

ENVIRONMENTAL PRODUCT DECLARATION

as per ISO 14025 and EN 15804+A2

Owner of the Declaration	Kingspan Light + Air GmbH
Publisher	Institut Bauen und Umwelt e.V. (IBU)
Programme holder	Institut Bauen und Umwelt e.V. (IBU)
Declaration number	EPD-KIN-20230525-CBA2-EN
Issue date	07/03/2024
Valid to	06/03/2029

**Continuous Rooflight LB plus glazing PC 16/7 + 10/4
Kingspan Light + Air GmbH**

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General Information

Kingspan Light + Air GmbH

Programme holder

IBU – Institut Bauen und Umwelt e.V.
Hegelplatz 1
10117 Berlin
Germany

Declaration number

EPD-KIN-20230525-CBA2-EN

This declaration is based on the product category rules:

Windows and doors , 01/08/2021
(PCR checked and approved by the SVR)

Issue date

07/03/2024

Valid to

06/03/2029



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Continuous Rooflight LB plus glazing PC 16/7 + 10/4

Owner of the declaration

Kingspan Light + Air GmbH
Kingspan Straße 2
32107 Bad-Salzuflen
Germany

Declared product / declared unit

This environmental product declaration is for 1 sqm of CRL LB Plus (Arcade) roof light PC 16/ 7 + 10/ 4, based on a reference product of 50 m x 2.5 m.

Scope:

CRL LB plus, glazing option PC 16/7+ 10/4 is manufactured with two multiwall polycarbonate sheets of 16 mm and 10mm thickness and aluminium frame as structural construction.

This product declaration is intended for a 4 the continuous rooflight LB plus with the glazing option 16/7 + 10/4 CRL manufactured in Kingspan Light + Air GmbH factory in Germany. The smoke ventilation system are not within the scope of this product declaration. The EPD is also found on the IBU database (EPD-KIN-20230524- CBA1-EN).

The owner of the declaration shall be liable for the underlying information and evidence; the IBU shall not be liable with respect to manufacturer information, life cycle assessment data and evidences.

The EPD was created according to the specifications of EN 15804+A2. In the following, the standard will be simplified as *EN 15804*.

Verification

The standard EN 15804 serves as the core PCR		
Independent verification of the declaration and data according to ISO 14025:2011		
☐	internally	☒ externally



Mrs Kim Allbury,
(Independent verifier)

Product

Product description/Product definition

LB Plus rooflight is an arched, continuous, and modular rooflight that provides natural daylighting to the buildings. As well as being a daylighting solution, it can also be adapted for daily building ventilation or complex smoke and heat extraction systems. LB Plus rooflight is available in a range of span widths, infinite lengths and various glazing options. LB Plus is suitable for commercial and industrial roofing applications (including retail and leisure) up to a maximum roof pitch of 20° (if parallel to a ridge, maximum pitch of 5°). It can be used on roof systems for both new builds and refurbishment projects. This product declaration is intended for LB Plus glazing option PC 16/ 7 + 10/ 4, one of the Kingspan Light + Air's rooflight range.

The LB plus is manufactured with two polycarbonate multiwall sheets in the thicknesses of 16 mm and 10 mm. For the placing of the product on the market in the European Union/European Free Trade Association /EU/EFTA) (apart from Switzerland) the Regulation (EU) No. 305/2011 (CPR) applies. The product needs a declaration of performance taking into consideration ETA-17/0482 of 28 May 2019, Kingspan Light + Air ESSMANN Gebäudetechnik GmbH Continuous rooflight system arcade and the CE marking.

Application

The continuous rooflight LB plus with the glazing option PC 16/7 + 10/4 can be installed in the building roofs with up to a

maximum Slope of 25° (parallel to ridge - max. slope 5°). It can be used on all flat roof systems, both new and refurbished.

Technical Data

Name	Value	Unit
Light Transmission opal glazing EN 410	34	%
Total solar energy Transmission opal glazing (G-value) EN 410	44	%
Thermal transmittance (U-value) EN 675	1.3	W/(m ² K)
Airborne sound reduction	24	dB

Performance data of the product in accordance with the declaration of performance with respect to its essential characteristics according to ETA-17/0482 of 28 May 2019, Continuous rooflight system and the CE-marking.

Base materials/Ancillary materials

Base materials are 63% plastic, 27% aluminium, and 10% PVC.

This product contains substances listed in the candidate list (date: 20.09.2023) exceeding 0.1 percentage by mass: no

Reference service life

According to the Federal Office for Building and Regional planning (BBSR), a reference service life of 25 years can be assumed for continuous rooflight. The use stage (module B2) is declared in this EPD for 25 years of usage.

LCA: Calculation rules

Declared Unit

The declared unit refers to 1 m² of a reference rooflight product. The reference product dimension are as followed: 50 m x 2.5 m.

Declared unit and mass reference

Name	Value	Unit
Declared unit	1	m ²
Grammage	8.12	kg/m ²
Layer thickness	0.026	m

System boundary

The type of EPD is cradle-to-gate with options, module C1-C4 and module D. The additional modules are modules A4, A5 and B2.

Considered product stages:

- Production of pre-products, extraction of energy carriers, raw material transportation, manufacture of product and packaging materials are declared in modules A1-A3.
- Modules A1-A3 also include the manufacturing and supply of energy. The production is done using certified green electricity (hydro power). The share of certified electricity accounts for 100 % of the total electricity consumption (0.006 kg CO₂ eq./kWh).
- The scenario for the transport of the product to the construction site is declared in module A4.

- The treatment of packaging materials at installation is declared in module A5. The installation process is also considered in module A5.
- The maintenance stage (cleaning) is included in module B2.
- The end-of-life scenarios include manual dismantling (C1) and transportation to waste processing (C2).
- Two end-of-life scenarios are declared:
- Scenario 1 (C3/1): Once dismantled, the metal parts of the roof light are recycled and the plastic parts are incinerated with energy recovery (R1 >0.6).
- Scenario 2 (C3/2): The roof light follows the same end-of-life as scenario 1 but the PC panels are recycled instead of incinerated.
- Credits for electricity and thermal energy, which result from energy recovery in module A5, and module C3 are declared in module D. In the same way, material credits from recycling in module C3 are declared in module D

Geographic Representativeness

Land or region, in which the declared product system is manufactured, used or handled at the end of the product's lifespan: Europe

Comparability

Basically, a comparison or an evaluation of EPD data is only possible if all the data sets to be compared were created according to EN 15804 and the building context, respectively the product-specific characteristics of performance, are taken into account.

LCA FE software - CUP 2023.1.

LCA: Scenarios and additional technical information

Characteristic product properties of biogenic carbon

Biogenic carbon is present in the packaging materials (wooden pallets and cardboard).

Note: 1 kg of biogenic Carbon is equivalent to 44/12 kg of CO₂.

Information on describing the biogenic carbon content at factory gate

Name	Value	Unit
Biogenic carbon content in accompanying packaging	0.197	kg C

Note: 1 kg of biogenic carbon is equivalent to 44/12 kg of CO₂.

The following technical scenario information is required for the declared modules.

Transport to the building site (A4)

Module A4 considers 100 km by truck transport from the manufacturing plant in Germany (Bad-Salzuflen) to the construction site in the Europe.

Name	Value	Unit
Litres of fuel	0.02	l/100km
Transport distance	100	km
Capacity utilisation (including empty runs)	61	%

Installation into the building (A5)

The installation of the CRL (Arcade) is done manually with the help of electric tools (screw drivers). The energy consumption was estimated as 0,0072 MJ per m² installed.

The products are delivered as 'kits' to the installation site, the fixings (e.g. screws) required for installation are provided alongside the product. The production of the installation materials is therefore considered in module A1-A3.

Module A5 considers also the waste treatment and disposal of the packaging material. Benefits for potential avoided burdens due to energy substitution of electricity and thermal energy generation are declared in module D.

Name	Value	Unit
Electricity consumption	0.002	kWh
Output substances following waste treatment on site	0.64	kg

Packaging material:

Wood pallets: 0,48 kg/ D.U

Plastic foil: 0,16 kg/ D.U

Maintenance (B2)

Module B2 includes the cleaning of the PC panels (of the product). Rooflight are located on the roofs of buildings, and are cleaned once a year with water. Cleaning of 1 m² of panels is estimated to require 10 cl of water per cleaning.

Name	Value	Unit
Maintenance cycle	25	Number/RSL
Water consumption	0.0025	m ³

Reference service life

According to BBSR, a reference service life of 25 years can be assumed for roof light products. The use stage (module B2) is declared in this EPD for 25 years of usage.

Name	Value	Unit
Life Span (according to BBSR)	25	a

End of life (C1-C4)

The end-of-life scenarios are as follows:

- C1 - The deconstruction of the product is done manually with the help of tools (energy consumption of 0.0072 MJ).
- C2 - The transport to waste processing is assumed to be 50 km.
- C3/1 - Once dismantled, the metal parts of the roof light are recycled and the plastic parts are incinerated with energy recovery (R1 >0.6).
- C3/2 - The roof light follows the same end-of-life as scenario 1 but the PC panels are recycled instead of incinerated.

Name	Value	Unit
Collected separately waste type waste type	8.12	kg
Recycling (Scenario 1 - metals)	2.09	kg
Energy recovery (Scenario 1)	6.03	kg
Recycling (Scenario 2 - metals and PC panel)	7.16	kg
Energy recovery (Scenario 2)	0.96	kg

Reuse, recovery and/or recycling potentials (D)

Module D includes the potential benefits in form of energy recovery of the incineration process A5 (incineration of packaging wastes).

Additionally, module D declares the benefits from the energy recovery of the incineration of the product at its end of life as well as the materials credits generated from the recycling of the product at its end of life (metals and plastic).

LCA: Results

The following tables display the environmentally relevant results according to EN 15804+A2 (EF3.1) for 1 m² of Roof Light.

Scenario 1 (C3/1 and D/1): Metal parts of the roof light are recycled and the plastic parts are incinerated with energy recovery.

Scenario 2 (C3/2 and D/2): The roof light follows the same end-of-life as Scenario 1 but the PC panels are recycled instead of incinerated.

DESCRIPTION OF THE SYSTEM BOUNDARY (X = INCLUDED IN LCA; MND = MODULE OR INDICATOR NOT DECLARED; MNR = MODULE NOT RELEVANT)

Product stage			Construction process stage		Use stage							End of life stage				Benefits and loads beyond the system boundaries
Raw material supply	Transport	Manufacturing	Transport from the gate to the site	Assembly	Use	Maintenance	Repair	Replacement	Refurbishment	Operational energy use	Operational water use	De-construction demolition	Transport	Waste processing	Disposal	Reuse-Recovery-Recycling-potential
A1	A2	A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
X	X	X	X	X	MND	X	MNR	MNR	MNR	MND	MND	X	X	X	X	X

RESULTS OF THE LCA - ENVIRONMENTAL IMPACT according to EN 15804+A2: 1 m² CRL LB Plus (Arcade) Roof Light

Parameter	Unit	A1-A3	A4	A5	B2	C1	C2	C3/1	C3/2	C4/1	C4/2	D/1	D/2
GWP-total	kg CO ₂ eq	4.44E+01	4.23E-01	1.06E+00	3.04E-03	8.32E-04	3.41E-02	1.6E+01	2.58E+00	0	0	-2.09E+01	-3.39E+01
GWP-fossil	kg CO ₂ eq	4.5E+01	4.22E-01	4.15E-01	1.54E-03	8.32E-04	3.37E-02	1.6E+01	2.57E+00	0	0	-2.08E+01	-3.37E+01
GWP-biogenic	kg CO ₂ eq	-5.76E-01	4.88E-04	6.42E-01	1.5E-03	3.24E-07	7.72E-05	5.08E-04	5.6E-03	0	0	-5.47E-02	-1.74E-01
GWP-luluc	kg CO ₂ eq	1.76E-02	6.52E-04	3.05E-05	4.41E-07	7.72E-08	3.16E-04	1.42E-04	1.96E-04	0	0	-4.27E-03	-7.98E-03
ODP	kg CFC11 eq	1.18E-08	3.32E-14	1.52E-13	1.01E-14	8.3E-15	4.44E-15	1.93E-12	1.29E-11	0	0	-5.6E-11	-1.56E-10
AP	mol H ⁺ eq	2.01E-01	5.74E-03	1.61E-04	3.76E-06	1.29E-06	5.03E-05	1.67E-03	1.75E-03	0	0	-8.16E-02	-1E-01
EP-freshwater	kg P eq	7.07E-05	3.35E-07	4.85E-08	1.89E-06	8.34E-10	1.25E-07	5.27E-07	2.72E-06	0	0	-1.55E-05	-7.78E-05
EP-marine	kg N eq	4.06E-02	2.94E-03	4.57E-05	8.14E-06	3.62E-07	1.82E-05	4.46E-04	4.51E-04	0	0	-1.17E-02	-1.81E-02
EP-terrestrial	mol N eq	4.44E-01	3.23E-02	6.89E-04	1.15E-05	3.83E-06	2.16E-04	7.78E-03	5.1E-03	0	0	-1.27E-01	-1.97E-01
POCP	kg NMVOC eq	1.27E-01	7.96E-03	1.27E-04	2.89E-06	1E-06	4.41E-05	1.27E-03	1.23E-03	0	0	-3.57E-02	-5.8E-02
ADPE	kg Sb eq	2.97E-05	7.85E-09	1.5E-09	7.07E-11	4.09E-11	2.26E-09	1.74E-08	1.09E-07	0	0	-1.68E-05	-1.76E-05
ADPF	MJ	8.12E+02	5.26E+00	3.93E-01	1.65E-02	1.85E-02	4.65E-01	4.53E+00	1.6E+01	0	0	-2.99E+02	-6.44E+02
WDP	m ³ world eq deprived	5.78E+00	1.43E-03	1.1E-01	6.06E-04	7.09E-05	4.12E-04	1.37E+00	3.29E-01	0	0	-3.03E+00	-2.95E+00

GWP = Global warming potential; ODP = Depletion potential of the stratospheric ozone layer; AP = Acidification potential of land and water; EP = Eutrophication potential; POCP = Formation potential of tropospheric ozone photochemical oxidants; ADPE = Abiotic depletion potential for non-fossil resources; ADPF = Abiotic depletion potential for fossil resources; WDP = Water (user) deprivation potential

RESULTS OF THE LCA - INDICATORS TO DESCRIBE RESOURCE USE according to EN 15804+A2: 1 m² CRL LB Plus (Arcade) Roof Light

Parameter	Unit	A1-A3	A4	A5	B2	C1	C2	C3/1	C3/2	C4/1	C4/2	D/1	D/2
PERE	MJ	1.52E+02	8.79E-02	7.26E+00	6.44E-03	2.54E-03	3.38E-02	1.1E+00	8.61E+00	0	0	-1.2E+02	-1.62E+02
PERM	MJ	7.18E+00	0	-7.18E+00	0	0	0	0	0	0	0	0	0
PERT	MJ	1.59E+02	8.79E-02	8.87E-02	6.44E-03	2.54E-03	3.38E-02	1.1E+00	8.61E+00	0	0	-1.2E+02	-1.62E+02
PENRE	MJ	6.33E+02	5.27E+00	5.54E+00	1.65E-02	1.85E-02	4.67E-01	1.79E+02	1.9E+02	0	0	-2.99E+02	-6.45E+02
PENRM	MJ	1.79E+02	0	-5.15E+00	0	0	0	-1.74E+02	-1.74E+02	0	0	0	0
PENRT	MJ	8.13E+02	5.27E+00	3.93E-01	1.65E-02	1.85E-02	4.67E-01	4.53E+00	1.6E+01	0	0	-2.99E+02	-6.45E+02
SM	kg	3.81E-01	0	0	0	0	0	0	0	0	0	2.04E+00	6.86E+00
RSF	MJ	0	0	0	0	0	0	0	0	0	0	0	0
NRSF	MJ	0	0	0	0	0	0	0	0	0	0	0	0
FW	m ³	2.94E-01	1.01E-04	2.6E-03	1.68E-05	4.25E-06	3.71E-05	3.25E-02	1.11E-02	0	0	-2.54E-01	-2.98E-01

PERE = Use of renewable primary energy excluding renewable primary energy resources used as raw materials; PERM = Use of renewable primary energy resources used as raw materials; PERT = Total use of renewable primary energy resources; PENRE = Use of non-renewable primary energy excluding non-renewable primary energy resources used as raw materials; PENRM = Use of non-renewable primary energy resources used as raw materials; PENRT = Total use of non-renewable primary energy resources; SM = Use of secondary material; RSF = Use of renewable secondary fuels; NRSF = Use of non-renewable secondary fuels; FW = Use of net fresh water

RESULTS OF THE LCA - WASTE CATEGORIES AND OUTPUT FLOWS according to EN 15804+A2: 1 m² CRL LB Plus (Arcade) Roof Light

Parameter	Unit	A1-A3	A4	A5	B2	C1	C2	C3/1	C3/2	C4/1	C4/2	D/1	D/2
HWD	kg	1.06E-06	1.66E-11	6.3E-12	1.36E-13	1.07E-12	1.44E-12	5.26E-11	6.41E-11	0	0	1.82E-08	-6.81E-09
NHWD	kg	4.39E+00	5.4E-04	4.93E-02	2.9E-03	4.09E-06	7.11E-05	7.62E-01	7.14E-01	0	0	-4.3E+00	-4.48E+00

RWD	kg	2.78E-02	6.86E-06	1.86E-05	1.48E-06	2.89E-06	8.73E-07	1.88E-04	2.2E-03	0	0	-1.92E-02	-1.95E-02
CRU	kg	0	0	0	0	0	0	0	0	0	0	0	0
MFR	kg	3.6E-01	0	0	0	0	0	2.09E+00	7.16E+00	0	0	0	0
MER	kg	0	0	0	0	0	0	0	0	0	0	0	0
EEE	MJ	0	0	1.64E+00	0	0	0	2.53E+01	2.65E+00	0	0	0	0
EET	MJ	0	0	2.94E+00	0	0	0	4.53E+01	4.8E+00	0	0	0	0

HWD = Hazardous waste disposed; NHWD = Non-hazardous waste disposed; RWD = Radioactive waste disposed; CRU = Components for re-use; MFR = Materials for recycling; MER = Materials for energy recovery; EEE = Exported electrical energy; EET = Exported thermal energy

RESULTS OF THE LCA – additional impact categories according to EN 15804+A2-optional: 1 m² CRL LB Plus (Arcade) Roof Light

Parameter	Unit	A1-A3	A4	A5	B2	C1	C2	C3/1	C3/2	C4/1	C4/2	D/1	D/2
PM	Disease incidence	2.43E-06	1.75E-07	1.36E-09	4.16E-11	1.16E-11	4.34E-10	1.55E-08	1.98E-08	0	0	-9.2E-07	-1.07E-06
IR	kBq U235 eq	5.05E+00	9.92E-04	2.81E-03	2.38E-04	4.34E-04	1.3E-04	2.75E-02	3.63E-01	0	0	-3.7E+00	-3.33E+00
ETP-fw	CTUe	9.93E+02	3.72E+00	2.09E-01	7.01E-02	1.61E-03	3.33E-01	2.66E+00	5.66E+00	0	0	-7.28E+01	-7.32E+02
HTP-c	CTUh	3.31E-07	6.93E-11	1.37E-11	8.76E-12	9.58E-14	6.76E-12	1.51E-10	2.7E-10	0	0	-1.1E-08	-1.57E-08
HTP-nc	CTUh	3.44E-07	2.39E-09	9.19E-10	8.7E-10	3.08E-12	3.01E-10	6.76E-09	9.13E-09	0	0	-1.95E-07	-4.07E-07
SQP	SQP	1.74E+02	4.11E-01	1.08E-01	4.81E-03	2.51E-03	1.94E-01	1.16E+00	5.82E+00	0	0	-2.7E+01	-5.88E+01

PM = Potential incidence of disease due to PM emissions; IR = Potential Human exposure efficiency relative to U235; ETP-fw = Potential comparative Toxic Unit for ecosystems; HTP-c = Potential comparative Toxic Unit for humans (cancerogenic); HTP-nc = Potential comparative Toxic Unit for humans (not cancerogenic); SQP = Potential soil quality index

Disclaimer 1 – for the indicator “Potential Human exposure efficiency relative to U235”. This impact category deals mainly with the eventual impact of low-dose ionizing radiation on human health of the nuclear fuel cycle. It does not consider effects due to possible nuclear accidents, occupational exposure or radioactive waste disposal in underground facilities. Potential ionizing radiation from the soil, radon and from some construction materials is also not measured by this indicator.

Disclaimer 2 – for the indicators “abiotic depletion potential for non-fossil resources”, “abiotic depletion potential for fossil resources”, “water (user) deprivation potential, deprivation-weighted water consumption”, “potential comparative toxic unit for ecosystems”, “potential comparative toxic unit for humans – cancerogenic”, “Potential comparative toxic unit for humans - not cancerogenic”, “potential soil quality index”. The results of this environmental impact indicator shall be used with care as the uncertainties on these results are high as there is limited experience with the indicator.

References

Standards

BBSR

Federal Office for Building and Regional Planning

CPR

EU Construction Products Regulation 305/2011

EN 15804

EN 15804:2012+A2:2019+AC:2021, Sustainability of construction works — Environmental Product Declarations — Core rules for the product category of construction products.

ISO 14025

EN ISO 14025:2011, Environmental labels and declarations — Type III environmental declarations — Principles and procedures.

Further References

IBU 2021

Institut Bauen und Umwelt e.V.: General Instructions for the EPD programme of Institut Bauen und Umwelt e.V., Version 2.0, Berlin: Institut Bauen und Umwelt e.V., 2021 www.ibu-epd.com

LCA FE

LCA for Expert Software System and Database for Life Cycle Engineering, 1992-2021, Sphera Solutions GmbH, Leinfelden-Echterdingen, with acknowledgement of LBP University of Stuttgart, program version GaBi 10; database version 2023.1 (CUP 2023.1).

LCA FE documentation

LCA FE dataset documentation for the software system and databases, LBP, University of Stuttgart and Sphera Solutions GmbH, Leinfelden-Echterdingen, 2021. ([http://www.gabi-software.com/support/gabi/gabi\[1\]database_2021-lci-documentation/](http://www.gabi-software.com/support/gabi/gabi[1]database_2021-lci-documentation/))

PCR Part A

PCR - Part A: Calculation rules for the Life Cycle Assessment and Requirements on the Background Report, version 1.3, Institut Bauen und Umwelt e.V., www.bau-umwelt.com, 2023

PCR Part B

Part B: Requirements on the EPD for Windows and Doors (08.2021)

REACH

Regulation (EC) No 1907/2006 concerning the Registration, Evaluation, Authorisation and Restriction of Chemicals (REACH)



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