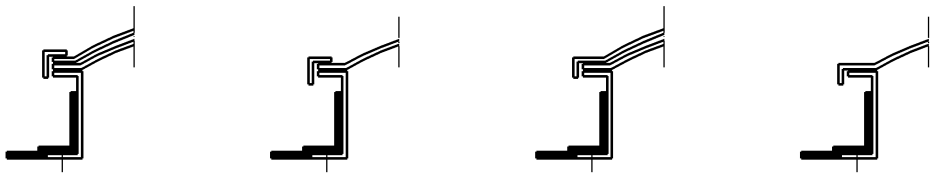
2a) Individual rooflight



2b) Individual rooflight with upstand



2c) Individual rooflight with upstand and edge profile



with edge profile without edge profile

2d) Vertical upstands

Key

1	multi skin	4	insulated upstand	7	roof finish
2	single skin	5	non insulated upstand		
3	edge profile	6	splayed upstand		

Figure 2 — Cross sections of typical individual rooflights and upstands

2 Normative references

The following documents, in whole or in part, are normatively referenced in this document and are indispensable for its application. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

EN 410:2011, *Glass in building - Determination of luminous and solar characteristics of glazing*

EN 596, *Timber structures - Test methods - Soft body impact test of timber framed walls*

EN 673, *Glass in building - Determination of thermal transmittance (U value) - Calculation method*

EN 674, *Glass in building - Determination of thermal transmittance (U value) - Guarded hot plate method*

EN 675, *Glass in building - Determination of thermal transmittance (U value) - Heat flow meter method*

EN 1013, *Light transmitting single skin profiled plastics sheets for internal and external roofs, walls and ceilings - Requirements and test methods*

CEN/TS 1187, *Test methods for external fire exposure to roofs*

EN 12412-2, *Thermal performance of windows, doors and shutters - Determination of thermal transmittance by hot box method - Part 2: Frames*

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

EN 13501-5, *Fire classification of construction products and building elements — Part 5: Classification using data from external fire exposure to roof tests*

EN 14351-1, *Windows and doors — Product standard, performance characteristics — Part 1: Windows and external pedestrian doorsets without resistance to fire and/or smoke leakage characteristics*

EN 13823, *Reaction to fire tests for building products - Building products excluding floorings exposed to the thermal attack by a single burning item*

EN 16153, *Light transmitting flat multiwall polycarbonate (PC) sheets for internal and external use in roofs, walls and ceilings - Requirements and test methods*

EN ISO 178, *Plastics - Determination of flexural properties (ISO 178)*

EN ISO 527-1, *Plastics - Determination of tensile properties - Part 1: General principles (ISO 527-1)*

EN ISO 527-2, *Plastics - Determination of tensile properties - Part 2: Test conditions for moulding and extrusion plastics (ISO 527-2)*

EN ISO 4892-1, *Plastics - Methods of exposure to laboratory light sources - Part 1: General guidance (ISO 4892-1)*

EN ISO 4892-2, *Plastics - Methods of exposure to laboratory light sources - Part 2: Xenon-arc lamps (ISO 4892-2)*

EN ISO 6946, *Building components and building elements - Thermal resistance and thermal transmittance - Calculation method (ISO 6946)*

EN ISO 10077-2, *Thermal performance of windows, doors and shutters - Calculation of thermal transmittance - Part 2: Numerical method for frames (ISO 10077-2)*

EN ISO 10140-1, *Acoustics - Laboratory measurement of sound insulation of building elements - Part 1: Application rules for specific products (ISO 10140-1)*

EN ISO 10140-2, *Acoustics - Laboratory measurement of sound insulation of building elements - Part 2: Measurement of airborne sound insulation (ISO 10140-2)*

EN ISO 10140-4, *Acoustics - Laboratory measurement of sound insulation of building elements - Part 4: Measurement procedures and requirements (ISO 10140-4)*

EN ISO 10140-5, *Acoustics - Laboratory measurement of sound insulation of building elements - Part 5: Requirements for test facilities and equipment (ISO 10140-5)*

EN ISO 10211, *Thermal bridges in building construction - Heat flows and surface temperatures - Detailed calculations (ISO 10211)*

EN ISO 11664-1, *Colorimetry - Part 1: CIE standard colorimetric observers (ISO 11664-1)*

EN ISO 11664-2, *Colorimetry - Part 2: CIE standard illuminants (ISO 11664-2)*

EN ISO 12017:1996, *Plastics - Poly(methyl methacrylate) double- and triple-skin sheets - Test methods (ISO 12017)*

EN ISO 12567-2, *Thermal performance of windows and doors - Determination of thermal transmittance by hot box method - Part 2: Roof windows and other projecting windows (ISO 12567-2)*

EN ISO 13468-1, *Plastics - Determination of total luminous transmittance of transparent materials - Part 1: Single-beam instrument (ISO 13468-1)*

EN ISO 13468-2, *Plastics - Determination of the total luminous transmittance of transparent materials - Part 2: Double-beam instrument (ISO 13468-2)*

EN ISO 14125, *Fibre-reinforced plastic composites - Determination of flexural properties (ISO 14125)*

EN ISO 11925-2:2010, *Reaction to fire tests - Ignitability of products subjected to direct impingement of flame - Part 2: Single-flame source test (ISO 11925-2:2010)*

3 Terms and definitions

For the purposes of this document, the following terms and definitions apply.

3.1
rooflight
building component used to introduce daylight which consists of a translucent part and associated edge profiles, if applicable

3.2
translucent part
consists of at least an outside plastic skin and several additional translucent skins below optionally

Note 1 to entry: The additional skins can follow or be integrated with the outer skin or be an additional flat skin.

Note 2 to entry: Additional flat skin may not be in plastic.

3.3
upstand
element which is single- or multi-walled or composite with vertical and/or pitched walls; with or without thermal insulation and having the two-fold purpose of providing an area for the fixture of plastic rooflights and for connection to the substructure, the roof covering or the roof sealing

Note 1 to entry: The upstand transmits the loads acting upon the plastic rooflight into the substructure.

Note 2 to entry: Upstands may include ventilation devices.

3.4
accessories
connections, opening and locking devices and seals for the assembly of the elements (rooflight, translucent part, upstand and edge profiile)

3.5
rooflight with upstand
building element which consists of at least the separate elements in accordance with rooflight, translucent part, upstand and accessories

3.6
batch
quantity of material made in a single operation, or in the case of continuous production for a defined quantity which shall be demonstrated by the producer to have a uniform composition

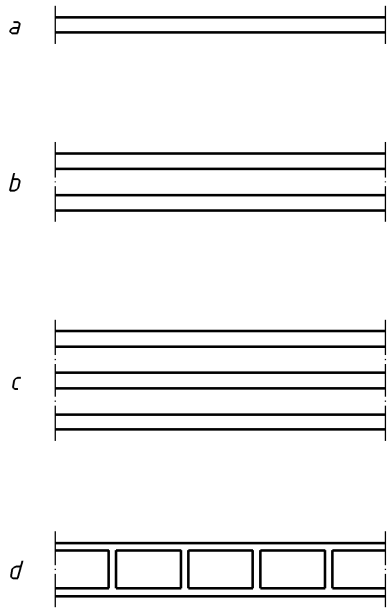
3.7
edge profile
any frame and/or profile necessary to fix and/or open the translucent part of the rooflight

Note 1 to entry: edge profiles can be made out of plastic materials.

3.8
junction part
any additional element (e.g. frame and/or profile) used with the edge profile to assemble the rooflight, when made with more than one translucent part

Note 1 to entry: Junction part can be made out of plastic materials.

3.9
starting point of calculation
horizontal surface or point where adiabatic conditions are to be taken into account for calculation



Key

a single skin, solid sheet

b double skin, solid sheet

c triple skin, solid sheet

d multiwalled sheet

Note 1 to entry: In case of more than one skin, thicknesses of the sheets can be different.

Figure 3 — Cross sections of typical plastic sheets

4 Symbols and abbreviations

ΔYI	Change in the yellowness index
H_c	Energy applied during ageing procedure
L_s	Light transmission of a test piece
L_{sn}	Light transmission of the *n*th test piece
τ_{D65}	Total luminous transmittance for the CIE-standard illuminant D_{65} in %
M_s	Average (see B.5.1) of R_1 and R_3
M_v	Light transmission of the sample
R	Thermal resistance in $m^2 \cdot K/W$
R_1 and R_3	Reading of galvanometer without any test piece
R_2	Reading of galvanometer with the test piece
R_w	Airborne sound index in dB
U	Heat transmittance in $W/(m^2 \cdot K)$
YI	Value of the yellowness index of aged test piece

YI_0	Value of the yellowness index of unaged test piece
ΔE	Variation of E-modulus in %
$\Delta\sigma$	Variation of strength in %
X_{CIE}, Y_{CIE}, Z_{CIE}	Colourimetric coordinates
A_e	Area of the outer exposed surface of the edge profile, in m^2
A_j	The outer exposed surface of the junction part, in m^2
A_r	The surface of the rooflight without upstand, in m^2
A_{rc}	The surface of the rooflight with upstand, in m^2
$A_{rc,ref}$	The surface of the rooflight without upstand of the reference model, in m^2
$A_{rc,ref300}$	The surface of the rooflight with upstand of the reference model, in m^2
A_t	Area of the outer exposed surface of the translucent part bordered with the perimeter of the translucent part, in m^2
At,flat	area of the horizontal projection of the clear opening of the translucent part of individual rooflight, in m^2
Aup	Area of the outer exposed surface of the rooflight upstand, in m^2
ee	The width of the edge profile, in m
ee,h	Horizontal distance between the upper outside border of the insulation and the clear opening of the translucent part, in m
ee,v	Vertical distance between the upper level of the translucent part and the upper level of the upstand, in m
ej.h	The width of the junction part, in m
eup	The height of the upstand, in m
h	Horizontal envelope boundary
k	Factor to take into account the shape of the translucent part
l_e	Length of the sealing of the edge profile, in m
l_j	Length of the transition zone between translucent part and junction part, in m
l_t	Length of the transition zone between translucent part and edge profile, in m
P_e	Perimeter of the edge profile, in m
P_t	Perimeter of the translucent part, equal to the perimeter of the clear opening of the translucent part, in m
P_{up}	The reference perimeter of the upstand
$P_{up,u}$	Upper outer perimeter of the upstand, in m
$P_{up,l}$	Lower outer perimeter of the upstand, in m
U_e	Thermal transmittance of the edge profile, in $W/(m^2 \cdot K)$
U_j	Thermal transmittance of the junction part, in $W/(m^2 \cdot K)$
U_r	Total thermal transmittance of rooflights including the edge profile, if applicable, in $W/(m^2 \cdot K)$
$U_{r,ref}$	Total thermal transmittance of a rooflight without upstand (reference model), in $W/(m^2 \cdot K)$
U_{rc}	Total thermal transmittance of rooflights including the edge profile, if applicable and upstand, in $W/(m^2 \cdot K)$
$U_{rc,ref300}$	Total thermal transmittance of a rooflight with upstand (300 mm height, reference model),

	in W/(m^2·K)
U_t	Thermal transmittance of the translucent part, in W/(m^2·K)
U_{up}	Thermal transmittance of the upstand, in W/(m^2·K)
$U_{up,e}$	Thermal transmittance of the upstand and the edge profile, if applicable, in W/(m^2·K)
v	Vertical envelope boundary
Ψ_e	Linear thermal transmittance in the transition zone of edge profile and upstand, in W/(m·K)
Ψ_j	Linear thermal transmittance in the transition zone of the translucent part and junction part, in W/(m·K)
Ψ_t	Linear thermal transmittance in the transition zone of the translucent part and edge profile, in W/(m · K)

5 Requirements

5.1 Radiation properties

5.1.1 General

The radiation properties of individual rooflights shall be assessed when subject to regulatory requirement and may be assessed voluntarily.

The radiation properties are essentially characterized by the light transmittance τ_{D65}, the direct solar transmittance τ_e and the total solar energy transmittance g. The spectral characteristics of the transparent part of an individual rooflight include the luminous and solar characteristics, and the reflection and transmission characteristics.

The characteristics are as follows:

- the spectral transmittance $\tau(\lambda)$ and the spectral reflectance $\rho(\lambda)$ in the wavelength range from 300 nm to 2450 nm;

- the light transmittance τ_{D65} and the light reflectance ρ_{D65} for standard illuminant D65;

- the solar direct transmittance τ_e and the solar direct reflectance ρ_e ;

- the total solar energy transmittance (solar factor) *g*.

The characteristics are determined for quasi-parallel, near normal radiation incidence using the radiation distribution of standard illuminant D65 (see EN 410:2011, Table 1), solar radiation in accordance with EN 410:2011, Table 2 and ultraviolet (UV) radiation in accordance with EN 410:2011, Table 3.

The solar factor depends, as all other optical material characteristics, on the angle of incidence. The angle of incidence should be taken into account for different sun positions.

5.1.2 Light transmission

The light transmission of the rooflight material is determined as total luminous transmittance of each skin and possible combinations of skins in new plastic rooflights and is stated by the manufacturer according to 6.2.1.

The recorded τ_{D65} value of the total luminous transmittance shall be within ± 5 % of the stated value.

5.1.3 Solar direct transmittance τ_e

The solar direct transmittance of the rooflight material is determined as the solar transmittance of each skin and possible combinations of skins in new plastic rooflights and is stated by the manufacturer according to 6.2.2.

The recorded τ_e value of the solar transmittance shall be within ± 5 % of the stated value.

5.1.4 Total solar energy transmittance g

The total solar energy transmittance, *g*, as defined in EN 410 shall be determined by calculation according to 6.2.3 or by measurement according to 6.2.3.

The calculation method is applicable only to transparent parts with symmetrical on-plan cross-section.

Where the calculation method is not applicable, then the total solar energy transmittance shall be measured.

5.2 Durability

This characteristic shall be assessed when subject to regulatory requirements and may be assessed voluntarily.

Durability of the product is evaluated by measuring the variation of total luminous transmittance, yellowness index and mechanical properties after ageing procedure of the material of the translucent part with the same energy level for the three following characteristics either on flat sheets and/or finished product. The ageing procedure shall be conducted in accordance with 6.3.

5.3 Water tightness

This characteristic shall be assessed when subject to regulatory requirements and may be assessed voluntarily. The plastic rooflight in the closed condition shall be tested in accordance with 6.4. No water shall drop from the internal surface. The design of the rooflight shall ensure that water drains away externally.

5.4 Mechanical performances

5.4.1 Resistance to upward loads

This characteristic shall be assessed.

For the determination of the resistance to upward load the plastic rooflight shall be tested and classified in accordance with 6.5.1.2.

A successful test is achieved if neither damage nor significant permanent deformation occurs.

5.4.2 Resistance to downward loads

This characteristic shall be assessed.

For the determination of the resistance to downward load the plastic rooflight shall be tested and classified in accordance with 6.5.1.3.

A successful test is achieved if neither damage nor significant permanent deformation occurs.

5.4.3 Impact resistance

5.4.3.1 Small, hard body impact

This characteristic shall be assessed when subject to regulatory requirements and may be assessed voluntarily.

A successful test is achieved when plastic rooflights are resistant to the impact of a small hard body when tested in accordance with 6.5.2.1.

The products shall always be tested with the manufacturer's corresponding or specified upstand.

The identification of the tested assembly (the rooflight and the upstand) is part of the information accompanying the declared performance.

5.4.3.2 Large soft body impact

This characteristic shall be assessed when subject to regulatory requirements and may be assessed voluntarily.

For .the determination of the resistance to the impact of a large soft body the plastic rooflight shall be tested and classified in accordance with 6.5.2.3.

The products shall always be tested with the manufacturer's corresponding or specified upstand.

The identification of the tested assembly (the rooflight and the upstand) is part of the information accompanying the declared performance.

A successful test is achieved if neither the bag nor the gauge can pass through the specimen.

5.5 Reaction to fire

This characteristic shall be assessed when subject to regulatory requirements and may be assessed otherwise.

The reaction to fire of the materials of the rooflight shall be classified in accordance with EN 13501-1.

NOTE 1 In accordance with the Construction Product Regulation (CPR) products will need to be evaluated under “end use conditions” in the pre-flashover period of a fire. This generally implies that it is not possible to judge the performance of a product made up of many components (like rubber seals, aluminium frame, PE ventilator) by assessing the materials individually.

The rooflight shall be classified with the least favourable classification of any of the materials it is made of, if it can be clearly shown that the reaction to fire properties of the complete rooflight is likely not to perform worse than the worst material in terms of its reaction to fire performance. In this case tests for the purpose of classification where mounting and fixing of a material can influence the performance of a material (SBI test EN 13823 and the test with the small flame EN ISO 11925-2) shall be performed on the materials in accordance with the appropriate test method. Requirements for mounting and fixing are given in Annex E dealing with the test methods.

The product and/or individual component is considered to satisfy the requirements for performance class of the characteristic reaction to fire in accordance with the relevant EC Decision on Classified Without Further Testing (CWFT) without the need for testing on the basis of its conformity with the specification of the product detailed in that Decision and its intended end use application being covered by that decision.

The relevant components are

— Profile including thermal separation elements of thermally isolated frames (eg frame, sash, upstand);

— Infill (eg glazing, panels);

— Gasket between infill and profile;

— Gasket between frame/upstand and sash;

— Additional gasket;

— Organic coating (if relevant and not part of the profile testing);

— Opening mechanism inclusive of brackets.

Small components with dimensions not more than 50 mm x 50 mm and a weight not more than 50 g may not need to be considered for final assessment of a classification.

Gaskets shall not be considered, treat as products having small areas and/or small surfaces.

In accordance with EN 13501-1, class F is the classification used for products which are not tested at all or where the product has failed the performance criteria required for class E.

NOTE 2 Class F classification may be sufficient for many member countries in the EC. At the moment there are only some member countries which have a requirement for at least class E. Generally it is therefore not necessary to claim a higher classification other than class E to cover the requirement within the member countries in the EC unless for particular circumstances a better classification is required.

Components with their own product standard (e.g. glass products or parts of windows) do not need to be tested again. The class for those components shall to be taken from that product standard in question.

5.6 Resistance to fire

The resistance to fire is considered irrelevant for this product, because rooflights are not intended to be used specifically to provide fire resistance.

5.7 External fire performance

This characteristic shall be assessed when subject to regulatory requirements and may be assessed voluntarily. The product shall be tested according to CEN/TS 1187 method 1 or method 4 and classified in accordance with EN 13501-5. The products to be tested shall be installed, in addition to the general provisions given in the relevant test method, in a manner representative of their intended end use.

5.8 Air permeability

This characteristic shall be assessed when subject to regulatory requirements and may be assessed voluntarily.

For the determination of the air permeability the plastic rooflight shall be tested and classified in accordance with 6.7

5.9 Thermal resistance

Thermal resistance is determined by declaring the thermal transmittance of the complete rooflight.

This characteristic shall be assessed when subject to regulatory requirements and may be assessed voluntarily.

Individual rooflights are three dimensional parts that are lifted out of the surface of the roof. This has to be considered while determine the total-U-value.

All U values are determined in reference to external total surface in accordance with Annex D.

5.10 Airborne sound insulation

This characteristic shall be assessed when subject to regulatory requirements and may be assessed voluntarily.

Airborne sound insulation shall be determined as sound reduction index *Rw (Ctr, C)* of plastic rooflights and rooflights with upstands in compliance with EN ISO 10140-1, EN ISO 10140-2, EN ISO 10140-4, EN ISO 10140-5.

NOTE In the absence of measurements, it is deemed that the values given in Table 1 apply for the airborne sound insulation indexes R_{wt} of some typical translucent parts according to Figure 3.

Table 1 — Airborne sound indexes

Type of translucent part	Airborne sound index $R_{w\,t}$ dB
single skin, solid sheet	12
double skin, solid sheet	20
triple skin, solid sheet	22

5.11 Release of dangerous substances

National regulations on dangerous substances may require verification and declaration on release, and sometimes content, when construction products covered by this standard are placed on those markets.

In the absence of European harmonized test methods, verification and declaration on release/content should be done taking into account national provisions in the place of use.

NOTE An informative database covering European and national provisions on dangerous substances is available at the Construction website on EUROPA accessed through:

http://ec.europa.eu/enterprise/construction/cpd-ds/

6 Testing and classification

6.1 General

The validity of the results for each test on one rooflight described in this document may be extended by calculation and/or correlation to all rooflights in a family provided that the selection of tested rooflights is made in accordance with 6.9.

6.2 Radiation properties

6.2.1 Total luminous transmittance

The total luminous transmittance τ_{D65} for solid sheets shall be determined by testing using a spectrophotometer in accordance with to EN ISO 13468-1 or EN ISO 13468-2.

The total luminous transmittance of multiwalled PC sheets shall be determined as luminous transmittance τ_{D65} by testing using a spectrophotometer in accordance with EN 16153.

The total luminous transmittance of multiwalled PMMA sheets shall be determined as luminous transmittance τ_A by testing using a spectrophotometer in accordance with EN ISO 12017:1996, Annex A.

The total luminous transmittance of the combination of different material is calculated according to formulas given in EN 410.

If the reference test method specified above is not used for factory production control testing, the alternative method given in Annex B shall be followed.

For total luminous transmittance tests, one test per material type, colour type, thickness and manufacturer of plastic/resin.

6.2.2 Determination of solar direct transmittance τ_e

The solar direct transmittance τ_e is to determine by measuring or by calculation.

For measuring, use the procedure and a calorimeter as described in [1].

For calculation, use the methods described in EN 410.

6.2.3 Determination of total solar energy transmittance g

The total solar energy transmittance g is to determine by measuring or by calculation.

For measuring, use the procedure and a calorimeter as described in [1].

For calculation, use the methods described in EN 410.

6.3 Durability

6.3.1 Classification for durability

6.3.1.1 Variation of total luminous transmittance τ_v and yellowness index *YI* (*ΔYI*)

Plastic rooflights are classified in 9 types as given in Table 2.

Table 2 — Material classification according to the change of the total luminous transmittance τ_{D65} and yellowness index *YI* (Δ*YI*)

Type	H_C GJ/m^2	Change of τ_{D65} %	*ΔYI*
ΔA	18	≤ 5	≤ 10
ΔB	18	≤ 5	≤ 20
ΔC	18	≤ 10	≤ 10
ΔD	18	≤ 10	≤ 20
ΔE	10	≤ 10	≤ 10
ΔF	10	≤ 10	≤ 20
ΔG	10	≤ 15	≤ 20
ΔH	6	≤ 15	≤ 20
ΔI	4	≤ 15	≤ 20

The figures indicated for the change of total luminous transmittance τ_{D65} refer to variation in percentage of the initial value.

NOTE Additional information for the application of Table 1 is available in EN 16153.

6.3.1.2 Variation of mechanical properties with ageing

The tensile strength and Young's Modulus are properties of a material which can vary with age.

Where required, the variation of the properties shall be determined by a bending test (or a tensile test) as defined in 6.3.5.

The percentage reduction in Young's Modulus, *E*, and tensile strength, *σ*, between new samples and samples aged to energy exposures (H_c) as described in Table 2, shall then be expressed in accordance with Tables 3 and 4.

Table 3 — Material classification according to change of E-Modulus after ageing procedure at the same energy level H_c selected from Table 2

Type	*ΔE* %
Cu 0	0
Cu 1	0 > ΔE ≥ −10
Cu 2	−10 > ΔE ≥ −20
Cu 3	−20 > ΔE ≥ −30

Table 4 — Material classification according to change of σ after ageing procedure at the same energy level H_c selected from Table 2

Type	$\Delta\sigma$ %
Ku 0	≥ 0
Ku 1	$0 > \Delta\sigma \geq -10$
Ku 2	$-10 > \Delta\sigma \geq -20$
Ku 3	$-20 > \Delta\sigma \geq -30$

6.3.2 Conditions for accelerated ageing

The testing shall be carried out in accordance with EN ISO 4892-1. The spectral distribution of the filtered Xenon-arc-radiation shall be in accordance with EN ISO 4892-2.

The following test conditions shall be observed:

— black-panel-temperature (45 ± 3) °C;

— black-standard-temperature (65 ± 3) °C.

Either the black panel temperature or the black standard temperature may be used according to the details of the apparatus:

— air-temperature in the test chamber: +30 °C to +35 °C;

— relative humidity in the dry period: (65 ± 5) %;

— spray cycle: 120 min = 18 min rain + 102 min dry;

or where those facilities are not available, times of 9 min and 51 min, respectively, are allowed.

The dimensions of the test samples shall be sufficient to be subsequently tested for light transmittance (see 6.3.3), yellowness index (see 6.3.4) and mechanical properties (see 6.3.5).

Test specimens for these tests shall be representative of and not thicker than the sheets used in practice.

6.3.3 Variation of light transmission

6.3.3.1 Apparatus

Determine the total luminous transmittance using a spectrophotometer as described in 6.2 before and after the ageing procedure.

6.3.3.2 Test pieces

Use 10 test pieces chosen at random so as to be representative.

6.3.3.3 Procedure

Calibrate and operate the spectrophotometer and other instruments in accordance with instructions supplied by the manufacturer.

Obtain spectral transmittance data relative to air in the wavelength range of 380 nm to 780 nm.

6.3.3.4 Expression of results

The change of light transmission is expressed as the average of the variation of total luminous transmittance of each test piece. These figures are as a percentage of the initial value.

6.3.4 Variation in yellowness index

6.3.4.1 Apparatus

Determine the yellowness index using a spectrophotometer as described in 6.2 before and after the ageing procedure.

6.3.4.2 Test pieces

The same test pieces as already used for change in light transmittance shall be used.

6.3.4.3 Procedure

Calibrate and operate the spectrophotometer and other instruments in accordance with instructions supplied by the manufacturer.

Obtain spectral transmittance data relative to air in the wavelength range of 380 nm to 780 nm.

6.3.4.4 Expression of results

Calculate the tristimulus values for CIE standard illuminant D 65 according to EN ISO 11664-2 and CIE standard observer 2° according to EN ISO 11664-1 by numerical integration of recorded spectral data or by automatic integration during spectrometer operation.

Calculate the magnitude and sign of the yellowness index from the following formula:

$$YI = \frac{100(1{,}2985X - 1{,}1335Z)}{Y}$$

Calculate the magnitude and direction of change in yellowness index from the following formula:

$$\Delta YI = YI - YI_0$$

6.3.5 Variation of mechanical properties with ageing

Measure the bending strength and the corresponding E-modulus of the sheet material according to EN ISO 14125 or EN ISO 178 for new samples and samples aged to energy exposures (H_c) as described in Table 1.

If a bending test cannot be performed, measure the tensile strength and the corresponding *E*-modulus according to EN ISO 527-1 and EN ISO 527-2.

Four test pieces are used for evaluation, two new samples and two aged samples.

Bending or tensile and light transmitting tests shall be carried out on the same sample ensuring the aged surface is in tension.

6.3.6 Test specimen

For durability, one test per material type, colour type, type of surface protection, thickness and manufacturer of plastic/resin.

6.4 Watertightness

6.4.1 Principle

This test simulates the effect of rainwater or melting snow which can run across the external surface of the plastic rooflight.

6.4.2 Procedure

Rooflight shall be tested with an upstand representative of the family as defined in 6.9 or with a suitable substitute upstand to simulate an upstand provided by the customer. The rooflight, in closed position if an openable type - as installed on the roof shall be sprayed with water as follows:

— water is sprayed over the entire test area, the nozzles being in horizontal position;

— the flow volume on the test area is 2 l/(m^2·min) to 3 l/(m^2·min);

— the test duration is 60 min.

The test report shall indicate the degree of inclination at which the test was undertaken.

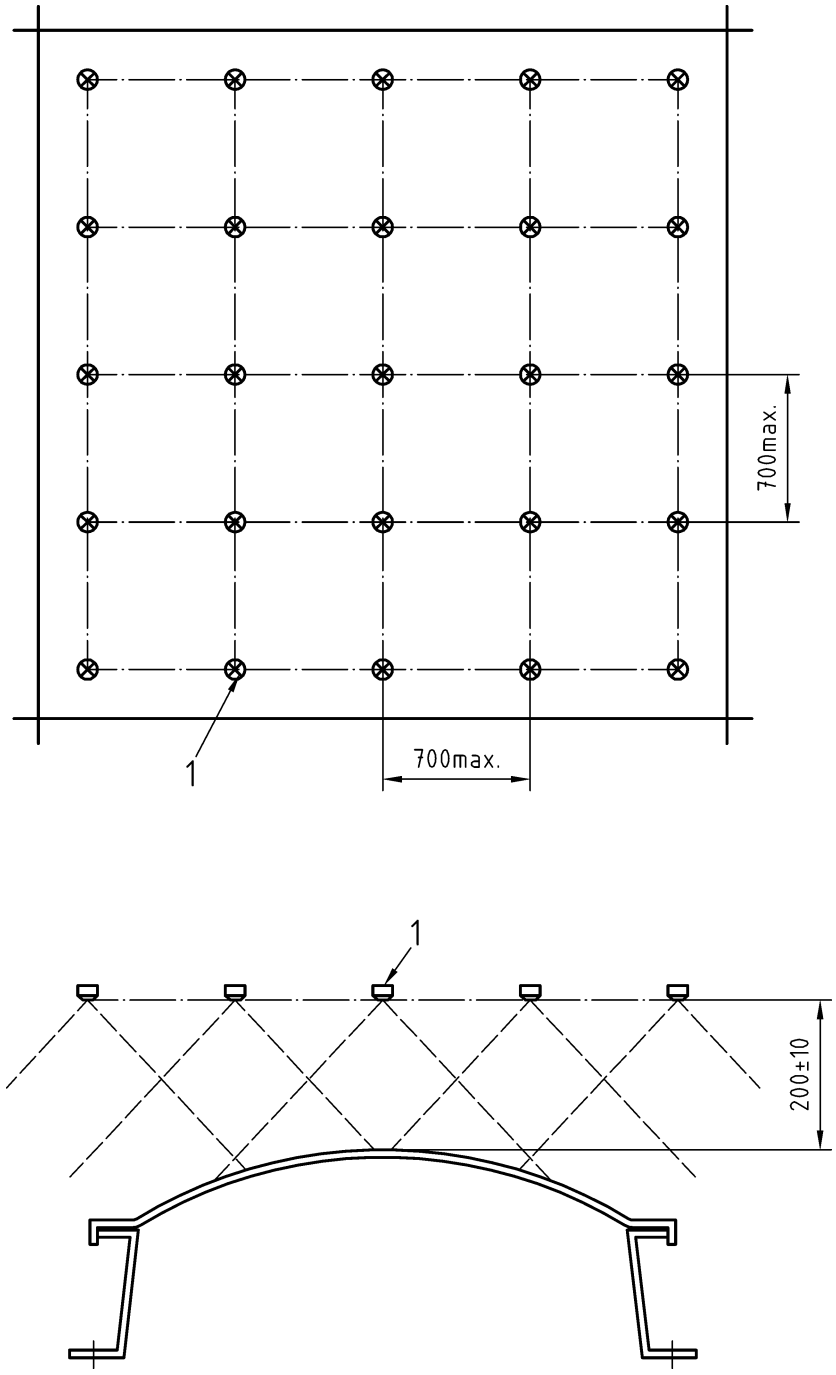
6.4.3 Apparatus

The apparatus used shall conform to Figure 4, which allows the water used to emanate from a rectangular grid system of nozzles. The nozzles together shall cover the whole of the square area relative to the horizontal plane as shown in Figure 4. The vertical position of the nozzle grid shall be fixed at (200 ± 5) mm above the highest point of the plastic rooflight.

6.4.4 Test specimen

For watertightness, one test on the least favourable rooflight dimension (usually the greatest dimension in area or perimeter of the rooflight), connection between rooflight and upstand and installation pitch.

Dimensions in millimetres



Key

1 nozzle

Figure 4 — Test apparatus for water tightness

6.5 Mechanical performances

6.5.1 Resistance to upward and downward loads

6.5.1.1 General

This test procedure serves the purpose of judging the behaviour of rooflights and rooflights with upstands under various loads.

6.5.1.2 Classification for upward load

According to their resistance to upward loads, plastic rooflights are classified into one of the three types as given in Table 5.

Table 5 — Types of upward loads

Type	Load N/m^2
UL 1500	1 500
UL 3000	3 000
UL A [a]	A [a]
[a] The value of Acan be selected to meet specific requirements.	

The designations UL 1500, UL 3000 and UL A are representative of the test upward load in N/m^2 applied.

The lowest value for upward load shall not be less than UL 200.

6.5.1.3 Classification for downward load

According to their resistance to downward loads, plastic rooflights are classified into one of the five types as given in Table 6.

Table 6 — Types of downward loads

Type	Load N/m^2
DL 750	750
DL 1125	1 125
DL 1750	1 750
DL 2500	2 500
DL A [a]	A [a]
[a] The value of A can be selected to meet specific requirements.	

The designations DL 750, DL 1175, DL 1750, DL 2500 and DL A are representative of the test downward load in N/m^2 applied.

The lowest value for downward load shall not be less than DL 100.

6.5.1.4 Test apparatus and procedure

The test shall be carried out as follows:

a) carry out the tests on a new plastic rooflight with upstand at a temperature of (23 ± 4) °C;

b) secure the upstand on rigid supports in accordance with the manufacturer's instructions for regular use (number and position of supports, fixings, etc.);

c) connect the plastic rooflight (or opening frame if applicable) with the upstand by means of the fixings normally used by the manufacturer and in accordance with the manufacturer's instructions;

d) if an openable type – carry out the test with the rooflight closed;

e) apply the load only on the outer skin of the rooflight for testing, air pressure can be used to simulate either positive or negative loads. The roof opening size (see Figure 1) shall be subject to the test;

f) equivalent loads (i.e. using weights instead of air pressure) may be used;

g) if weights are used for downward loads the overall size shall be used;

h) for upward loads the daylight size shall be used referring to Figure 1;

i) maintain the load for 6 min at the required value accurate to $^{+2}_{0}$ %;

j) if air pressure is used as load, measure the pressure as a function of time recorded on a diagram.

NOTE As a result of the vacuum or excess pressure test method, the forces will be normal to the surface of the rooflight, whereas actual forces can be normal to the horizontal. The differences are considered negligible, taken into account in the estimation of national safety factors, if any.

6.5.1.5 Test specimen

For resistance to upward loads, one test on the least favourable rooflight and upstand dimension, material type, thinnest outer skin, type of connection between rooflight and upstand.

For resistance to downward loads, one test on the least favourable rooflight and upstand dimension, material type, thickness of skin(s) and type of connection between rooflight and upstand. The rooflight may be tested with all skins, this shall however, be indicated in the test report.

6.5.2 Impact resistance

6.5.2.1 Small hard body impact

6.5.2.1.1 General

This test procedure serves the purpose of judging the behaviour of plastic rooflights with upstands to the impact of a steel ball falling from a height of 1,0 m above the impact point in a laboratory environment.

6.5.2.1.2 Equipment and procedure

The equipment and procedures for the test are as follows:

— test specimens and equipment shall be at (23 ± 4) °C;

— secure the upstand on a rigid horizontal support in accordance with the manufacturer's instructions for regular use (number and position of fixings etc.);

— connect the plastic rooflight (or opening frame, if applicable) with the upstand by means of the fixings normally used by the manufacturer and in accordance with the manufacturer's instructions;

— if an openable type - carry out the test with the rooflight closed;

— use a steel ball with a mass of 250 g ± 1 %;

— test the impact strength at three points, located in the daylight area of the rooflight, at the centre, at a corner, or edge for circular types, and at the least favourable position.

The test is satisfactory if the steel ball does not pass through the product in either of the three positions.

6.5.2.2 test specimen

For small hard body impact test, perform one test on the least favourable rooflight dimension (usually the smallest dimension in area or perimeter of the rooflight), material type, thickness of outer skin and type of connection dome/upstand.

6.5.2.3 Large soft body impact

6.5.2.3.1 General

This test procedure serves the purpose of judging the behaviour of a plastic rooflight with upstand by the impact of a sphero-conic bag of 50 kg mass falling from a given height in a laboratory environment.

6.5.2.3.2 Classification for large soft body impact

Table 7 — Types of large soft body impact loads

Types	Impact energy J
SB 1200	1 200
SB 800	800
SB 600	600
SB 300	300
SB A [a]	A [a]
[a] The value of A can be selected to meet specific requirements.	

The designations SB 1200, SB 800, SB 600, SB 300 and SB A are representing the test impact energy in Joules applied.

6.5.2.3.3 Equipment and procedure

The equipment and procedures for the test are as follows:

a) test specimens and equipment shall be at (23 ± 4) °C;

b) secure the upstand on a rigid horizontal support in accordance with the manufacturer's instructions for regular use (number and position of fixings etc.). Carry out the fixing to the substructure or to the ground in such a way that no supporting air pressure below the rooflight occurs;

c) connect the plastic rooflight (or opening frame, if applicable) with the upstand by means of the fixings normally used by the manufacturer and in accordance with the manufacturer's instructions;

d) carry out the test with the rooflight closed;

e) suspend the bag defined in EN 596 at a height (distance between lowest point of bag and proposed impact point) of:

2,40 m	±1 %	for type SB 1200,
1,60 m	±1 %	for type SB 800,
1,20 m	±1 %	for type SB 600,
0,60 m	±1 %	for type SB 300, and
(A x 0,002) m	±1 %	for type SB A

above the impact point and drop the bag without initial velocity;

f) test the impact strength at a point, which is determined to be the least favourable point, located in an area between 0,5 m and 1,0 m from the outer edge of the rooflight. If one of the two sides of the rooflight is smaller than 1,0 m, carry out the test at the centre line;

g) only one test shall be carried out on each rooflight sample;

h) examine the test specimen without changing the position of the bag one minute after the impact to check whether a 300 mm diameter spherical gauge can pass through.

6.5.2.3.4 Test specimen

For impact test − large soft body, one test on the least favourable rooflight dimension (usually the smallest dimension in area or perimeter of the rooflight), material type, thickness of skin(s) and type of connection dome/upstand.

6.6 Fire behaviour

Rooflight shall be tested and classified in accordance with EN 13501-1 when tested in accordance with Annex E.

6.7 Air permeability

Rooflight shall be tested and classified in accordance with following:

Test shall be carried out applying to the inside of the test specimen a series of positive pressures and measuring the air permeability in accordance with Annex C.

Classes are indicated by the total amount of air referenced to the perimeter of the rooflight at different pressure.

The reference perimeter is the length of the perimeter of the daylight size of the rooflight as defined in Figure 1

Classes are given in Table 8 and Figure 5.

Table 8 – Air permeability classes

Internal pressure	Maximum Air flow $m^3/h/m$		
Pa	Ap 12	Ap 50	Ap A
4	1,4	6	A/8,4
100	12	50	A

The designations 12, 50 and A in the above mentioned classes represent the maximum air permeability in $m^3/h/m$ measured when the rooflight is tested in accordance with Annex C.

Class Ap A may express better or worse performances than the defined classes in the table.

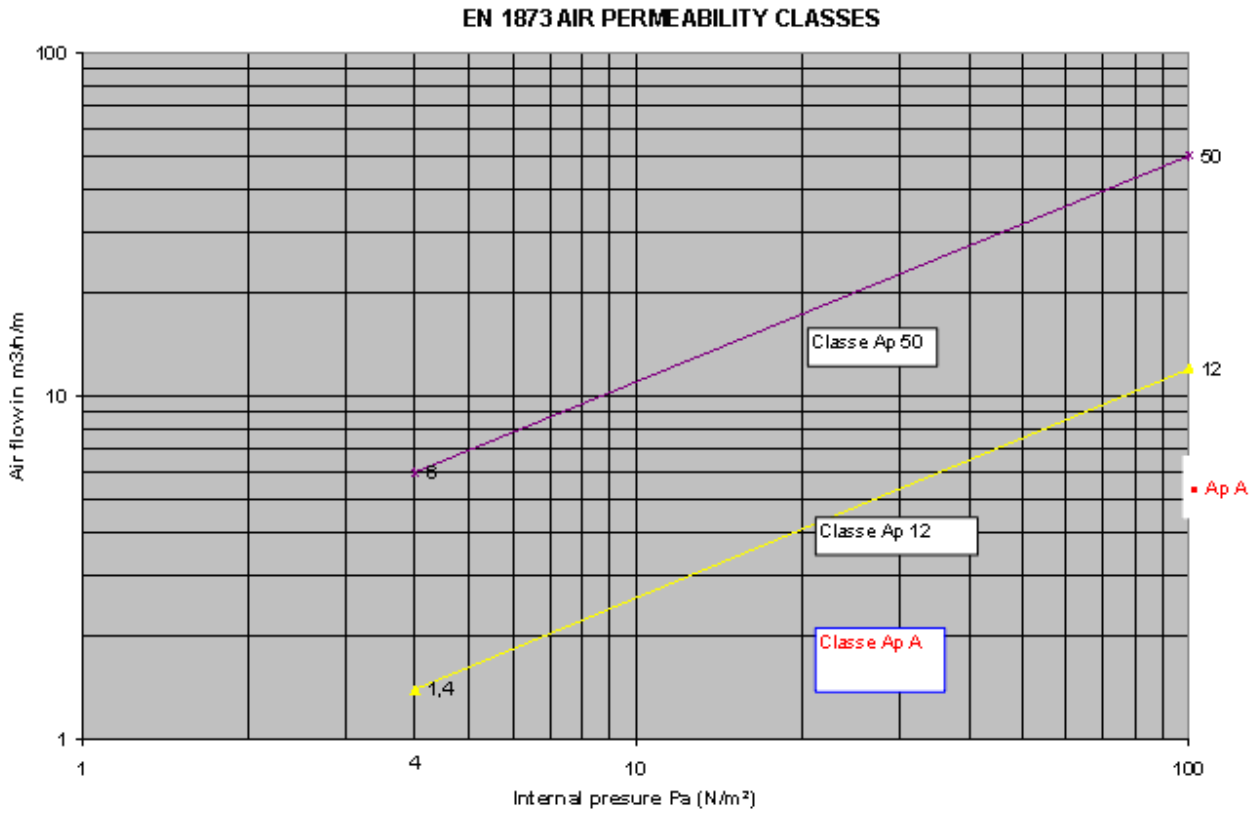


Figure 5 — Diagram of maximum airflow versus pressure test

6.8 Thermal transmittance

Thermal transmittance of rooflights can be determined by measurement or by calculation in accordance with Annex D.

6.9 Relationship between characteristics, families and test specimens

Generally for each characteristic according to this standard, the critical design has to be tested.

Therefore the family and the corresponding test specimens are defined in accordance to the characteristics (see 7.2.1).

In the following table, the definitions of the family in accordance to the characteristics and the representative designs for the test specimens are described.

Table 9 – determination of test specimens for each characteristic and family

characteristic	family	Test specimen
Light transmission	The family is defined with the design of the translucent part, including all skins with a defined material, a defined thickness and a defined pigmentation of each skin.	Translucent part
Durability	The family is defined with the design of the outside skin of the transparent part with a defined material, a defined thickness and a defined pigmentation.	Outside skin of the translucent part
Water tightness	The family is defined by the same design concept.	See 6.4.4
Resistance to downward loads Resistance to upward loads	The family is defined by the same design concept and the same materials and construction details e.g. the type of the edge profiles and junction parts (if existing), the number and maximum distance of the fixings on the upstand or the rigid support and the material and thicknesses of the skins of the translucent part.	6.5.1.5
Impact load Soft large body	The family is defined by the same design concept and same materials and construction details e.g. the type of the edge profiles and junction parts (if existing), the number and maximum distance of the fixings on the upstand or the rigid support and the material and thicknesses of the skins of the translucent.	The largest and the smallest daylight size whereas the test specimen defines the minimum thickness and the minimum number of skins
Impact load Small hard body	The family is defined by the same design concept.	The smallest daylight size
Reaction to fire	See Annex E	See Annex E
External fire	The family is defined by the same design concept and same materials and construction details.	see CEN/TS 1187
Thermal transmittance	The family is defined by the same design concept Same materials and construction details e.g. the type of the edge profiles and junction parts (if existing), and the same translucent	See Annex D

	part.	
Airborne sound insulation	The family is defined by the same design concept and same materials and construction details e.g. the type of the edge profiles and junction parts (if existing), and the same translucent part.	According to the test method.
Air permeability	The family is defined by the same design concept and same materials and construction details e.g. the type of the edge profiles and junction parts (if existing), and the same translucent part.	See Annex C

6.10 Test report

The test report shall include at least the following items:

a) name of manufacturer;

b) references to this standard;

c) testing conditions (e.g. upstand substitute);

d) date of test;

e) results of the test;

f) description and drawing of the rooflight and rooflight with upstand in accordance with 3.1 and 3.5 including specification of the construction material used;

g) indication on restrictions of use;

h) place and date of the testing;

i) place and date and authorized signature.

7 Assessment and verification of constancy of performance - AVCP

7.1 General

The compliance of individual plastic rooflights with the requirements of this European Standard and with the performances declared by the manufacturer in the DoP shall be demonstrated by:

– determination of the product type,

– factory production control by the manufacturer, including product assessment.

The manufacturer shall always retain the overall control and shall have the necessary means to take responsibility for the product with its declared performance(s).

7.2 Type testing

7.2.1 General

Type testing shall be performed to demonstrate compliance with this European Standard.

Tests previously performed in accordance with the provisions of this standard, may be taken into account provided that they were made to the same or a more rigorous test method, under the same AVCP system on the same product or products of similar design, construction and functionality, such that the results are applicable to the product in question.

For the purposes of assessment, the manufacturer's products may be grouped into families, where it is considered that the results for one or more characteristics from any one product within the family are representative of the same characteristics for all products within that same family (a product may be in different families for different characteristics).

Products may be grouped in different families for different characteristics.

Reference to the test method standards should be made to allow the selection of a suitable representative sample.

In addition, type testing shall be performed at the beginning of the production of a new individual plastic rooflight s (unless a member of the same family) or at the beginning of a new method of production (where this may affect the stated properties).

Where components are used whose characteristics have already been determined, by the component manufacturer, on the basis of compliance with other product standards, these characteristics need not be re-assessed. The specifications of these components shall be documented, as shall the inspection scheme for ensuring their compliance.

Products bearing regulatory marking in accordance with appropriate harmonized European specifications may be presumed to have the performances declared in the DoP, although this does not replace the responsibility on the Individual plastic rooflights manufacturer to ensure that the individual plastic rooflight s as a whole is correctly designed and its component products have the necessary performance values to meet the design.

All characteristics in 5.1, 5.2, 5.3, 5.4, 5.5, 5.7, 5.8, 5.9 and 5.10 shall be subject to type testing. Whenever a change occurs in the individual plastic rooflights design, in the raw material or in the supplier of the components, or in the production process (subject to the definition of a family), which would affect significantly one or more of the characteristics, the type tests shall be repeated for the appropriate characteristic(s).

7.2.2 Test reports

The results of the determination nof the product type shall be documented in the test reports. All test reports shall be retained by the manufacturer for at least 10 years after the last date of production of the Individual plastic rooflights to which they relate.

7.3 Factory production control (FPC)

7.3.1 General

The manufacturer shall establish, document and maintain an FPC system to ensure that the products placed on the market conform with the stated performance characteristics.

The FPC system shall consist of procedures, regular inspections and tests and/or assessments and the use of the results to control raw and other incoming materials or components, equipment, the production process and the product.

All the elements, requirements and provisions adopted by the manufacturer shall be documented in a systematic manner in the form of written policies and procedures.

This production control system documentation shall ensure a common understanding of conformity evaluation and enable the achievement of the required product characteristics and the effective operation of the production control system to be checked.

Factory production control therefore brings together operational techniques and all measures allowing maintenance and control of the compliance of the product with this technical specification.

7.3.2 General requirements

7.3.2.1 Introduction

The manufacturer is responsible for organizing effective implementation of the factory production control system. Tasks and responsibilities in the production control organization shall be documented and this documentation shall be kept up-to-date.

In each factory the manufacturer may delegate the action to a person having the necessary authority to:

– identify procedures to demonstrate conformity of the product at appropriate stages;

– identify and record any instance of non-conformity;

– identify procedures to correct instances of non- conformity.

The manufacturer shall draw up and keep up-to-date documents defining the factory production control which is applied. The manufacturer's documentation and procedures should be appropriate to the product and manufacturing process. The FPC system should achieve an appropriate level of confidence in the conformity of the product. This involves:

(a) the preparation of documented procedures and instructions relating to factory production control operations, in accordance with the requirements of the reference technical specification;

(b) the effective implementation of these procedures and instructions;

(c) the recording of these operations and their results;

(d) the use of these results to correct any deviations, repair the effects of such deviations, treat any resulting instances of non-conformity and, if necessary, revise the FPC to rectify the cause of non-conformity.

Where subcontracting takes place, the manufacturer shall retain the overall control of the product and ensure that he receives all the information that is necessary to fulfill his responsibilities according to the European Standard in question.

If the manufacturer has part of the product designed, manufactured, assembled, packed, processed and/or labelled by subcontracting, the FPC of the subcontractor may be taken into account, where appropriate for the product in question. The manufacturer who subcontracts all of his activities may in no circumstances pass these responsibilities on to a subcontractor.

NOTE Manufacturers having an FPC system, which complies with EN ISO 9001 and which addresses the provisions of the present European Standard are considered as satisfying the FPC requirements of the Regulation (EU) No 305/2011.

7.3.2.2 Equipment

Testing: all weighing, measuring and testing equipment shall be calibrated and regularly inspected according to documented procedures, frequencies and criteria.

Manufacturing: all equipment used in the manufacturing process shall be regularly inspected and maintained to ensure use, wear or failure does not cause inconsistency in the manufacturing process. Inspections and maintenance shall be carried out and recorded in accordance with the manufacturer's written procedures and the records retained for the period defined in the manufacturer's FPC procedures.

7.3.2.3 Raw materials and components

The specifications of all incoming raw materials and components shall be documented, as shall the inspection scheme for ensuring their compliance.

7.3.2.4 Design process

The factory production control system shall document the various stages in the design of products, identify the checking procedure and those individuals responsible for all stages of design.

During the design process itself, a record shall be kept of all checks, their results, and any corrective actions taken. This record shall be sufficiently detailed and accurate to demonstrate that all stages of the design phase, and all checks, have been carried out satisfactorily.

7.3.2.5 Product testing and evaluation

The manufacturer shall establish procedures to ensure that the stated values of all of the characteristics are maintained. The characteristics, and the means of control, are:

Table 10 - Verifications in the framework of factory production control

Characteristics	Verification method [a]	Minimum frequency
For light transmitting sheets, upstands, accessories, etc.		
Material properties of upstand material, insulation products, accessories, etc.	Compliance with supplier's declaration	Every delivery
Geometry (all declared parameters, e.g. length, width, height)	Manufacturer's methods	Every unit, light transmitting sheet and upstand (if relevant)
For the raw translucent elements only		
Composition	Manufacturer's methods	Continuously or every production batch
Density		Every production batch
Bending or tensile strength (initial)	6.3.5	
Impact resistance (hard body)	6.5.2.1	
Heat resistance [b]	EN 1013	
Glass content [c]	EN 1013	
Curing [c]	EN 1013	
Luminous transmittance	6.2.1 (or Annex B)	Every 1 000 light transmitting sheets

[a] The test methods should correspond to those included in the technical specification referred to, but different equipment may be used by the manufacturer, as long as correlation with ITT results can be established (where applicable).

[b] Only applicable for PVC light transmitting sheets.

[c] Only applicable for GRP sheet material.

7.3.2.6 Non-complying products

The manufacturer shall have written procedures which specify how non-conforming products shall be dealt with. Any such events shall be recorded as they occur and these records shall be kept for the period defined in the manufacturer's written procedures.

7.3.3 Product specific requirements

The FPC system shall:

– address this European Standard

and

– ensure that the products placed on the market comply with the stated performance characteristics.

The FPC system shall include a product specific FPC, which identifies procedures to demonstrate compliance of the product at appropriate stages, i.e.:

a) the controls and tests to be carried out prior to and/or during manufacture according to a frequency laid down in the FPC test plan,

and/or

b) the verifications and tests to be carried out on finished products according to a frequency laid down in the FPC test plan.

If the manufacturer uses only finished products, the operations under b) shall lead to an equivalent level of compliance of the product as if FPC had been carried out during the production.

If the manufacturer carries out parts of the production himself, the operations under b) may be reduced and partly replaced by operations under a). Generally, the more parts of the production that are carried out by the manufacturer, the more operations under b) may be replaced by operations under a).

In any case the operation shall lead to an equivalent level of compliance of the product as if FPC had been carried out during the production.

NOTE Depending on the specific case, it can be necessary to carry out the operations referred to under a) and b), only the operations under a) or only those under b).

The operations under a) refer to the intermediate states of the product as on manufacturing machines and their adjustment, and measuring equipment etc. These controls and tests and their frequency shall be chosen based on product type and composition, the manufacturing process and its complexity, the sensitivity of product features to variations in manufacturing parameters etc.

The manufacturer shall establish and maintain records that provide evidence that the production has been sampled and tested. These records shall show clearly whether the production has satisfied the defined acceptance criteria and shall be available for at least three years.

Where the product fails to satisfy the acceptance measures, the provisions for non-conforming products shall apply, the necessary corrective action shall immediately be taken and the products or batches not conforming shall be isolated and properly identified.

Once the fault has been corrected, the test or verification in question shall be repeated.

The results of controls and tests shall be properly recorded. The product description, date of manufacture, test method adopted, test results and acceptance criteria shall be entered in the records under the signature of the person responsible for the control/test.

With regard to any control result not meeting the requirements of this European Standard, the corrective measures taken to rectify the situation (e.g. a further test carried out, modification of manufacturing process, throwing away or putting right of product) shall be indicated in the records.

Individual products or batches of products and the related manufacturing documentation shall be completely identifiable and retraceable.

7.3.4 Initial inspection of factory and of FPC

Initial inspection of factory and of FPC shall be carried out when the production process has been finalised and in operation. The factory and FPC documentation shall be assessed to verify that the requirements of 7.3.2 and 7.3.3 are fulfilled.

During the inspection it shall be verified:

a) that all resources necessary for the achievement of the product characteristics included in this European Standard are in place and correctly implemented,

and

b) that the FPC-procedures in accordance with the FPC documentation are followed in practice,

and

c) that the product complies with the product type samples, for which compliance of the product performance to the DoP has been verified.

All locations where final assembly or at least final testing of the relevant product is performed, shall be assessed to verify that the above conditions a) to c) are in place and implemented. If the FPC system covers more than one product, production line or production process, and it is verified that the general requirements are fulfilled when assessing one product, production line or production process, then the assessment of the general requirements does not need to be repeated when assessing the FPC for another product, production line or production process.

All assessments and their results shall be documented in the initial inspection report.

7.3.5 Continuous surveillance of FPC

The surveillance of the FPC shall include a review of the FPC test plan(s) and production processes(s) for each product to determine if any changes have been made since the last assessment or surveillance. The significance of any changes shall be assessed.

Checks shall be made to ensure that the test plans are still correctly implemented and that the production equipment is still correctly maintained and calibrated at appropriate time intervals.

The records of tests and measurement made during the production process and to finished products shall be reviewed to ensure that the values obtained still correspond with those values for the samples submitted to the determination of the product type and that the correct actions have been taken for non-compliant products.

7.3.6 Procedure for modifications

If modifications are made to the product, production process or FPC system that could affect any of the product characteristics declared according to this standard, then all the characteristics for which the manufacturer declares performance, which may be affected by the modification, shall be subject to the determination of the product type, as described in 7.2.1.

Where relevant, a re-assessment of the factory and of the FPC system shall be performed for those aspects, which may be affected by the modification.

All assessments and their results shall be documented in a report.

8 Designation and marking

Relevant designations of characteristics (see Clause 5 and 6) as well as information about intended use, handling, installation, maintenance and care (see Annex A) shall be provided:

NOTE Information that is required for regulatory marking (see Annex ZA) need not be duplicated elsewhere.

The products shall be designated at least by the following items:

a) name or trademark of the manufacturer or responsible supplier;

b) type and model;

c) month and year of manufacture;

d) wording “plastic rooflight or “plastic rooflight with upstand” (as relevant);

e) reference to this document (EN 1873);

f) size (roof opening diameter or roof opening width x roof opening length);

g) daylight size (daylight diameter or daylight width x daylight length);

h) height of the upstand (if applicable);

i) material classification according to change of total luminous transmittance τ_{D65} and yellowness index *YI (ΔYI)*;

j) material classification according to change of E-modulus after ageing procedure;

k) material classification according to change of σ after ageing procedure;

l) mechanical performances (types of upward, downward and impact loads);

m) luminous transmittance.

This designation shall either be contained on a product label or detailed in accompanying documents or in the manufacturer's published technical specification(s).

The manufacturer shall provide sufficient information to ensure the traceability of his product (e.g. by means of product codes) giving the link between the product, the manufacturer and the production.

Annex A
(informative)

Guidelines for safety, application, use and maintenance

A.1 General

Plastic rooflights with upstands should be fit for purpose. The construction materials should be mutually compatible and suitable for their respective purposes.

A.2 Guidelines for safety

A.2.1 Plastic rooflights according to this document are not intended to be walked on. Rooflights should only be opened according to the manufacturer's instruction.

A.2.2 Plastic rooflights, upstands, opening frames and accessories should be designed to minimize risk to personnel when used in compliance with the specification. In particular, there should be no possibility of falling debris which can cause bodily injuries, except under extraordinary conditions (i.e. fire conditions).

A.2.3 Plastic rooflights with upstands should be equipped with fixing elements which cannot be removed from the outside without tools. Opening rooflights should be secure in the closed position.

A.3 Guidelines for application and use

A.3.1 Where not otherwise defined in this document, European and/or national regulations and codes of practice applicable to the design and installation of roofing systems should be followed. Where relevant, the methods of application laid down by suppliers of special roofing materials should be always considered. The manufacturer should specify the installation conditions.

A.3.2 The connection of the individual rooflight unit to the supporting substructure should be executed in such a way that the loads acting upon the connection are transferred to the substructure.

A.3.3 The storage, transportation, erection and installation of plastic rooflights, upstands, opening frames and accessories should be performed in accordance with the manufacturer’s instructions.

A.3.4 The manufacturer’s instructions should be adhered to with respect to the temperature and environmental compatibility such as the effect of cleaning agents, fluids, gaseous and solid substances (particularly organic solvents).

A.3.5 Rooflights made of plastic materials are vapour permeable. For this reason, in the case of multi-skinned rooflights the formation of water condensate between the skins may occur temporarily, which, however, should not affect the function of the rooflight.

A.3.6 Opening rooflights should be closed at wind speeds of over 10 m/s.

A.3.7 The minimum height of the upstand should be at least 150 mm above the finished roof level.

A.3.8 Where wind loads corresponding to higher test loads than those indicated in Table 5 are specified, the plastic rooflight should be tested using the method described in 5.4.1 but with the higher test load.

A.3.9 Where higher loads than those indicated in Table 6 are required (i.e. in regions of regular high snow falls), the plastic rooflight should either be fitted substantially higher than the roof surface or subjected to a special test load.

A.4 Maintenance

Plastic rooflights and plastic rooflights with upstands should be subjected to periodic maintenance according to the manufacturer's instructions. The maintenance should include:

— cleaning of structural elements;

— checking and possible replacement of seals;

— checking, maintenance and possible replacement of accessories;

— maintenance of the opening mechanism (if any).

The maintenance measures should be safely and easily implemented without the need to dismantle the plastic rooflights with upstands. Failure to comply with these maintenance requirements may affect the performance and life expectancy of the product.

Annex B
(normative)

Alternative test method for the determination of light transmission

B.1 General

The described test method may be used for quality control purposes provided that the manufacturer can demonstrate correlation with the method described in 6.2.1. In this case the manufacturer shall use as reference the light transmission figure relative to the box method equivalent to the stated value. The tolerance of ± 5 % applies to this reference.

B.2 Apparatus

The apparatus consists of:

— an open box, square in plan, painted matt white[1] inside with internal dimensions of 600 $^{+5}_{0}$ mm and 900 $^{+5}_{0}$ mm high. An internal flange 25 $^{+5}_{0}$ mm wide and 25 $^{+5}_{0}$ mm deep has to be provided at a distance (from the top of the box) of 100 mm, or the maximum depth of the profile to be tested plus 5 mm, whichever is the greater;

— a 40 mm colour and cosine-corrected selenium photocell is mounted, facing downwards, at the centre of the aperture formed by the flange but 600 $^{+5}_{0}$ mm below it. The spectral response of this photocell is such as to give a maximum reading between 380 nm to 780 nm. The photocell is connected to a galvanometer;

— a light source designed to have a colour temperature of about 6 500 K is fitted to the top of the box. It consists of an optically neutral opal acrylic plastics diffuser (opal polymerised methyl methacrylate or equivalent may be used[2]) mounted flush with the top of the box with eight tubes, 600 mm long, 20 W fluorescent “cold white” above it and control apparatus mounted outside;

— a regulator circuit, if necessary, to maintain a constant voltage supply to the lamps;

— suitable devices to measure temperature:

  a) on the surface of the diffuser, centrally positioned;

  b) immediately above the photocell.

B.3 Test pieces

Cut five test pieces from the sheet which are square in shape, each side being 575 mm in length.

[1] Colour RAL 9003 matt can be used.

[2] For example, "Perspex", grade 040, is a suitable product available commercially. This information is given for the convenience of users of this document and does not constitute an endorsement by CEN of this product.

B.4 Procedure

B.4.1 Before testing, fit the top to the box, switch on the lamps and leave to stabilize for a minimum period of 30 min.

B.4.2 The temperature levels from each device has to be monitored. Tests shall be discontinued if the temperatures recorded in the centre and on the surface of the diffuser exceed 35 °C and/or the temperature recorded immediately above the photocell exceeds 30 °C.

B.4.3 Note the reading R_1 of the galvanometer without any test piece in position.

B.4.4 Remove the top from the box and place the test piece on the internal flange. Refit the top to the box and note the reading R_2 of the galvanometer with the sample in position.

B.4.5 Remove the top from the box, remove the test piece. Refit the top to the box and note the reading R_3 of the galvanometer.

B.4.6 Compare R_1 and R_3, and if the difference is not greater than 5 % relative to the greater value, accept the results. If the difference is more than 5 %, repeat the test until satisfactory results are obtained.

B.4.7 Repeat B.4.3 to B.4.6 four times with different test pieces.

B.5 Expression of results

B.5.1 Determine the mean value M_s of R_1 and R_3 for each test piece as:

$$M_s = \frac{R_1 + R_3}{2}$$

B.5.2 Express the light transmission L_s of each test piece as:

$$L_s = \frac{R_2}{M_s}.100\% \qquad \text{in \%}$$

B.5.3 Determine the mean value of the light transmission of the test pieces as:

$$M_v = \frac{1}{5} \times \sum_{n-1}^{n=5} L_{sn}$$

Annex C
(normative)

Test method for air permeability

C.1 General

This test is intended to judge the airtightness of plastic rooflights and plastic rooflights with upstands by measuring the total amount of air passing through a closed test specimen, from inside to outside; caused by the test pressure.

The amount of air shall be expressed in cubic meters per hour (m^3/h).

The ambient temperature and humidity around the specimen shall be within the range 19 °C to 27 °C and 25 % to 75 % RH and the specimen shall be conditioned thus for at least 4 h immediately before testing.

Temperature shall be measured to within ± 3 °C and relative humidity to within ± 5 %. Atmospheric pressure shall be measured to within ± 1 kPa.

The test pressure shall be applied with the following steps at 4 Pa, 10 Pa, 20 Pa, 30 Pa, 40 Pa, 50Pa, 75Pa and 100 Pa.

The air permeability result shall be given to an accuracy of 10 %.

The procedure to follow shall account for the air permeability of the test chamber.

C.2 Test apparatus

Test apparatus consists in:

- A chamber with an open side on the top suitable to fit the test specimen. It shall be constructed so as to withstand the test pressures without deflecting to an extent likely to influence the test results.
- Means for applying controlled test pressure to test specimen.
- Means of producing rapid changes in test pressure, controlled within defined limits.
- Instrument suitable for measuring the quantity of air flow into or out of the chamber within an accuracy of ± 5 % (calibrated at + 20 °C, 101 kPa).
- Means of measuring the test pressure applied across the specimen, within an accuracy of ± 5 %.
- Means of sealing all joints of the chamber test, when required.

C.3 Test specimen

A test on the rooflight with the maximum perimeter dimensions may be considered to be representative of all rooflights in a particular family range as defined in 6.9.

C.4 Test procedure

Secure the test specimen on the top of the chamber as it would be on a roof, in accordance with the manufacturer's instructions, without any twists or bends which may influence the test results. The specimen shall be fully operable. The test specimen shall be cleaned and surfaces dry.

Rooflight without upstand shall be tested with a suitable substitute upstand.

If rooflight is an openable type test shall be carried out in the closed position.

The air permeability of the test chamber shall be less than 5 % of the maximum air permeability permitted throughout the range of the classification that is attributed to the test specimen.

NOTE A suitable means to measure air permeability of the chamber may be the test method indicated in EN 1026.

In the case of openable rooflights, open and close all opening parts of the test specimen at least once before securing them in the closed position.

Apply three pressure pulses at 110 Pa. The time to reach the maximum test pressure shall be not less than 1 s and the pressure shall be sustained for at least 3 s.

Apply positive test pressure steps as specified in 6.7

Measure and record the total air flow at each step. The duration of each step shall be sufficient to allow the test pressure to stabilize before the air permeability is measured.

C.5 Evaluation of the results

Adjust the result of the air flow measurements (Vx) at each step, to calculate the air flow (V0)under normal conditions (*T*o = 293 K, *P*o = 101,3 kPa), considering the actual temperature *T*x expressed in°C and atmospheric pressure Px expressed in kPa, during the test.

$$V_o = V_x \cdot \frac{293}{273 + T_x} \cdot \frac{P_X}{101{,}3}$$

Calculate the air permeability in terms of $m^3/h/m$, dividing the air flow volume (V0) by the perimeter of the rooflight as defined in 6.7.

Record on a graph the air permeability for each pressure step.

C.6 Rounding off to be used for the air permeability

For the measurement of the air permeability for classification 2 significant figures are used.

For example:

Calculation = 1, 41 becomes 1, 4 $m^3/h/m$

Calculation = 1, 45 becomes 1, 5 $m^3/h/m$

Calculation = 12, 7 becomes 13 $m^3/h/m$

Calculation = 12, 4 becomes 12 $m^3/h/m$

C.7 Test report

This shall state the airflow measurement devices used for the test and record on a drawing or a photograph of the test specimen, the location of any significant points or air leakage observed.

Where appropriate the report shall contain as a minimum the following information:

- reference to this standard;
- the name of the test laboratory;
- the graph with the test result;
- date of the test;
- all necessary references to identify the test specimen and the rooflight family range;
- all relevant details concerning the dimensions of the specimen, its materials, design, construction and fittings;
- drawings of details of the specimen including cross section to a scale of 1:2 or larger;
- test method;
- test procedures, including storage and conditioning prior to test, and methods for mounting the test specimen ready for;
- test climates during tests.

Annex D
(normative)

Determination of thermal transmittance of rooflight

D.1 General

The thermal transmittance U-value, in W/(m^2·K), determines the thermal flow through exchange surface, in m^2, between inside and outside of all components of the individual rooflight, as defined in Clause 3.

The thermal transmittance U-value is determined in reference to the external surface.

D.2 Determination of thermal transmittance of rooflight components

D.2.1 Determination by measurement

U-value shall be measured in accordance with the test method of EN ISO 12567-2 fixing the test specimen on the test rig in horizontal position.

D.2.2 Determination by calculation

D.2.2.1 General

Calculation shall be done for the rooflight mounted horizontally.

D.2.2.2 Thermal transmittance of the upstand U_{up} and $U_{up,e}$

The U_{up}-value as nominal value of an upstand shall be either measured according to EN 12412-2 or calculated according to EN ISO 6946 for thermal homogenous design or according to EN ISO 10077-2 and EN ISO 10211 in other case.

The $U_{up,e}$-value as nominal value of the combination of an upstand and an edge profile is calculated according to EN ISO 10077-2 and EN ISO 10211.

D.2.2.3 Thermal transmittance of the edge profile U_e

The U_e-value as nominal value of the edge profile is either measured according to EN 12412-2 or calculated according to EN ISO 10077-2.

D.2.2.4 Thermal transmittance of the junction part U_j

The U_j-value as nominal value of the junction part is either measured according to EN 12412-2 or calculated according to EN ISO 10077-2.

D.2.2.5 Thermal transmittance of the translucent parts U_t

In general the U_t-value as nominal value of the translucent parts can be either calculated or measured in accordance with Table 1. In the process one has to consider that the sheets are built in horizontally or nearly horizontally. In this respect the orientation especially of the structured sheets (vertical or horizontal) has to be recorded during the measuring.

Table D 1 - Normative references for calculation and measurement of translucent parts

Element	Calculation	Measurement
Single, double, triple etc skins of solid sheets	EN 673	EN 674
Multiwall sheets	Methods described in EN ISO 10077-2 and EN ISO 10211	EN 674
Non parallel translucent parts	EN 673 Methods described in EN ISO 10077-2 and EN ISO 10211	EN 674
Additional layer - mineral glass	EN 673	EN 674

The U_t-value of translucent part thermo-formed from multiwall sheet is declared by the manufacturer and deviates from the U_t-value measured on the raw material (flat sheet). If no tested value is available a conservative justified value may be used.

D.2.2.6 Linear thermal transmittances Ψ_e, Ψ_j, Ψ_t

Ψ_e is to be calculated according to EN ISO 10211.

Ψ_j , Ψ_t are to be calculated according to EN ISO 10077-2.

Ψ_e, Ψ_j, Ψ_t values have to be indicated using two significant digits.

$0{,}35\ \mathrm{W/(m \cdot K)}$ is a conservative value for Ψ_e, Ψ_j and Ψ_t.

NOTE The linear thermal transmittance Ψ_e regards the higher heat transfer in the border area for example at rooflights caused by the sheet spacer and the enclosed area of the edge profile. It depends on the border area construction as well as the level of isolation of the used framing or of the glazing bars.

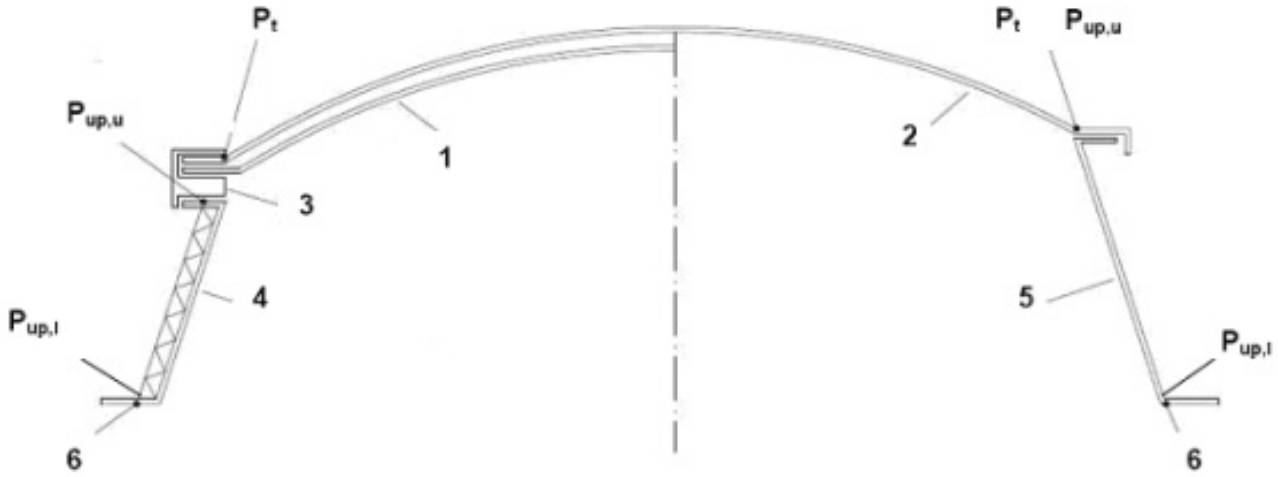
D.2.2.7 Definition of starting point for calculation of thermal transmittance

The starting point for calculation of thermal transmittance is defined on the adiabatic level (see D.3.1, Figures D.1 and D.2).

D.3 Determination of areas of a rooflight

D.3.1 Components

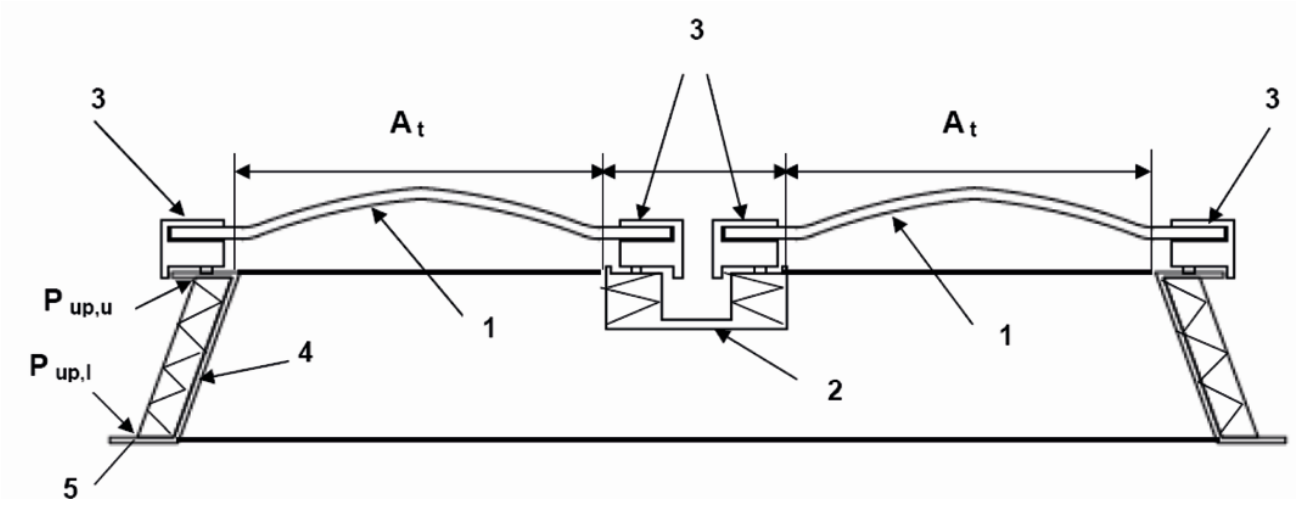
Individual rooflight with and without edge profile



Key

1 translucent part, multi skin
2 translucent part, single skin
3 edge profile
4 insulated upstand
5 non insulated upstand
6 starting point of calculation
P_t perimeter of the translucent part, equal to the clear opening of the translucent part
$P_{up,u}$ upper outer perimeter of the upstand
$P_{up,l}$ lower outer perimeter of the upstand

Figure D.1 - Exemplary overview of the components of an individual rooflight



Key

1	translucent part, multi skin
2	junction part
3	edge profile
4	insulated upstand
5	starting point of calculation
A_t	Area of the outer exposed surface of the translucent part bordered with the perimeter of the translucent part
$P_{up,u}$	upper outer perimeter of the upstand
$P_{up,l}$	lower outer perimeter of the upstand

Figure D.2 - Exemplary overview of the components of a rooflight with a junction

D.3.2 Area of the rooflight upstand

The area of the rooflight upstand A_{up} is the outer exposed surface.

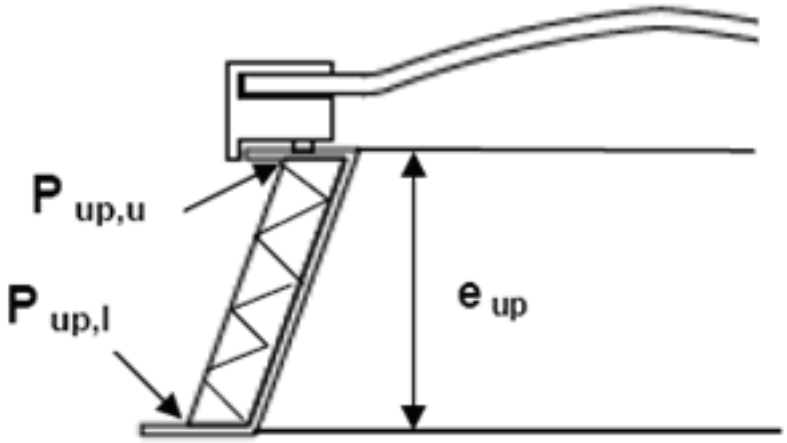
The outer exposed surface of the rooflight upstand is defined as:

$$A_{up} = P_{up} \cdot e_{up} \left[\mathrm{m}^2 \right] \quad \text{(D.1)}$$

where

P_{up} the reference perimeter of the upstand (calculated as average of upper outer perimeter $P_{up,u}$ and lower outer perimeter $P_{up,l}$)

e_{up} the vertical height of the upstand equates to the distance of $P_{up,u}$ and $P_{up,l}$



Key

e_{up} the height of the upstand

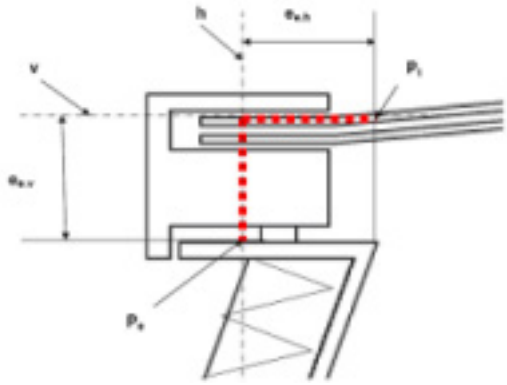
$P_{up,u}$ upper outer perimeter of the upstand

$P_{up,l}$ lower outer perimeter of the upstand

Figure D.3 - Exemplary overview showing the perimeter and the height of the upstand

D.3.3 Area of the edge profile

Instead of the real geometry of the edge profiles a virtual simplified geometry as shown in Figure D.4 and Figure D.5 is used for calculation. The dimensions of $e_{e,h}$ and $e_{e,v}$ depend on the specific design of the construction of the manufacturer and shall be determined individually. The location of the virtual lines is the envelope boundary.



Key

$e_{e,v}$ vertical distance between the upper level of the translucent part and the upper level of the upstand

P_e perimeter of the edge profile (= $P_{up,u}$)

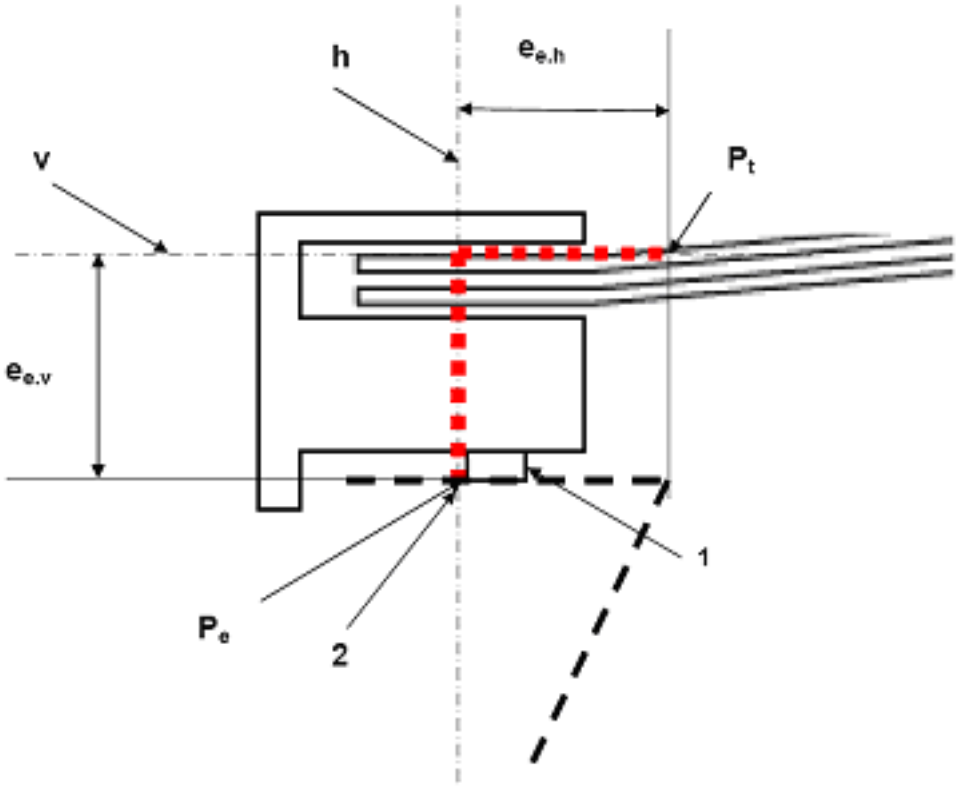
P_t perimeter of the translucent part

h horizontal envelope boundary

$e_{e,h}$ horizontal distance between the upper outside border of the insulation and the clear opening of the translucent part

v vertical envelope boundary

Figure D.4 - Exemplary overview of the area with edge profile and upstand



Key

1 joint sealing

2 starting point of calculation

$e_{e,h}$ horizontal distance between the upper outside border of the insulation and the clear opening of the translucent part

$e_{e,v}$ vertical distance between the upper level of the translucent part and the upper level of the upstand

P_e perimeter of the edge profile (= $P_{up,u}$)

P_t perimeter of the translucent part

h horizontal envelope boundary

v vertical envelope boundary

Figure D.5 - Exemplary overview of the area with edge profile and without upstand

The area of the edge profile is defined as:

$$A_e = P_e \cdot e_e \quad [m^2] \tag{D.2}$$

where

P_e the virtual outer perimeter of the edge profiles

e_e the width of the edge profile

The width of the edge profile is defined as:

$$e_e = e_{e,h} + e_{e,v} \tag{D.3}$$

where

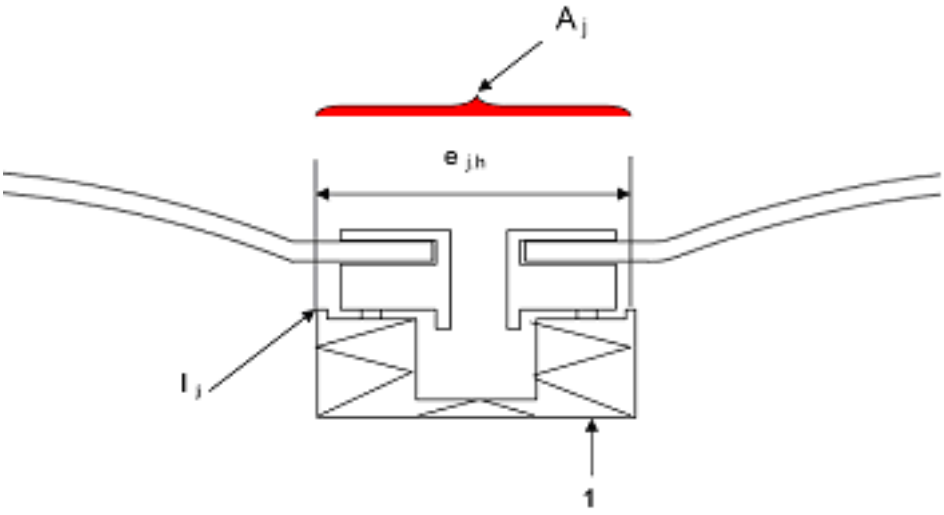
$e_{e,h}$ horizontal distance between the upper outside border of the insulation in the case of an upstand or the upper outside border of the joint sealing, if there is no upstand, and the clear opening of the translucent part

$e_{e,v}$ vertical distance between the upper level of the translucent part and the upper level of the upstand

For rooflights with upstand the perimeter of the edge profile equates to the upper outer perimeter of the upstand $P_{up,u}$.

For rooflights without upstand it is defined with the outside edge of the joint sealing according to Figure D.5.

D.3.4 Area of the junction part



Key

1 junction part

A_j area of the junction part

$e_{j,h}$ the width of the junction part

l_j the length of the junction part

Figure D.6 - Exemplary overview of the area of junction part

The area of the junction part is defined as:

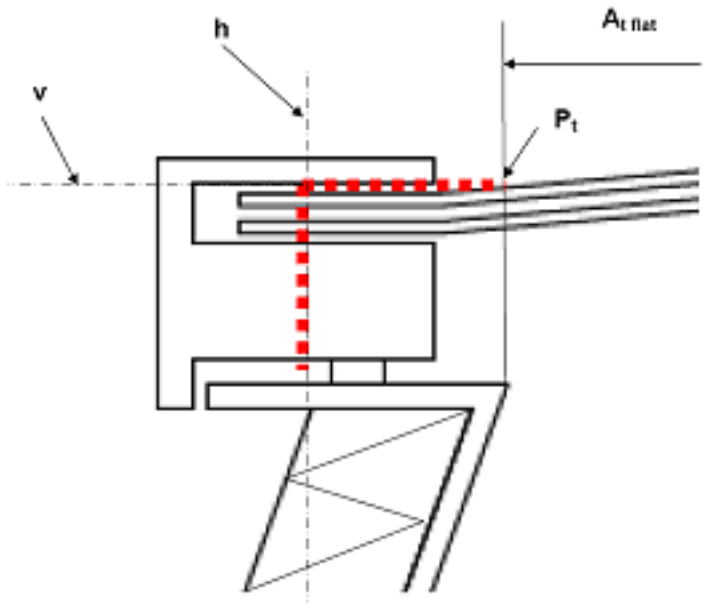
$$A_j = l_j \cdot e_{j.h} \quad [m^2] \tag{D.4}$$

where

l_j the length of the junction part, in m

$e_{j.h}$ the width of the junction part (see Figure D.6), in m

D.3.5 Area of the translucent part A_t



Key

P_t	perimeter of the translucent part
$A_{t,flat}$	The area of the horizontal projection of the outer exposed surface bordered with the perimeter of the daylight area
h	horizontal envelope boundary
v	vertical envelope boundary

Figure D.7 - Exemplary overview of the area of translucent part

The area of the translucent part A_t is the outer exposed surface bordered with the perimeter of the translucent part P_t. Within the scope of this standard the translucent part is to be calculated simply as follows:

$$A_t = A_{t,flat} \cdot k \quad [m^2] \tag{D.5}$$

where

$A_{t,flat}$	area of the horizontal projection of the clear opening of the translucent part
*k**	factor to take into account the shape of the translucent part
*) *k* = 1,12	for normal domed rooflight– for height/length relation between 1/6 and 1/4
*) *k* = 1,0	for slightly domed rooflight – for height/length relation 1/40 < and < 1/6

Without calculation of the outer surface it is permissible to use the appropriate factor *k*.

As an alternative for determination of the surface area it is permissible to use the exact outer surface areas of the translucent part.

D.3.6 Surface of the rooflight

The surface of the rooflight without upstand A_r is defined as

$$A_r = A_e + A_t \quad [m^2] \tag{D.6}$$

where

A_e area of the edge profile, in m^2

A_t area of the translucent part, in m^2

The surface of the rooflight with upstand A_{rc} with a single translucent part is defined as:

$$A_{rc} = A_{up} + A_e + A_t \quad [m^2] \tag{D.7}$$

where

A_e area of the edge profile, in m^2

A_t area of the translucent part, in m^2

A_{up} area of the upstand, in m^2

The surface of the rooflight with upstand A_{rc} with more than one translucent part is defined as:

$$A_{rc} = A_{up} + A_e + \Sigma A_j + \Sigma A_t \quad [m^2] \tag{D.8}$$

where

A_e area of the edge profile, in m^2

ΣA_j total area of the junction parts, in m^2

ΣA_t total area of the translucent parts, in m^2

A_{up} area of the upstand, in m^2

D.4 Total thermal transmittance of individual rooflights

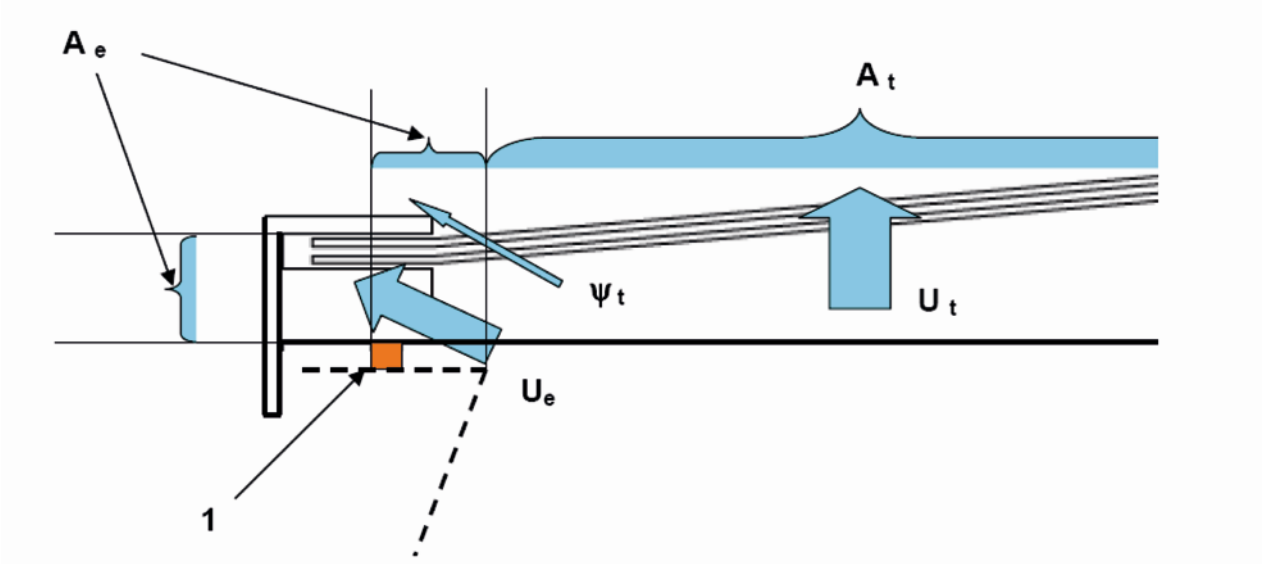
D.4.1 General

The total U-value of an individual rooflight shall be evaluated taking into account characteristics of translucent part, edge profiles, junction part and upstand:

- Surface of the rooflight without upstand A_r as defined in D.3.6
- Surface of the rooflight with upstand A_{rc} as defined in D.3.6
- Surface of the upstand A_{up} as defined in D.3.2
- Surface of the edge profile part A_e as defined in D.3.3
- Surface of the junction part A_j as defined in D.3.4
- Surface of the translucent part A_t as defined in D.4.6
- Thermal transmittance of upstand U_{up} as defined in D.2.2.2
- Thermal transmittance of edge profile $U_{up,e}$ as defined in D.2.2.2
- Thermal transmittance of edge profile U_e as defined in D.2.2.3

- Thermal transmittance of the junction part U_j as defined in D.2.2.4
- Thermal transmittance of translucent part U_t as defined in D.2.2.5
- the linear thermal transmittance coefficient in the transition zone of edge profile and upstand Ψ_e as defined in D.2.2.6
- the linear thermal transmittance coefficient in the transition zone of the translucent part and junction part Ψ_j as defined in D.2.2.6

D.4.2 Total thermal transmittance U_r of individual rooflights including the edge profile



Key

1 starting point of calculation

A_e the outer exposed surface of the edge profiles

A_t the outer exposed surface of the translucent part

U_e the thermal transmittance of the edge profiles

U_t the thermal transmittance of the translucent part

Ψ_t the linear heat transfer coefficient in the transition zone of the translucent part and the edge profile

Figure D.8 - Explanation of the factors for the calculation of individual rooflights including edge profiles

The U-value of the rooflight U_r including the edge profile is calculated – as follows:

$$U_r = \frac{A_e \times U_e + A_t \times U_t + l_t \times \Psi_t}{A_e + A_t} \left[\mathrm{W/(m^2 \cdot K)} \right] \quad \text{(D.9)}$$

where

A_e the outer exposed surface of the edge profiles, in m^2

A_t the outer exposed surface of the translucent part, in m^2

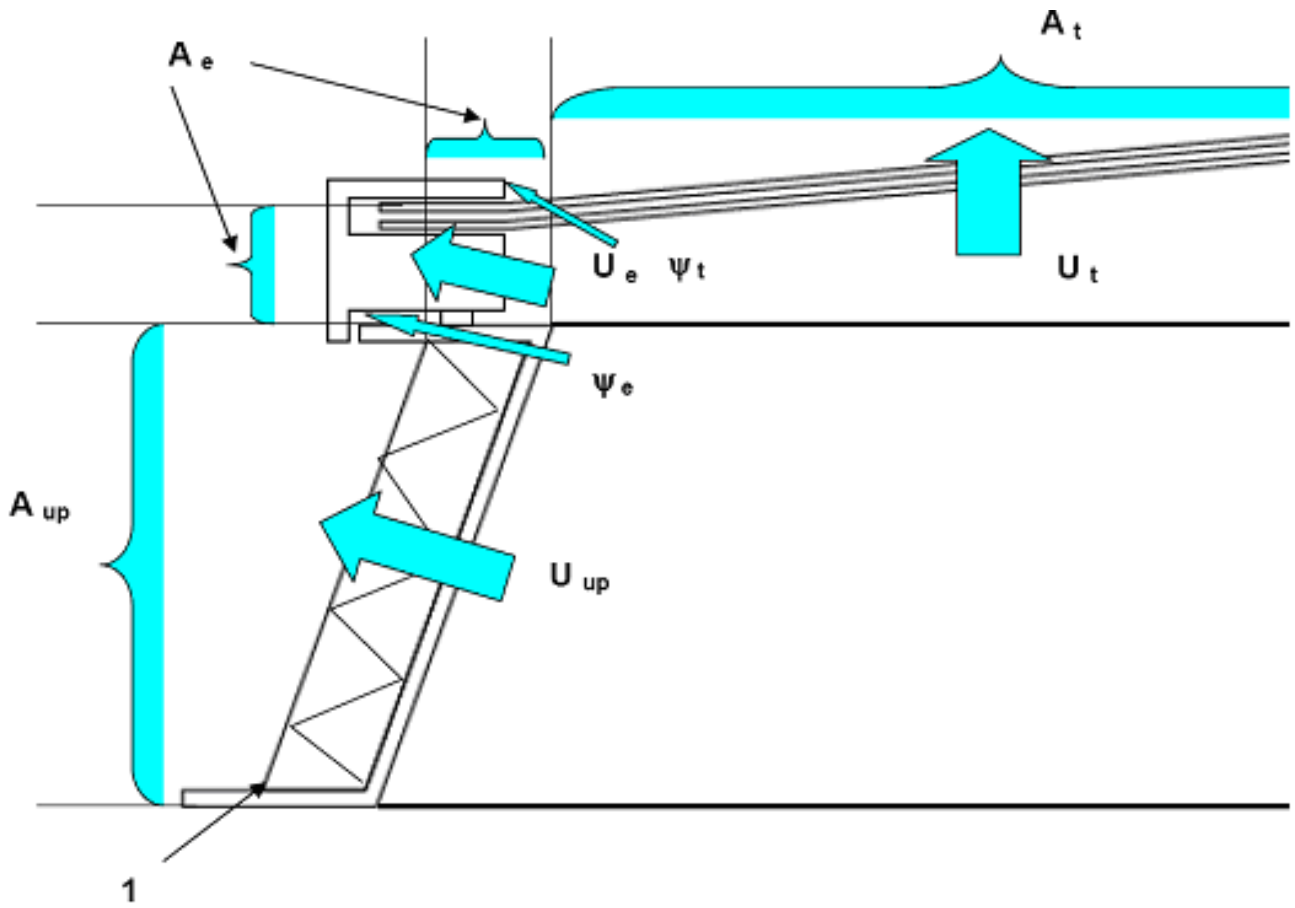
l_t length of the transition zone between translucent part and edge profiles, in m

U_e the thermal transmittance of the edge profiles, in W/(m^2·K)

U_t the thermal transmittance of the translucent part, in W/(m^2·K)

Ψ_t the linear heat transfer coefficient in the transition zone of the translucent part and the edge profile, in W/(m · K)

D.4.3 Total thermal transmittance U_{rc} of individual rooflights including the edge profile and upstand



Key

1 starting point of calculation

A_e the outer exposed surface of the edge profiles

A_t the outer exposed surface of the translucent part

A_{up} the outer exposed surface of the upstand

U_e the thermal transmittance of the edge profiles

U_t the thermal transmittance of the translucent part

U_{up} the thermal transmittance of the upstand

Ψ_e the linear heat transfer coefficient in the transition zone of edge profile and upstand

Ψ_t the linear heat transfer coefficient in the transition zone of the translucent part and the edge profile

Figure D.9 - Explanation of the factors for the calculation of individual rooflights including the edge profile and upstand

The U-value of the complete individual rooflight U_{rc} consisting of rooflight with edge profile and upstand is calculated as follows:

$$U_{rc} = \frac{A_{up} \times U_{up} + A_e \times U_e + A_t \times U_t + l_e \times \Psi_e + l_t \times \Psi_t}{A_{up} + A_e + A_t} \left[W/(m^2 \cdot K) \right] \qquad (D.10)$$

where

A_e the outer exposed surface of the edge profile, in m^2

A_t the outer exposed surface of the translucent part, in m^2

A_{up} the outer exposed surface of the upstand, in m^2

l_e length of the sealing of the edge profile equates to the perimeter of the edge profile, in m

l_t length of the transition between translucent part and edge profile (= P_t), in m

U_e the thermal transmittance of the edge profile, in $W/(m^2 \cdot K)$

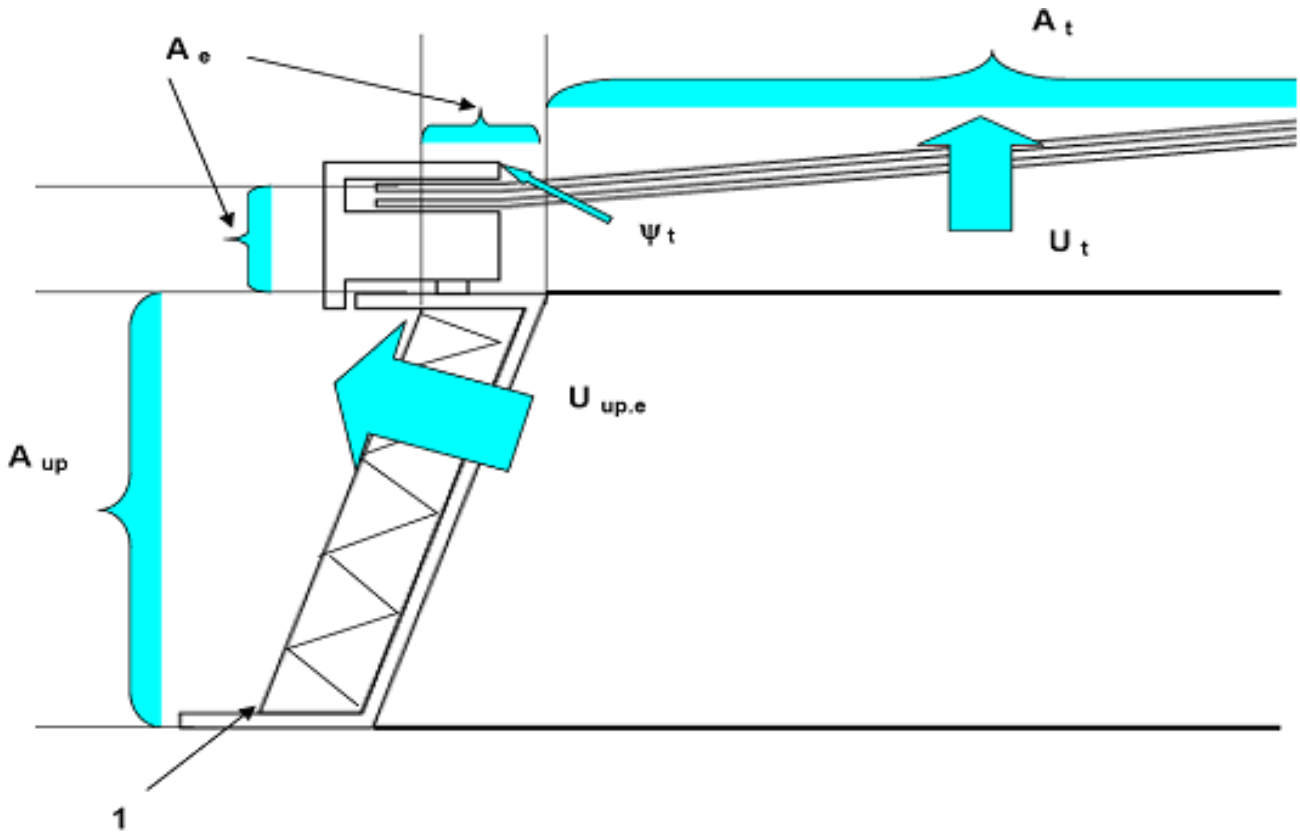
U_t the thermal transmittance of the translucent part, in $W/(m^2 \cdot K)$

U_{up} the thermal transmittance of the upstand, in $W/(m^2 \cdot K)$

Ψ_e the linear heat transfer coefficient in the transition zone of edge profile and upstand, in $W/(m \cdot K)$

Ψ_t the linear heat transfer coefficient in the transition zone of the translucent part and edge profile, in $W/(m \cdot K)$

D.4.4 Total thermal transmittance U_{rc} of individual rooflights including the edge profile and upstand (alternative method)



Key

1	starting point of calculation
A_e	the outer exposed surface of the edge profiles
A_t	the outer exposed surface of the translucent part
A_{up}	the outer exposed surface of the upstand
U_t	the thermal transmittance of the translucent part
$U_{up,e}$	the thermal transmittance of the upstand including edge profile
Ψ_t	the linear heat transfer coefficient in the transition zone of the translucent part and the edge profile

Figure D.10 - Explanation of the factors for the calculation of individual rooflights including the edge profile and upstand (alternative method)

The U-value of the complete individual rooflight U_{rc} consisting of rooflight with edge profile and upstand is calculated as follows:

$$U_{rc} = \frac{(A_{up} + A_e) \times U_{up,e} + A_t \times U_t + l_t \times \Psi_t}{A_{up} + A_e + A_t} \left[\mathrm{W/(m^2 \cdot K)} \right] \quad \text{(D.11)}$$

where

A_e the outer exposed surface of the edge profile, in m^2

A_{up} the outer exposed surface of the upstand, in m^2

A_t the outer exposed surface of the translucent part, in m^2

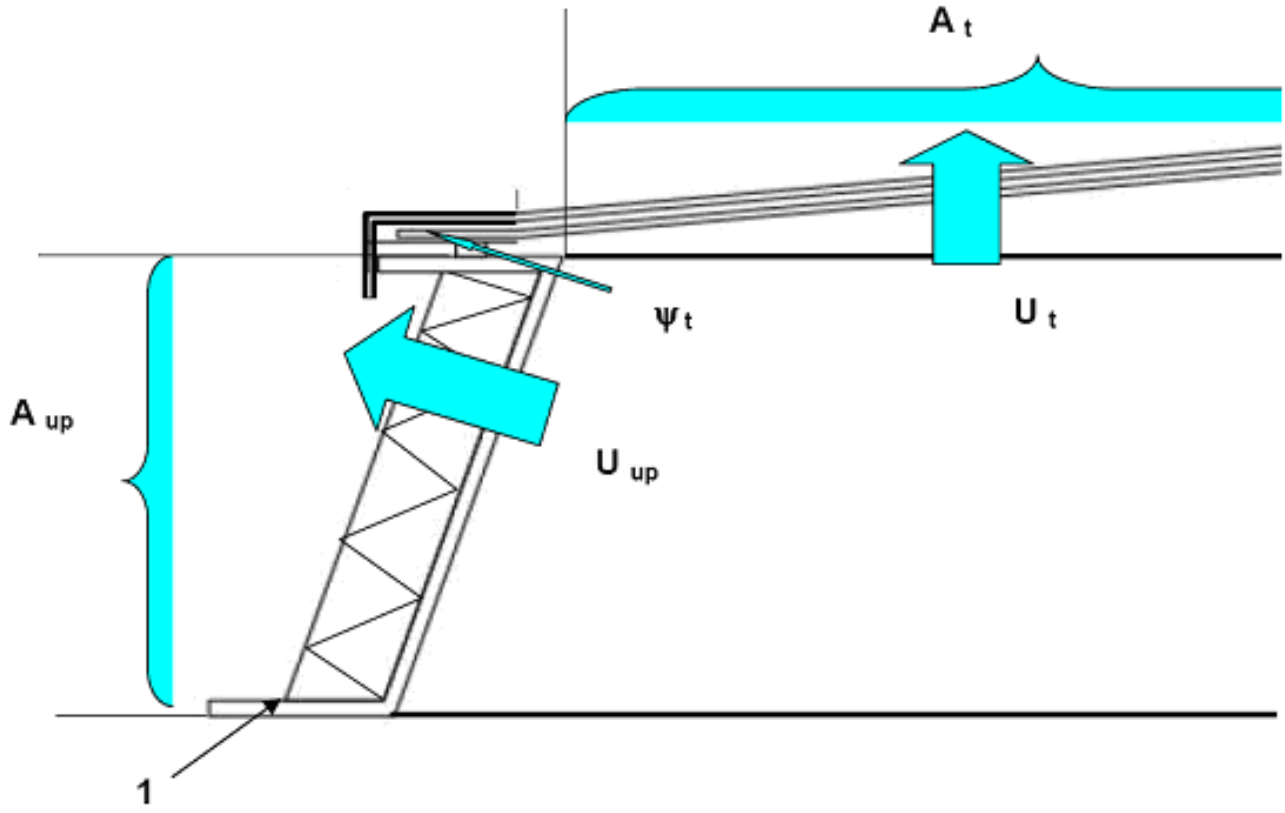
l_t length of the transition between glazing and edge profile(= P_t), in m

$U_{up,e}$ the thermal transmittance of the upstand and hedge profile, in $W/(m^2 \cdot K)$

U_t the thermal transmittance of the translucent part, in $W/(m^2 \cdot K)$

Ψ_t the linear heat transfer coefficient in the transition zone of the translucent part and edge profile, in $W/(m \cdot K)$

D.4.5 Total thermal transmittance U_{rc} of individual rooflights including the upstand without edge profile



Key

1 starting point of calculation

A_t the outer exposed surface of the translucent part

A_{up} the outer exposed surface of the upstand

U_t the thermal transmittance of the translucent part

U_{up} the thermal transmittance of the upstand

Ψ_t the linear heat transfer coefficient in the transition zone of the translucent part and the edge profile

Figure D.11 - Explanation of the factors for the calculation of individual rooflights with upstand, without edge profile

The U-value for the complete individual rooflight U_{rc} consisting of rooflight with upstand, without edge profile is calculated as follows:

$$U_{rc} = \frac{A_{up} \times U_{up} + A_t \times U_t + l_t \times \Psi_t}{A_{up} + A_t} [W/(m^2 \cdot K)] \quad (12)$$

where

A_t the outer exposed surface of the translucent part, in m^2

A_{up} the outer exposed surface of the upstand, in m^2

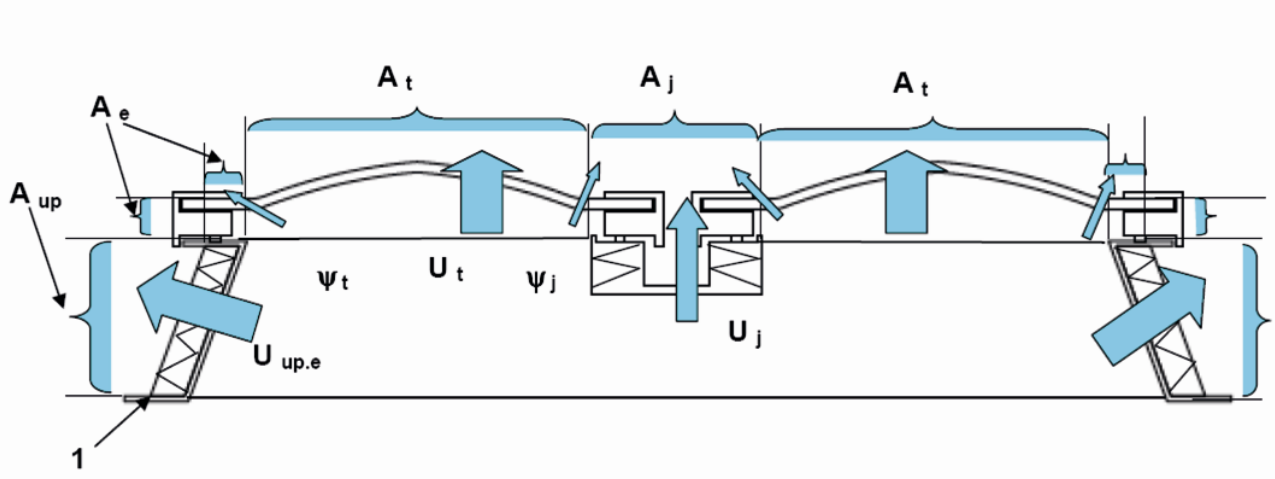
l_t length of the transition zone between translucent part and upstand equates to the perimeter of the translucent part, in m

U_t the thermal transmittance of the translucent part, in $W/(m^2 \cdot K)$

U_{up} the thermal transmittance of the upstand and edge profile, in $W/(m^2 \cdot K)$

Ψ_t the linear heat transfer coefficient in the transition zone of the translucent part and upstand, in $W/(m \cdot K)$

D.4.6 Total thermal transmittance U_{rc} of individual rooflights including the edge profile and upstand with more than one translucent part



Key

1 starting point of calculation

A_e the outer exposed surface of the edge profiles

A_j outer exposed surface of the junction part

A_t the outer exposed surface of the translucent part

A_{up} the outer exposed surface of the upstand

U_j thermal transmittance of the junction part

U_t the thermal transmittance of the translucent part

$U_{up,e}$ the thermal transmittance of the upstand

Ψ_j the linear thermal transmittance in the transition zone of the translucent part and junction part

Ψ_t the linear heat transfer coefficient in the transition zone of the translucent part and the edge profile

Figure D.12 - Explanation of the factors for the calculation of individual rooflights with edge profile, upstand and more than one translucent part (example shown has two translucent parts)

The U-value of the complete individual rooflight U_{rc} consisting of rooflight with edge profile and upstand is calculated as followed:

$$U_{rc} = \frac{(A_{up} + A_e) \times U_{up,e} + \Sigma A_t \times U_t + \Sigma A_j \times U_j + \Sigma l_t \times \Psi_t + \Sigma l_j \times \Psi_j}{A_{up} + A_e + \Sigma A_t + \Sigma A_j} [W/(m^2 \cdot K)] \quad (D.13)$$

where

A_e the outer exposed surface of the edge profile in m^2

ΣA_j the sum of the outer exposed surfaces of the junction parts, in m^2

ΣA_t the sum of the outer exposed surfaces of the translucent parts, in m^2

A_{up} the outer exposed surface of the upstand, in m^2

U_j the thermal transmittance of the junction parts, in $W/(m^2 \cdot K)$

U_t the thermal transmittance of the translucent part, in $W/(m^2 \cdot K)$

$U_{up,e}$ the thermal transmittance of the upstand and edge profile, in $W/(m^2 \cdot K)$

Σl_t sum of the length of the transition zone between translucent part and edge profile, in m

Σl_j sum of the length of the transition zone between translucent part and junction part, in m

Ψ_t the linear thermal transmittance in the transition zone of the translucent part and edge profile, in $W/(m \cdot K)$

Ψ_j the linear thermal transmittance in the transition zone of the translucent part and junction part, in $W/(m \cdot K)$

D.4.7 Rounding off to be used for thermal transmittance in calculation and classification

For the calculation of the thermal transmittance values of U_e, U_{up} and Ψ and the values of the surfaces as input have to be indicated using 3 significant digits.

For the output (result for classification) values have to be indicated using 2 significant digits.

For example:

Calculation = 1,41 becomes 1,4 $W/(m^2 \cdot K)$

Calculation = 1,45 becomes 1,5 $W/(m^2 \cdot K)$

Calculation = 0,741 becomes 0,74 $W/(m^2 \cdot K)$

Calculation = 0,745 becomes 0,75 $W/(m^2 \cdot K)$

D.5 Test specimen for evaluation of thermal transmittance: $U_{r,ref}$, $U_{rc,ref300}$

For type testing the following reference model for evaluation of the U-value is provided for each family:

D.5.1 General

For the purpose of comparing the product performances of all manufacturers, the thermal transmittance of reference models indicated in following clauses is evaluated for each family.

This reference value should be certified by a third party laboratory.

The reference model depends only on the nominal size of the roof opening and the height of the upstand. Supplied products may have different dimensions.

The calculation method described in this standard enables the evaluation and declaration of the specific U-value of the supplied product.

D.5.2 Reference models

D.5.2.1 Individual rooflight without upstand

Table D.2 - Overview of the reference models for individual rooflights without upstand

Type A Rooflight family with only one translucent part	**Type B** Rooflight family with two or more translucent parts
Nominal size of the roof opening 1,20 m x 1,20 m	Nominal size of the roof opening 1,50 m x 1,50 m
$U_{r,ref}$ $A_{r,ref}$	$U_{r,ref}$ $A_{r,ref}$

To characterize the individual reference rooflight model, the following statements in relation to the $U_{r,ref}$-value declaration shall be made:

Type: A or B

Translucent part: glazing material; number of skins; light transmission; size of the translucent parts

Edge profile: YES or NO; in case of YES the material has to be declared fixed or openable; in case of openable the number of seals has to be declared

D.5.2.2 Individual rooflight with upstand

Upstand height: 300 mm

Table D.3 - Overview of the reference models for individual rooflights with upstands

Type A Rooflight family with only one translucent part	**Type B** Rooflight family with two or more translucent parts
Nominal size of the roof opening 1,20 m x 1,20 m	Nominal size of the roof opening 1,50 m x 1,50 m
$U_{rc,ref300}$ $A_{rc,ref300}$	$U_{rc,ref300}$ $A_{rc,ref300}$

To characterize the reference individual rooflight model with upstand the following statements in relation to the $U_{rc,ref300}$-value declaration has to be made:

Type: A or B

Translucent part: glazing material; number of shells; light transmission; size of the translucent parts

Edge profile: YES or NO; in case of YES the material has to be declared

fixed or openable: in case of openable the number of seals shall be declared

Upstand: bearing material; insulation material; thickness of insulation

D.6 Characteristics for supplied rooflight

Manufacturers should indicate:

$U_{r,ref}$- $A_{r,ref}$ or $U_{rc,ref300}$- $A_{rc,ref300}$ value for the reference model,

U_r- A_r or U_{rc}- A_{rc} value, nominal size

Annex E
(normative)

Reaction to fire test

E.1 Class E

E.1.1 General

For class E the small flame test in accordance with EN ISO 11925-2 is the test procedure for the purpose of classification in accordance with EN 13501-1. For the single flame test in accordance with EN ISO 11925-2 only those components shall be considered which are visible when the rooflight is opened and/or closed.

E.1.2 Mounting and fixing for the small flame test in accordance to EN ISO 11925-2

In accordance with EN ISO 11925-2 any material which is not a small component in accordance with the definition in 4.2.7 shall be tested in the sizes specified in EN ISO 11925-2.

If materials are available as flat products the test specimen shall be in the shape of the end use application in the rooflight, e.g. fillings. Mounting and fixing shall be done as specified in EN ISO 11925-2. The test on flat products may be performed with surface flame attack only.

Products which are not flat in the end use application e.g. profiles and gaskets shall be tested in their original condition in the end use application. That implies that e.g. gasket or thermal separation elements of thermally isolated profiles shall be tested fitted into the appropriate profile. An adjacent glazing element may be simulated by a non-combustible plate, e.g. a steel plate. The tests, except for corner tests as described in the next paragraph, shall be performed with surface flame attack onto the most critical fire-exposed face only. The test laboratory may select the most critical fire-exposed face of the product.

If products are bent around a corner, e.g. gasket, this corner part shall be tested in its original arrangement and the test shall be performed with edges and surface flame attack at the corner.

If products have different top layers, e.g. profiles or fillings, both surfaces (interior and exterior surface) shall be tested.

The test specimen including those for corner tests shall have a maximum length of 250 mm and a maximum width of 90 mm. The maximum depth of test specimen is 60 mm.

If a product has different kinds of gasket etc. of the same material the test laboratory may select the most critical gasket subject to the assembly area, the cross section of the gasket and the exposed width.

The test results for profiles are valid for profiles made of the same material and with greater thicknesses of the visible surface.

The test results for coatings are valid for substrates with the same or greater thickness coating and for coatings with the same or lower thickness but with an equal or lower PCS value.

E.2 Class A2 to class D

E.2.1 General

For classifications from A2 to class D, the SBI test in accordance with EN 13823 is the main test procedure for the purpose of classification in accordance with EN 13501-1. The small flame test in accordance with EN ISO 11925-2 (see E.1.2) applies also for class D, C and B. The non-combustible test in accordance with EN ISO 1182 or the determination of the heat of combustion in accordance with EN ISO 1716 applies also for class A2.

E.2.2 Mounting and fixing for the SBI test

In accordance with EN 13823 materials of the rooflight which are not small components in accordance with the definition in 4.2.7 shall be tested in the sizes specified in EN 13823. The requirements for mounting and fixing in the single burning item test in accordance with EN 13823 shall be taken from the product standard for windows (EN 14351-1) or for rooflights (EN 1873).

E.3 Class A1

For class A1 the Non-combustible test in accordance with EN ISO 1182 and the determination of the heat of combustion in accordance with EN ISO 1716 are the main test procedures for the purpose of classification in accordance with EN 13501-1.

Rooflights which are made of materials deemed to satisfy class A1 without the need for testing do not need to be tested and can be classified in accordance with EN 13501-1 on the basis of the list given by the Commission Decision 96/603/EEC as amended.

NOTE Classification A1 relates to the post-flashover period of a fire and relates to a material test (that is not under “end use conditions”).

Annex ZA
(informative)

Clauses of this European Standard addressing the provisions of the EU Construction Products Regulation

ZA.1 Scope and relevant characteristics

This European Standard has been prepared under Mandate M/122 “Roof coverings, rooflights, roof windows and ancillary products” given to CEN by the European Commission and the European Free Trade Association.

If this European Standard is cited in the Official Journal of the European Union (OJEU), the clauses of this standard, shown in this annex, are considered to meet the provisions of the relevant mandate, under the Regulation (EU) No. 305/2011.

This annex deals with the CE marking of the prefabricated accessories for roofing – individual rooflights of plastics intended for the uses indicated in Table ZA.1 and shows the relevant clauses applicable.

This annex has the same scope as in Clause 1 of this standard related to the aspects covered by the mandate and is defined by Table ZA.1.

Table ZA.1 — Relevant clauses for prefabricated accessories for roofing – individual rooflights of plastics and intended use: light transmission for use in flat and inclined roofs of buildings

Product: Prefabricated accessories for roofing – individual rooflights **Intended use:** Light transmission for use in flat and inclined roofs of buildings			
Essential Characteristics	**Clauses in this and other European Standard(s) related to essential characteristics**	**Regulatory classes**	**Notes**
Mechanical resistance	5.4.1 Resistance to upwards load 5.4.2 Resistance to downwards loads	–	Declared class
External fire performance	5.7	-	Declared class and declared test method
Reaction to fire	5.5	Classes A1 to F	Declared class
Water tightness	5.3.	–	Pass / Fail
Impact resistance	5.4.3.1 Small hard body impact 5.4.3.2 Large soft body impact	–	Pass / Fail Declared class
Direct airborne sound insulation	5.10	-	Rw index
Thermal resistance	5.9	–	$U_{rc,ref300}$ - $A_{rc,ref300}$

			$U_{r,ref}$, $A_{r,ref}$
Radiation properties	5.1	−	τD65-value / g-value
Air permeability	5.8	−	Declared class
Durability:			
- variation of mechanical strength	5.2	−	Declared type
- variation of optical properties o variation of total luminous transmittance	5.2	−	Declared type
o variation of yellowness index	5.2	−	Declared type
Dangerous substances:	5.11	-	-

The declaration of the product performance related to certain essential characteristics is not required in those Member States (MS) where there are no regulatory requirements on these essential characteristics for the intended use of the product.In this case, manufacturers placing their products on the market of these MS are not obliged to determine nor declare the performance of their products with regard to these essential characteristics and the option “No performance determined” (NPD) in the information accompanying the CE marking and in the declaration of performance (see ZA.3) may be used for those essential characteristics

ZA.2 Procedure for AVCP of prefabricated accessories for roofing – individual rooflights of plastics.

ZA.2.1 Systems of AVCP

The AVCP systems of prefabricated accessories for roofing – individual rooflights of plastics indicated in Table ZA.1, in accordance with the Decision of the Commission 98/436/EC of 1998-06-22(published the 10.07.98 under L194) amended by the Decision 01/596/EC (published the 2.08.01 under L209) as given in Annex III of the mandate for “Roof coverings, roof lights, roof windows and ancillary products”, is shown in Table ZA.2 for the indicated intended use and relevant levels or classes of performance.

Table ZA.2 — Systems of AVCP

Product(s)	Intended use(s)	Level(s) or class(es) of performance	AVCP system(s)
rooflights	For uses subject to reaction to fire regulations	A1 (*), A2(*), B(*) and C(*)	1
		A1 (**), A2 (**), B (**), C (**), D and E	3
		A1 to E (***), F	4
	For uses subject to external fire performance regulations	Products requiring testing	3
		Product deemed to satisfy without testing	4
	For uses subject to regulations on dangerous substances	-	3
	For other uses than those above mentioned	–	3

* Products/materials for which a clearly identifiable stage in the production process results in an improvement of the reaction to fire classification (e.g. an addition of fire retardants or a limiting of organic material).

** Products not covered by footnote (*).

*** Products/materials that do not require to be tested for reaction to fire (e.g. products/materials of Class A1 according to Commission Decision 96/603/EC).

System 1: See Regulation (EU) No. 305/2011 (CPR) Annex V, 1.2

System 3: See Regulation (EU) No. 305/2011 (CPR) Annex V, 1.4

System 4: See Regulation (EU) No. 305/2011 (CPR) Annex V, 1.5

The AVCP of the prefabricated accessories for roofing – individual rooflights of plastics in Table ZA.1 shall be according to the AVCP procedures indicated in Tables ZA.3.1 to ZA.3.3 resulting from application of the clauses of this or other European Standard indicated therein. The content of tasks of the notified body shall be limited to those essential characteristics as provided for, if any, in Annex III of the relevant mandate and to those that the manufacturer intends to declare.

Table ZA.3.1 — Assignment of AVCP tasks for prefabricated accessories for roofing – individual rooflights of plastics under system 1

Tasks		Content of the task	AVCP clauses to apply
Tasks for the manufacturer	Factory production control (FPC)	Parameters related to all essential characteristics of Table ZA.1 relevant for the intended use which are declared	7.3
	Further testing of samples taken at factory according to the prescribed test plan	All essential characteristics of Table ZA.1 relevant for the intended use which are declared	7.3
Tasks for the notified product certification body	Determination of the product type on the basis of type testing (including sampling), type calculation, tabulated values or descriptive documentation of the product	Reaction to fire (Classes A1 (*), A2(*), B(*) and C(*))	7.2
	Initial inspection of manufacturing plant and of FPC	Parameters related to all essential characteristics of Table ZA.1, relevant for the intended use which are declared, namely reaction to fire Documentation of the FPC.	7.3 and 7.3.4
	Continuous surveillance, assessment and evaluation of FPC	Parameters related to all essential characteristics of Table ZA.1, relevant for the intended use which are declared, namely reaction to fire. Documentation of FPC	7.3 and 7.3.5

Table ZA.3.2 — Assignment of AVCP tasks for prefabricated accessories for roofing – individual rooflights of plastics under system 3

Tasks		Content of the task	AVCP clauses to apply
Tasks for the manufacturer	Factory production control (FPC)	Parameters related to all essential characteristics of Table ZA.1 relevant for the intended use which are declared	7.3
Tasks for a notified testing laboratory	Determination of the product-type on the basis of type testing (based on sampling carried out by the manufacturer), type calculation, tabulated values or descriptive documentation of the product	Essential characteristics of Table ZA 1 relevant for the intended use which are declared: Mechanical resistance Reaction to fire (A1 (*), A2(*), B(*) and C(*)) External fire performance (products requiring testing) Dangerous substances Watertightness Impact resistance Direct airborne sound insulation Thermal resistance Air permeability	7.2

Table ZA.3.3 — Assignment of AVCP tasks for prefabricated accessories for roofing – individual rooflights of plastics under system 4

Tasks		Content of the task	AVCP clauses to apply
Tasks for the manufacturer	Factory production control (FPC)	Parameters related to essential characteristics of Table ZA.1 relevant for the intended use.	7.3
	Determination of the product-type on the basis of type testing, type calculation, tabulated values or descriptive documentation of the product	Essential characteristics of Table ZA.1 relevant for the intended use which are declared: Reaction to fire classes A1 to E (***), F and characteristics other than those subject to the tasks of the notified testing laboratory	7.2

ZA.2.2 Declaration of performance (DoP)

ZA.2.2.1 General

The manufacturer draws up the DoP and affixes the CE marking on the basis of the different AVCP systems set out in Annex V of the Regulation (EU) No 305/2011:

In case of products under system 1

- the factory production control and further testing of samples taken at the factory according to the prescribed test plan, carried out by the manufacturer; and

- the certificate of constancy of performance issued by the notified product certification body on the basis of determination of the product type on the basis of type testing (including sampling), type calculation, tabulated values or descriptive documentation of the product; initial inspection of the manufacturing plant and of factory production control and continuous surveillance, assessment and evaluation of factory production control.

In case of products under system 3

- the factory production control carried out by the manufacturer; and

- the determination of the product-type on the basis of type testing (based on sampling carried out by the manufacturer), type calculation, tabulated values or descriptive documentation of the product, carried out by the notified testing laboratory.

In case of products under system 4

- the factory production control carried out by the manufacturer

- the determination by the manufacturer of the product-type on the basis of type testing, type calculation, tabulated values or descriptive documentation of the product.

ZA.2.2.2 Content

The model of the DoP is provided in Annex III of the Regulation (EU) No 305/2011.

According to this Regulation, the DoP shall contain, in particular, the following information:

- the reference of the product-type for which the declaration of performance has been drawn up;

- the AVCP system or systems of the construction product, as set out in Annex V of the CPR;

- the reference number and date of issue of the harmonized standard which has been used for the assessment of each essential characteristic;

- where applicable, the reference number of the Specific Technical Documentation used and the requirements with which the manufacturer claims the product complies.

The DoP shall in addition contain:

(a) the intended use or uses for the construction product, in accordance with the applicable harmonized technical specification;

(b) the list of essential characteristics, as determined in the harmonized technical specification for the declared intended use or uses;

(c) the performance of at least one of the essential characteristics of the construction product, relevant for the declared intended use or uses;

(d) where applicable, the performance of the construction product, by levels or classes, or in a description, if necessary based on a calculation in relation to its essential characteristics determined in accordance with the Commission determination regarding those essential characteristics for which the manufacturer shall declare the performance of the product when it is placed on the market or the Commission determination regarding threshold levels for the performance in relation to the essential characteristics to be declared.

(e) the performance of those essential characteristics of the construction product which are related to the intended use or uses, taking into consideration the provisions in relation to the intended use or uses where the manufacturer intends the product to be made available on the market;

(f) for the listed essential characteristics for which no performance is declared, the letters “NPD” (No Performance Determined);

Regarding the supply of the DoP, article 7 of the Regulation (EU) No 305/2011 applies.

The information referred to in Article 31 or, as the case may be, in Article 33 of Regulation (EC) No 1907/2006, (REACH) shall be provided together with the DoP.

ZA.2.2.3 Example of DoP

The following gives an example of a filled-in DoP for individual rooflights of plastics:

DECLARATION OF PERFORMANCE

No. 001DoP2013-07-14

1. Unique identification code of the product-type:

Prefabricated accessories for roofing – individual rooflights of plastics

UL1500- DL750-E-Froof(t4)

2 Type, batch or serial number or any other element allowing identification of the construction product as required under Article 11(4):

Prefabricated accessories for roofing – individual rooflights of plastics

UL1500- DL750-E-Froof(t4)

3. Intended use or uses of the construction product, in accordance with the applicable harmonized technical specification, as foreseen by the manufacturer:

Prefabricated accessories for roofing – individual rooflights for light transmission for use in flat and inclined roofs of buildings.

4. Name, registered trade name or registered trade mark and contact address of the manufacturer as required under Article 11(5):

AnyCo SA,

PO Box 21

B-1050 Brussels, Belgium

Tel. +32987654321

Fax: +32123456789

Email: anyco.sa@provider.be

5. Where applicable, name and contact address of the authorized representative whose mandate covers the tasks specified in Article 12(2):

Anyone Ltd

Flower Str. 24

West Hamfordshire

UK-589645 United Kingdom

Tel. +44987654321

Fax: +44123456789

e-mail: anyone.ltd@provider.uk

6. System or systems of assessment and verification of constancy of performance of the construction product as set out in CPR, Annex V:

System 1/ System 3

7. In case of the declaration of performance concerning a construction product covered by a harmonized standard:

System 1: Notified factory production control certification body No. 5678 performed, the determination of the product type on the basis of type testing (including sampling), type calculation, tabulated values or descriptive documentation of the product,the initial inspection of the manufacturing plant and of factory production control and the continuous surveillance, assessment and evaluation of factory production control and issued the certificate of conformity of the constancy of performance of the product.

System 3: The notified testing laboratory No. 1234 performed the determination of the product type on the basis of type testing, type calculation, tabulated values or descriptive documentation of the product. The manufacturer AnyCo SA, performed the factory production control.

8. Declared performance

Essential characteristics	Performance	Harmonized technical specification
Resistance to upward load	**UL1500**	EN 1873:2014
Resistance to downward loads	**DL750**	
Reaction to fire	**E**	
External fire performance	**F_{ROOF}(T4)**	
Water tightness	**Pass**	
Impact resistance: – **Small hard body** – **Large, soft body**	**Pass** **SB1200**	
Thermal transmittance: – $U_{rc,ref300}$ – $A_{rc,ref300}$	**2,2 W/(m^2 K)** **3,2 m^2**	
Direct airborne sound insulation:– Rw (Ctr, C)	**20 (−1, −4) dB**	
Radiation properties: - τD65-value / - g-value	**55 %** **0,5**	
Air permeability:	**Ap 12**	
Durability:	**ΔA, Cu 0, Ku 0**	
Dangerous substances	**NPD**	

9. The performance of the product identified in points 1 and 2 is in conformity with the declared performance in point 8.

This declaration of performance is issued under the sole responsibility of the manufacturer identified in point 4.

Signed for and on behalf of the manufacturer by:

……

(name and function)

…….…… ……..……

(place and date of issue) (signature)

ZA.3 CE marking and labelling

The CE marking symbol shall be in accordance with the general principles set out in Article 30 of Regulation (EC) No 765/2008 and shall be affixed visibly, legibly and indelibly:

- to the prefabricated accessories for roofing – individual rooflights

or

- to a label attached to it.

Where this is not possible or not warranted on account of the nature of the product, it shall be affixed:

- to the packaging

or

- to the accompanying documents.

The CE marking shall be followed by:

- the last two digits of the year in which it was first affixed,
- the name and the registered address of the manufacturer, or the identifying mark allowing identification of the name and address of the manufacturer easily and without any ambiguity,
- the unique identification code of the product-type
- the reference number of the declaration of performance
- the level or class of the performance declared
- the dated reference to the harmonized technical specification applied the identification number of the notified body,
- the intended use as laid down in the harmonized technical specification applied.

The CE marking shall be affixed before the construction product is placed on the market. It may be followed by a pictogram or any other mark notably indicating a special risk or use.

Figures ZA.1 gives an example of the information related to products subject to AVCP under system 1 and 3 to be given on the individual rooflights or to a label attached to it.

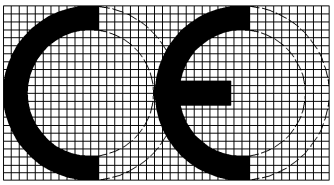
 5678 1234	*CE marking, consisting of the "CE"-symbol* *Identification number of the product certification body and of notified testing laboratory*
AnyCo Ltd, PO Box 21, B-1050, Brussels, Belgium **13** 001DoP2013–07–14	*name and the registered address of the manufacturer, or identifying mark* *Last two digits of the year in which the marking was first affixed* *Reference number of the DoP*
EN 1873:2014 **UL1500- DL750-E-Froof(t4)** intended to be used for daylighting in flat and inclined roofs of buildings **Resistance to upward load:** UL 1500 **Resistance to downward loads:** DL 750 **Reaction to fire:** E **External fire performance:** F_{ROOF} (t4) **Water tightness:** Pass **Impact resistance:** – **Small hard body:** Pass – **Large, soft body:** SB 1200 **Thermal transmittance:** – 2,2 W/(m^2 K) – 3,2m^2 **Direct airborne sound insulation:** – Rw (Ctr, C) 20 (−1, −4) dB **Radiation properties:** - 55 % - 0.5 **Air permeability:** Ap 12 **Durability:** ΔA, Cu 0, Ku 0 **Dangerous substances:** NPD	*No. of European Standard applied, as referenced in OJEU* *Unique identification code of the product-type* *Intended use of the product as laid down in the European Standard applied* *Level or class of the performance declared*

Figure ZA.1 — Example CE marking information of products under AVCP system 1

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