

Environmental Product Declaration (EPD)



Declaration code: EPD-EG-GB-11.2



LAMILUX Heinrich
Strunz GmbH

Glass elements

Glass Skylight FE, Glass Skylight F100, Glass Skylight FE Passive House and Smoke Lift ME



Basis:

DIN EN ISO 14025
EN15804

Company-EPD
Environmental
Product Declaration

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13.05.2024





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Programme operator	ift Rosenheim GmbH Theodor-Gietl-Straße 7-9 83026 Rosenheim		
Practitioner of the LCA	brands & values GmbH Vagtstr. 48/49 28203 Bremen		
Declaration holder	LAMILUX Heinrich Strunz GmbH Zehstraße 2 95111 Rehau		
Declaration code	EPD-EG-GB-11.2		
Designation of the declared product	LAMILUX Glass Skylight FE, Glass Skylight F100, Glass Skylight FE Passive House and Smoke Lift ME		
Scope	Daylight systems for increased daylight incidence and natural ventilation and extraction		
Basis	This company EPD was prepared on the basis of EN ISO 14025:2011 and EN 15804:2012+A1:2013. In addition, the "Allgemeiner Leitfaden zur Erstellung von Typ II Umweltproduktdeklarationen" (General guideline for elaboration of Type III Environmental Product Declarations) applies. The Declaration is based on the PCR Documents PCR-A-0.1:2018 und „Fenster, Flachdachfenster, Lichtkuppeln und Lichtbänder“ (windows, flat roof windows, light domes and continuous rooflights) PCR-FE-2.1:2018.		
Validity	Publication date: 13.05.2019	Last revision: 13.05.2019	Next revision: 13.05.2024
	This verified company Environmental Product Declaration applies solely to the specified products and is valid for a period of 5 years from the date of publication in accordance with DIN EN 15804.		
LCA basis	The LCA was prepared in accordance with EN ISO 14040 and DIN EN ISO 14044. The base data include both data collected the LAMILUX Heinrich Strunz GmbH production site and the generic data derived from the "GaBi 8.6 ts" database. LCA calculations were based on the "cradle to gate with options" life cycle including all upstream processes (e.g. raw materials extraction, etc.).		
Notes on publication	The "Conditions and Guidance on the Use of ift Test Documents" apply. The declaration holder assumes full liability for the underlying data, certificates and verifications.		
			
Prof. Ulrich Sieberath Director of institute	Dr.-Ing. Carolin Roth External verifier		

1 General product information

Product definition

This EPD relates to the product group Glass elements and applies to:

1 m² Glass Skylight FE, Glass Skylight F100, Glass Skylight FE Passive House and Smoke Lift ME of the company LAMILUX Heinrich Strunz GmbH

The functional unit is declared as follows:

Considered product	Functional unit (FU)	Weight per FU
Glass skylight F100	1,20m x 1,20m (1,44m ²)	72,1 kg
Glass skylight FE Passive house	1,20m x 1,20m (1,44m ²)	139,2 kg
Glass skylight FE	1,20m x 1,20m (1,44m ²)	86,0 kg
Smoke lift ME	1,20m x 1,20m (1,44m ²)	103,3 kg

The average unit is declared as follows:

Directly used material flows are determined using average size (1,44 m²) and assigned to the declared unit. All other inputs and outputs in the manufacturing process were scaled to the declared unit as a whole, since no direct assignment to the average size is possible.

Product description

Different individual elements made of real glass for flat roofs. There are flat glasses, pitched, pyramid-shaped or hipped roof daylight systems.

Glass Skylight FE

- Up to triple glazing
- Thermal break aluminium profile with optimized insulating core
- Thermally insulated upstand made of fibre-reinforced plastics

Glass Skylight F100

- Insulating glazing
- PVC frame profile
- Thermal break aluminium profile with optimized insulating core

Glass Skylight FE Passive House

- Triple insulation glazing
- Thermal break aluminium profile with optimized insulating core
- Thermally insulated upstand made of fibre-reinforced plastics with triple multistage sealing system
- Suitable for Passivhaus applications



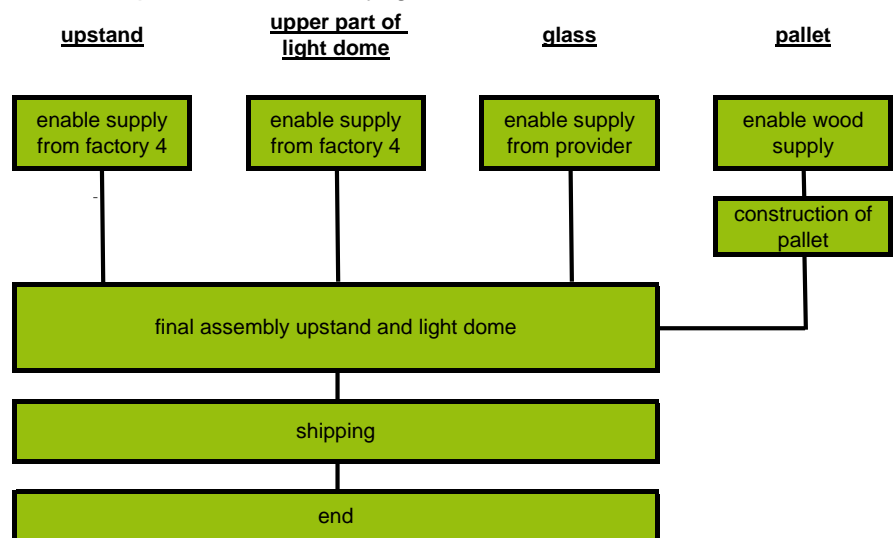
Smoke Lift ME

- Insulation glazing
- Continuously insulated upstand made of fibre reinforced plastics
- Suitable for use with SHEV and ventilation systems
- Opening width up to 60°

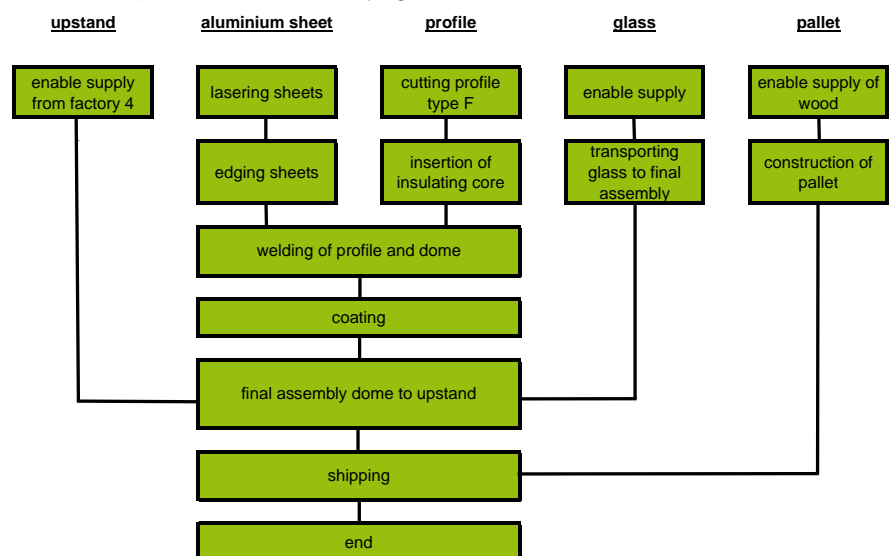
For detailed and binding product descriptions and performance specifications of Glass Skylight FE, Glass Skylight F100, Glass Skylight FE Passive House and Smoke Lift ME refer to the manufacturer specifications at www.lamilux.de or product descriptions of the respective product.

Product manufacture

Production process Glass Skylight F100

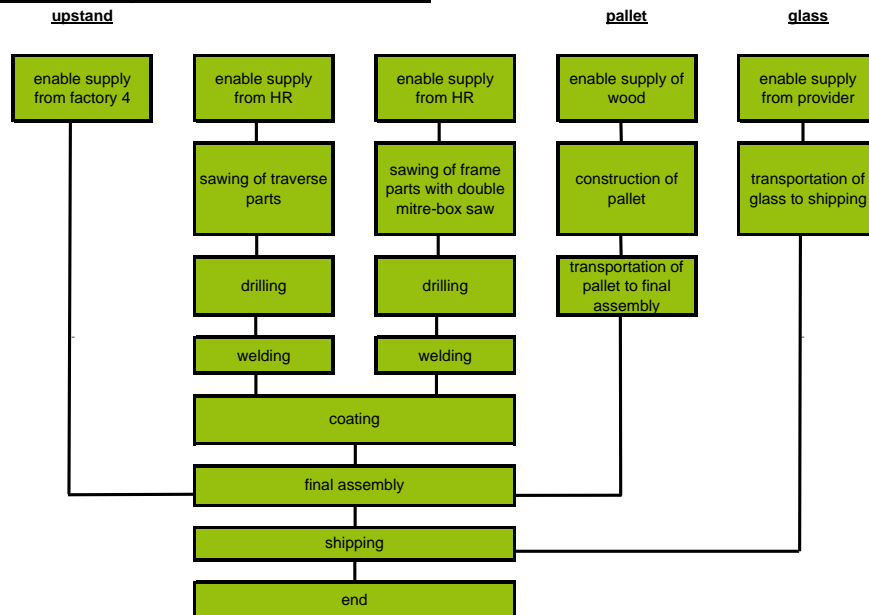


Production process Glass Skylight FE and FE Passive House





Production process Smoke Lift ME



Application

Daylight systems for increased daylight incidence and natural ventilation and extraction.

Verifications

The following verifications are held:

- Product quality as per DIN EN 14351-1
- Product quality as per DIN EN 12101-2
- FE Passive house holds a passive house verification

Management systems

The following management systems are in place:

- Quality management system as per DIN EN ISO 9001:2015
- Energy Management System as per DIN EN ISO 50001:2011

Additional information

For detailed structural characteristics refer to the CE marking and documents accompanying the product.

2 Materials used

Primary products

The primary products used are listed in the LCA (see Section 7).

Declarable substances

In accordance with the REACH candidate list, no substances of very high concern are contained (declaration of 15. April 2019).

All safety data sheets are available on request from LAMILUX Heinrich Strunz GmbH.

3 Construction process stage

Processing recommendations, installation

The instructions for installation, operation, maintenance and disassembly must be noted. See www.lamilux.de for more information.



4 Use stage

Emissions to the environment

There are no known emissions to indoor air, water and soil. VOC emissions may occur.

Reference service life (RSL)

RSL information to be declared in an EPD covering the use stage shall be provided by the manufacturer. The RSL shall refer to the declared technical and functional performance of the product within a building. It shall be established in accordance with any specific rules given in European product standards and shall take into account ISO 15686-1, -2, -7 and -8. Where European product standards provide guidance on deriving the RSL, such guidance shall have priority.

If the reference service life can't be determined according to ISO 15686, the BBSR table „Nutzungsdauern von Bauteilen zur Lebenszyklusanalyse nach BNB“ can be used. For further information visit www.nachhaltigesbauen.de

Relevant for this EPD is:

The service life of Glass Skylight FE, Glass Skylight F100, Glass Skylight FE Passive House and Smoke Lift ME is optionally specified at 50 years according to BBSR table.

The reference service life depends on the characteristics of the product and the reference terms of use. The features described in the EPD are applied, in particular the following:

- Outdoor conditions: Weather conditions can have a negative effect on the service life.
- Indoor conditions: There are no known impacts that have a negative effect on the service life.

The reference service life is for the features, which are reported in this EPD or the relevant references for this purpose.

The RSL does not reflect the actual life time, which is usually determined by the service life and the redevelopment of a building. It represents no statement about service life, guarantee of performance or promise of guarantee.

5 End of life stage

Possible end of life stages

Glass Skylight FE, Glass Skylight F100, Glass Skylight FE Passive House and Smoke Lift ME are shipped to the central collection points. There they are generally shredded and separated. Certain Parts of aluminum, steel, plastic and glass are recycled. Residual fractions are deposited or partly thermally recycled.

The end-of-life stage depends on the site where the products are used and is therefore subject to local regulations. Observe the locally applicable regulatory requirements.

Disposal methods

The average disposal routes were taken into account in the LCA.



All life cycle scenarios are described detailed in the Annex.

6 Life Cycle Assessment (LCA)

Environmental product declarations are based on life cycle analyses (LCAs) which use material and energy flows for the calculation and subsequent representation of environmental impacts.

As the basis for this, an LCA was prepared for Glass Skylight FE, Glass Skylight F100, Glass Skylight FE Passive House and Smoke Lift ME. The LCA was developed in accordance with EN 15804 and the requirements set out by the international standards DIN EN ISO 14040, DIN EN ISO 14044, ISO 21930 and EN ISO 14025.

The LCA is representative of the products presented in the declaration and the specified reference period.

6.1 Definition of goal and scope

Goal

The goal of the LCA is to demonstrate the environmental impacts of Glass Skylight FE, Glass Skylight F100, Glass Skylight FE Passive House and Smoke Lift ME. In accordance with EN 15804, the environmental impacts covered by this Environmental Product Declaration are presented for the entire product life cycle in the form of basic information. Apart from these, no other environmental impacts have been specified.

Data quality, data availability, and geographical and time-related system boundaries

The specific data originate exclusively from the fiscal year 2012. 2018, the data has been verified to its actuality. These were recorded at the plant in Rehau by on-site collection and originate partly from company records and partly from values directly obtained by measurement.

The generic data originates from the "Professional Datenbank" and "Baustoff Datenbank" (professional database and building materials database) from the software "GaBi 8.6", as well as ecoinvent database (v2.2). The last update of both databases was in 2018. Data from before this date originate also from these databases and are not more than 10 years old. No other generic data were used for the calculation.

Data gaps were either filled with comparable data or conservative assumptions, or the data were cut off in compliance with the 1 % rule.

The life cycle was modelled using the sustainability software tool "GaBi 8.6" for the development of Life Cycle Assessments.

Scope / System boundaries

The system boundaries refer to the supply of raw materials and purchased parts, the manufacture, the use and the end-of-life stage of Glass Skylight FE, Glass Skylight F100, Glass Skylight FE Passive House and Smoke Lift ME (cradle to gate with options). No additional data from pre-suppliers / subcontractors or other sites were taken into consideration.

Specific data for smoke and heat exhaust ventilation systems can be found in the EPD „Electrical drives and pneumatic cylinders for SHEV and ventilation systems” and “Electrical control units and pneumatic valves / alert stations for SHEV and ventilation systems” for the „Verband Fensterautomation und Entrauchung e.V. (VFE). These construction parts have not been considered in this EPD.

Cut-off criteria

All company data collected, i.e. all input and output materials used, the thermal energy, the electricity consumption were taken into consideration.

The boundaries cover only the production-relevant data. Building sections / parts of facilities that are not relevant to the manufacture of the products were excluded.

The transport distances of the pre-products were taken into consideration. Delivery distances were multiplied with the percental part of transported masses. This shows an average transportation distance.

Considered Product	Mass (kg)	Distance (km)
Glass skylight FE	140,1	170,6
Glass skylight F100	123,9	134,8
Glass skylight FE Passive house	195,0	215,7
Smoke lift ME	157,3	178,2

The criteria for the exclusion of inputs and outputs as set out in EN 15804 are fulfilled. It can be assumed that the total negligible processes per life cycle stage doesn't exceed 1 per cent of the mass or the primary energy. This way the total of negligible processes does not exceed 5 per cent of the energy and mass input. The life cycle calculation also includes material and energy flows that account for less than 1 per cent.

6.2 Inventory analysis

Goal

All material and energy flows are described below. The processes covered are presented as input and output parameters and refer to the declared / functional units.

Life Cycle stages

The Annex shows the entire life cycle of Glass Skylight FE, Glass Skylight F100, Glass Skylight FE Passive House and Smoke Lift ME. Product stage “A1 – A3”, construction stage “A4 – A5”, use stage “B2 and B3”, end-of-life stage “C2 – C4” and benefits and loads beyond the system boundaries “D” are considered.

Benefits

The below benefits have been defined as per EN 15804:

- Benefits from recycling
- Benefits from (thermal and electric) incineration



Product group: Glass elements

Allocation of co-products

Waste materials, that are generated in the production process (i.e. steel, aluminium, plastics) are treated as co-products, as a market for these secondary raw materials exists. Inputs for these co-products are treated as an economical allocation (energy) or a physical allocation (use of material).

Allocations for reuse, recycling and recovery

If Glass Skylight FE, Glass Skylight F100, Glass Skylight FE Passive House and Smoke Lift ME are reused / recycled during product stage (rejects), the elements are shredded, as necessary, and then sorted into original pure components. This is done by various process plants such as magnetic separators. The system boundaries for the Glass Skylight FE, Glass Skylight F100, Glass Skylight FE Passive House and Smoke Lift ME were set following their disposal, with termination of their waste characteristics.

Allocations beyond life cycle boundaries

The use of recycled materials in the product stage is based on the current market-specific situation. In parallel to this, a recycling potential was taken into consideration that reflects the economic value of the product after processing (recyclate). The system boundary of the recycled material was set during collection.

Secondary material

The use of secondary materials in the module A3 by company LAMILUX Heinrich Strunz GmbH was not considered. Secondary material is not used.

Inputs

The LCA includes the following production relevant inputs:

Energy:

The electricity mix is based on „Strommix Deutschland“ (German electricity mix). Gas is based on „Erdgas Deutschland“ (German natural gas). In addition, solar electricity produced by company LAMILUX Heinrich Strunz GmbH photovoltaic system has been considered as follows:

Production hall	Electricity from photovoltaic system
Production upstand	0,0%
Production real glass dome	4,3 %
Production glass architecture / continuous rooflights	2,4 %

Water:

No water is consumed by the individual process steps for the manufacture of the Glass Skylight FE, Glass Skylight F100, Glass Skylight FE Passive House and Smoke Lift ME.

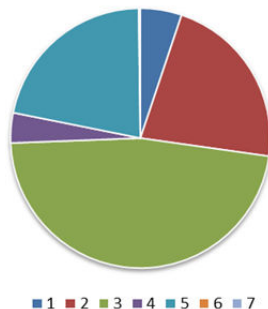
The consumption of fresh water specified in Section 6.3 originates (among others) from the upstream processes of the pre-products.



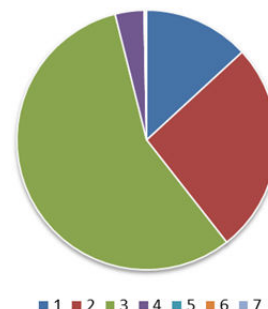
Raw material / Pre-products:

The chart below shows the use of raw materials / pre-products per cent.

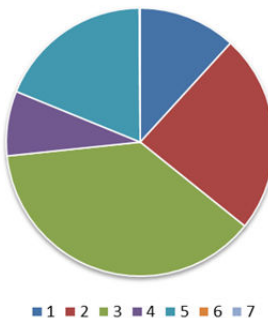
Glass Skylight FE (PG1)



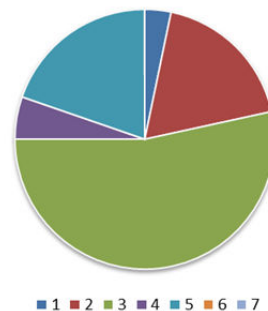
Glass Skylight F100 (PG2)



Glass skylight FE Passive House (PG3)



Smoke Lift ME (PG4)



No.	Material	Mass in %			
		PG1	PG2	PG3	PG4
1	Plastics	5,1	13,2	11,8	3,3
2	GFRP	22,0	26,3	24,0	18,3
3	Glass	47,3	56,7	37,6	53,4
4	(Stainless) Steel	3,7	3,6	7,8	5,3
5	Aluminium	21,6	0,0	18,7	19,7
6	Other metals	0,2	0,2	0,1	<0,1
7	Wood	0,0	0,1	0,0	0,0

Operating supplies

The only relevant operating supply is gas for forklifts.

Product package

The following quantities of product package accumulate:

No.	Material	Mass in kg per FU			
		PG1	PG2	PG3	PG4
1	Wood	32,0	32,0	33,0	32,0
2	Steel	0,1	0,1	0,1	0,1
3	Plastics	0,2	0,2	0,4	0,2

**Outputs**

Following outputs have been balanced per m² Glass Skylight FE, Glass Skylight F100, Glass Skylight FE Passive House and Smoke Lift ME:

Waste

Secondary raw materials were considered in the benefits. See section 6.3 Impact assessment.

Waste water

The manufacturer of Glass Skylight FE, Glass Skylight F100, Glass Skylight FE Passive House and Smoke Lift ME produces no waste water per 1 m².

6.3 Impact assessment**Goal**

Impact assessment covers inputs and outputs. The impact categories applied are named below:

Impact categories

The models for impact assessment were applied as described in EN 15804-A1. The impact categories presented in the EPD are as follows:

- Depletion of abiotic resources (fossil fuels);
- Depletion of abiotic resources (elements);
- Acidification of soil and water;
- Ozone depletion;
- Global warming;
- Eutrophication;
- Photochemical ozone creation.

Waste

The waste generated during the production of 1 m² Glass Skylight FE, Glass Skylight F100, Glass Skylight FE Passive House and Smoke Lift ME is evaluated and shown separately for each of the three main fractions, namely trade wastes, special wastes and radioactive wastes. Since waste handling is modelled within the system boundaries, the amounts shown refer to the deposited wastes. A portion of the waste indicated is generated during the manufacture of the pre-products.

Date of issue: 13.05.2019

Results per m ² Glass Skylight FE										
Environmental impacts	unit	A1-A3	A4	A5	B2	B3	C2	C3	C4	D
Global warming potential	kg CO ₂ -equiv.	226,00	8,54	58,40	0,39	6,36	0,15	15,10	0,21	-148,00
Depletion potential of stratospheric ozone layer	kg R11-equiv.	4,64E-07	1,80E-13	5,97E-13	1,50E-11	6,33E-08	3,08E-15	1,69E-07	7,37E-12	-1,88E-07
Acidification potential of soil and water	kg SO ₂ -equiv.	1,08	3,59E-02	7,31E-03	8,31E-04	2,21E-02	5,89E-04	1,51E-02	6,67E-04	-0,64
Eutrophication potential	kg PO ₄ ³⁻ -equiv.	0,11	9,15E-03	1,94E-03	1,44E-04	1,11E-03	1,49E-04	8,77E-03	3,64E-04	-5,35E-02
Formation potential of tropospheric ozone	kg C ₂ H ₄ -equiv.	7,58E-02	-1,38E-02	1,73E-03	1,08E-04	1,88E-03	-2,24E-04	9,79E-04	7,03E-05	-3,74E-02
Depletion of abiotic resources (ADP elements)	kg Sb-equiv.	1,72E-03	8,91E-07	7,53E-07	7,96E-08	2,28E-04	1,52E-08	9,10E-06	4,82E-08	-4,27E-04
Depletion of abiotic resources (ADP fossil fuels)	MJ	3810,00	115,00	14,30	15,90	98,70	1,97	33,00	2,56	-1770,00
Use of resources	unit	A1-A3	A4	A5	B2	B3	C2	C3	C4	D
Renewable primary energy as energy source	MJ	596,00	7,76	650,00	0,24	5,53	0,13	3,98	0,23	-483,00
Renewable primary energy for material use	MJ	648,00	0,00	-648,00	0,00	0,00	0,00	0,00	0,00	0,00
Total use of renewable primary energy	MJ	1240,00	7,76	2,48	0,24	5,53	0,13	3,98	0,23	-483,00
Non-renewable primary energy as energy source	MJ	3720,00	115,00	23,60	16,10	106,00	1,97	539,00	2,65	-2140,00
Non-renewable primary energy for material use	MJ	584,00	0,00	-8,00	0,00	0,00	0,00	627,00	0,00	0,00
Total use of non-renewable primary energy	MJ	4310,00	115,00	15,60	16,10	106,00	1,97	-576,00	2,65	-2140,00
Use of secondary materials	kg	0,00	0,00	0,00	0,00	0,00	0,00	50,90	0,00	-37,20
Renewable secondary fuels	MJ	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00
Non-renewable secondary fuels	MJ	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00
Use of fresh water resources	m ³	5,32	9,00E-03	0,128	7,07E-04	3,91E-02	1,54E-04	18,40	-1,10E-04	-1,03
Waste categories and output material flows	unit	A1-A3	A4	A5	B2	B3	C2	C3	C4	D
Disposed hazardous waste	kg	4,81E-04	7,39E-06	2,42E-08	4,98E-03	8,12E-06	1,26E-07	4,94E-07	1,88E-08	-3,95E-06
Disposed non-hazardous waste	kg	34,70	8,60E-03	2,07	1,01E-02	0,67	1,47E-04	0,20	5,33	-24,70
Radioactive waste	kg	0,20	1,39E-04	5,18E-04	6,09E-05	2,64E-03	2,38E-06	1,60E-04	3,82E-05	-0,15
Components for further use	kg	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00
Materials for recycling	kg	0,00	0,00	0,00	0,00	0,00	0,00	41,80	0,00	0,00
Materials for energy recovery	kg	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00
Exported electrical energy	MJ	0,00	0,00	64,80	0,00	0,00	0,00	19,90	0,00	0,00
Exported thermal energy	MJ	0,00	0,00	152,00	0,00	0,00	0,00	42,40	0,00	0,00

Results per m ² Glass Skylight F100										
Environmental impacts	unit	A1-A3	A4	A5	B2	B3	C2	C3	C4	D
Global warming potential	kg CO ₂ -equiv.	74,40	7,64	58,40	0,32	6,36	0,20	37,60	7,95E-02	-59,00
Depletion potential of stratospheric ozone layer	kg R11-equiv.	2,79E-07	1,61E-13	5,98E-13	1,26E-11	6,33E-08	4,28E-15	1,48E-07	6,15E-12	-1,86E-07
Acidification potential of soil and water	kg SO ₂ -equiv.	0,37	3,22E-02	7,32E-03	6,97E-04	2,21E-02	8,16E-04	4,65E-02	3,20E-04	-0,29
Eutrophication potential	kg PO ₄ ³⁻ -equiv.	5,79E-02	8,19E-03	1,95E-03	1,20E-04	1,11E-03	2,07E-04	7,75E-03	4,46E-05	-3,09E-02
Formation potential of tropospheric ozone	kg C ₂ H ₄ -equiv.	3,66E-02	-1,23E-02	1,73E-03	9,05E-05	1,88E-03	-3,11E-04	1,02E-03	3,19E-05	-1,73E-02
Depletion of abiotic resources (ADP elements)	kg Sb-equiv.	1,15E-03	7,97E-07	7,54E-07	6,68E-08	2,28E-04	2,11E-08	9,05E-06	2,06E-08	-1,48E-04
Depletion of abiotic resources (ADP fossil fuels)	MJ	2210,00	103,00	14,40	13,40	98,70	2,73	35,90	0,74	-843,00
Use of resources	unit	A1-A3	A4	A5	B2	B3	C2	C3	C4	D
Renewable primary energy as energy source	MJ	106,00	6,95	651,00	0,20	5,53	0,18	4,61	8,65E-02	-103,00
Renewable primary energy for material use	MJ	649,00	0,00	-649,00	0,00	0,00	0,00	0,00	0,00	0,00
Total use of renewable primary energy	MJ	755,00	6,95	2,48	0,20	5,53	0,18	4,61	8,65E-02	-103,00
Non-renewable primary energy as energy source	MJ	1750,00	103,00	23,70	13,50	106,00	2,73	644,00	0,77	-966,00
Non-renewable primary energy for material use	MJ	600,00	0,00	-8,00	0,00	0,00	0,00	-592,00	0,00	0,00
Total use of non-renewable primary energy	MJ	2350,00	103,00	15,70	13,50	106,00	2,73	52,20	0,77	-966,00
Use of secondary materials	kg	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	-25,30
Renewable secondary fuels	MJ	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00
Non-renewable secondary fuels	MJ	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00
Use of fresh water resources	m ³	3,55	8,06E-03	0,13	5,93E-04	3,92E-02	2,13E-04	15,50	-6,95E-05	-0,19
Waste categories and output material flows	unit	A1-A3	A4	A5	B2	B3	C2	C3	C4	D
Disposed hazardous waste	kg	7,81E-06	6,62E-06	2,43E-08	4,17E-03	8,12E-06	1,75E-07	3,92E-06	1,07E-08	-2,99E-07
Disposed non-hazardous waste	kg	4,80	7,70E-03	2,09	8,46E-03	0,67	2,04E-04	1,52	3,40	-0,86
Radioactive waste	kg	5,44E-02	1,25E-04	5,18E-04	5,11E-05	2,64E-03	3,30E-06	6,07E-04	1,14E-05	-4,92E-02
Components for further use	kg	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00
Materials for recycling	kg	0,00	0,00	0,00	0,00	0,00	0,00	29,9	0,00	0,00
Materials for energy recovery	kg	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00
Exported electrical energy	MJ	0,00	0,00	64,80	0,00	0,00	0,00	52,6	0,00	0,00
Exported thermal energy	MJ	0,00	0,00	152,00	0,00	0,00	0,00	125,0	0,00	0,00

Results per m ² Glass Skylight FE Passive House										
Environmental impacts	unit	A1-A3	A4	A5	B2	B3	C2	C3	C4	D
Global warming potential	kg CO ₂ -equiv.	373,00	12,00	59,90	0,62	9,19	0,26	30,00	0,39	-243,00
Depletion potential of stratospheric ozone layer	kg R11-equiv.	7,78E-07	2,54E-13	6,14E-13	2,43E-11	6,42E-08	4,99E-15	2,75E-07	1,19E-11	-2,43E-07
Acidification potential of soil and water	kg SO ₂ -equiv.	1,59	5,07E-02	7,52E-03	1,35E-03	2,75E-02	9,53E-04	2,63E-02	1,18E-03	-1,02
Eutrophication potential	kg PO ₄ ³⁻ -equiv.	0,16	1,29E-02	2,00E-03	2,32E-04	1,77E-03	2,42E-04	1,41E-02	7,44E-04	-8,18E-02
Formation potential of tropospheric ozone	kg C ₂ H ₄ -equiv.	0,12	-1,95E-02	1,78E-03	1,75E-04	2,49E-03	-3,63E-04	1,62E-03	1,27E-04	-5,91E-02
Depletion of abiotic resources (ADP elements)	kg Sb-equiv.	2,46E-03	1,26E-06	7,75E-07	1,29E-07	2,46E-04	2,47E-08	1,67E-05	8,76E-08	-3,65E-04
Depletion of abiotic resources (ADP fossil fuels)	MJ	6040,00	162,00	14,80	25,80	136,00	3,18	58,20	4,96	-2860,00
Use of resources	unit	A1-A3	A4	A5	B2	B3	C2	C3	C4	D
Renewable primary energy as energy source	MJ	1030,00	11,00	668,00	0,39	7,46	0,22	7,43	0,42	-851,00
Renewable primary energy for material use	MJ	665,00	0,00	-665,00	0,00	0,00	0,00	0,00	0,00	0,00
Total use of renewable primary energy	MJ	1690,00	11,00	2,55	0,39	7,46	0,22	7,43	0,42	-851,00
Non-renewable primary energy as energy source	MJ	5590,00	163,00	21,10	26,10	145,00	3,19	1320,00	5,14	-3490,00
Non-renewable primary energy for material use	MJ	1240,00	0,00	-5,00	0,00	0,00	0,00	-1230,00	0,00	0,00
Total use of non-renewable primary energy	MJ	6820,00	163,00	16,10	26,10	145,00	3,19	87,90	5,14	-3490,00
Use of secondary materials	kg	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	53,10
Renewable secondary fuels	MJ	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00
Non-renewable secondary fuels	MJ	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00
Use of fresh water resources	m ³	9,44	1,27E-02	0,13	1,14E-03	5,20E-02	2,49E-04	29,80	-2,18E-04	-1,81
Waste categories and output material flows	unit	A1-A3	A4	A5	B2	B3	C2	C3	C4	D
Disposed hazardous waste	kg	6,72E-04	1,04E-05	2,50E-08	8,06E-03	1,18E-05	2,05E-07	3,13E-06	3,17E-08	-2,86E-06
Disposed non-hazardous waste	kg	49,3	1,21E-02	2,14	1,63E-02	3,38	3,38E-04	1,78	8,76	-44,80
Radioactive waste	kg	0,31	1,96E-04	5,33E-04	9,86E-05	3,48E-03	3,86E-06	5,40E-04	7,38E-05	-0,25
Components for further use	kg	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00
Materials for recycling	kg	0,00	0,00	0,00	0,00	0,00	0,00	64,10	0,00	0,00
Materials for energy recovery	kg	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00
Exported electrical energy	MJ	0,00	0,00	66,40	0,00	0,00	0,00	38,90	0,00	0,00
Exported thermal energy	MJ	0,00	0,00	156,00	0,00	0,00	0,00	92,80	0,00	0,00

Date of issue: 13.05.2019

Results per m ² Smoke Lift ME										
Environmental impacts	unit	A1-A3	A4	A5	B2	B3	C2	C3	C4	D
Global warming potential	kg CO ₂ -equiv.	267,00	9,64	58,10	0,46	6,36	0,26	19,40	0,18	-183,00
Depletion potential of stratospheric ozone layer	kg R11-equiv.	3,36E-07	2,04E-13	5,95E-13	1,80E-11	6,33E-08	5,39E-15	2,02E-07	4,63E-14	-2,51E-07
Acidification potential of soil and water	kg SO ₂ -equiv.	1,25	4,06E-02	7,28E-03	9,99E-04	2,21E-02	1,03E-03	1,88E-02	6,89E-04	-0,79
Eutrophication potential	kg PO ₄ ³⁻ -equiv.	0,13	1,03E-02	1,94E-03	1,73E-04	1,11E-03	2,61E-04	1,05E-02	3,54E-04	-6,72E-02
Formation potential of tropospheric ozone	kg C ₂ H ₄ -equiv.	8,84E-02	-1,56E-02	1,72E-03	1,30E-04	1,88E-03	-3,92E-04	1,18E-03	6,33E-05	-4,60E-02
Depletion of abiotic resources (ADP elements)	kg Sb-equiv.	1,81E-03	1,01E-06	7,50E-07	9,57E-08	2,28E-04	2,66E-08	1,17E-05	4,96E-08	-2,34E-04
Depletion of abiotic resources (ADP fossil fuels)	MJ	4200,00	130,00	14,30	19,20	98,70	3,43	41,00	2,54	-2240,00
Use of resources	unit	A1-A3	A4	A5	B2	B3	C2	C3	C4	D
Renewable primary energy as energy source	MJ	639,00	8,77	651,00	0,29	5,53	0,23	5,17	0,24	-544,00
Renewable primary energy for material use	MJ	648,00	0,00	-648,00	0,00	0,00	0,00	0,00	0,00	0,00
Total use of renewable primary energy	MJ	1290,00	8,77	2,47	0,29	5,53	0,23	5,17	0,24	-544,00
Non-renewable primary energy as energy source	MJ	4180,00	130,00	22,80	19,30	106,00	3,45	615,00	2,63	-2640,00
Non-renewable primary energy for material use	MJ	559,00	0,00	-7,20	0,00	0,00	0,00	-552,00	0,00	0,00
Total use of non-renewable primary energy	MJ	4740,00	130,00	15,60	19,30	106,00	3,45	62,80	2,63	-2640,00
Use of secondary materials	kg	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	-47,80
Renewable secondary fuels	MJ	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00
Non-renewable secondary fuels	MJ	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00
Use of fresh water resources	m ³	5,61	1,02E-02	0,13	8,49E-04	3,92E-02	2,69E-04	22,10	1,50E-04	-1,21
Waste categories and output material flows	unit	A1-A3	A4	A5	B2	B3	C2	C3	C4	D
Disposed hazardous waste	kg	5,54E-04	8,35E-06	2,42E-08	5,98E-03	8,12E-06	2,21E-07	9,79E-07	2,19E-08	-1,24E-06
Disposed non-hazardous waste	kg	39,30	9,71E-03	2,08	1,21E-02	0,67	2,57E-04	0,75	5,61	-30,40
Radioactive waste	kg	0,21	1,57E-04	5,16E-04	7,32E-05	2,64E-03	4,16E-06	2,79E-04	3,75E-05	-0,16
Components for further use	kg	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00
Materials for recycling	kg	0,00	0,00	0,00	0,00	0,00	0,00	51,90	0,00	0,00
Materials for energy recovery	kg	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00
Exported electrical energy	MJ	0,00	0,00	64,80	0,00	0,00	0,00	25,40	0,00	0,00
Exported thermal energy	MJ	0,00	0,00	152,00	0,00	0,00	0,00	54,70	0,00	0,00



6.4 Interpretation, LCA presentation and critical verification

Evaluation

Global Warming Potential (GWP) listed in module A1-A3 is mainly caused by the used aluminium (extrusion profile and sheets) and insulating glass.

Benefits are calculated for both thermal and electrical energy produced by the thermal use of packaging (mainly wood from packaging). Effects on the climate resulting from thermal conversion of packaging wood are calculated in A5.

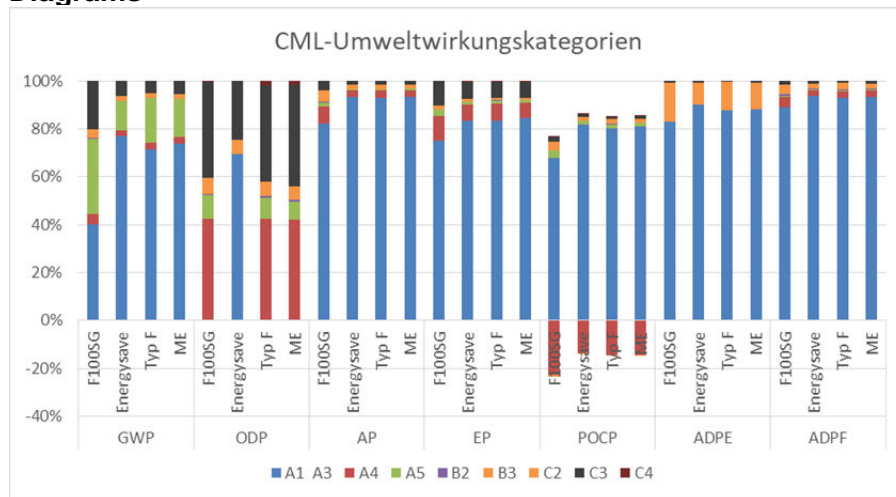
Proportionally, module C3 shows low emissions, as most of the materials are recycled. Recycling results in lower climate effects than thermal conversion.

Transports cause small amounts of benefits for POCP, which can be explained by the different weight of environmental indicators according to CML-methods (2013).

Environmental effects of the products “Glass Skylight FE”, “Glass Skylight FE Passive House” and “Smoke lift ME” are very similar, “glass skylight F100” shows a higher influence on packaging (A5 and C3), caused by a smaller weight of the product.

The values obtained from the LCA calculation are suitable for the certification of buildings, as necessary.

Diagrams



Report

The LCA underlying this EPD was developed according to the requirements of DIN EN ISO 14040 and DIN EN ISO 14044 as well as EN 15804 and EN ISO 14025. It is not addressed to third parties for confidentiality reasons. It is deposited with the ift Rosenheim. The results and conclusions reported to the target group are complete, correct, without bias and transparent. The results of the study are not designed to be used for comparative statements intended for publication.

Critical review

The critical review of the LCA and the report took place in the course of verification of the EPD by the external verifier Dr.-Ing. Carolin Roth.



7 General information regarding the EPD

Comparability

This EPD was prepared in accordance with EN 15804 and is therefore only comparable to those EPDs that also comply with the requirements set out in EN 15804.

Any comparison must refer to the building context and the same boundary conditions of the various life cycle stages.

For comparing EPDs of construction products, the rules set out in EN 15804 (Clause 5.3) apply.

Communication

The communications format of this EPD meets the requirements of EN 15942:2011 and is therefore the basis for B2B communication. Only the nomenclature has been changed according to EN 15804.

Verification

Verification of the Environmental Product Declaration is documented in accordance with the "Richtlinie zur Erstellung von Typ III Umweltproduktdeklarationen" (Guidance on preparing Type III Environmental Product Declarations) in accordance with the requirements set out in ISO 14025.

This declaration is based on the ift PCR document "PCR Teil A" (PCR part A) PCR-A-0.1:2018 und „Fenster, Flachdachfenster, Lichtkuppeln und Lichtbänder“ (windows, flat roof windows, light domes and continuous rooflights) PCR-FE-2.1:2018.

The European standard EN 15804 serves as the core PCR ^{a)}
Independent verification of the Declaration and statement according to EN ISO 14025:2010 <input type="checkbox"/> intern <input checked="" type="checkbox"/> extern
Independent third party verifier: ^{b)} Dr.-Ing. Carolin Roth
^{a)} Product category rules ^{b)} Optional for business-to-business communication, mandatory for business-to-consumer communication (see EN ISO 14025:2010, 9.4)

Revisions of this document

No.	Date	Note	Practitioner of the LCA	Verifier/s
1	13.05.2019	External verification	Zwick	Roth
2				
3				

Bibliography

- [1] Ökologische Bilanzierung von Baustoffen und Gebäuden – Wege zu einer ganzheitlichen Bilanzierung.
Hrsg.: Eyerer, P.; Reinhardt, H.-W.
Birkhäuser Verlag, Basel, 2000
- [2] Leitfaden Nachhaltiges Bauen.
Hrsg.: Bundesministerium für Verkehr, Bau- und Wohnungswesen
Berlin, 2013
- [3] GaBi ts: Software und Datenbank zur Ganzheitlichen Bilanzierung.
Hrsg.: IKP Universität Stuttgart und PE Europe GmbH
Leinfelden-Echterdingen, 1992 – 2014
- [4] „Ökobilanzen (LCA)“.
Klöpper, W.; Grahl, B.
Wiley-VCH-Verlag, Weinheim, 2009
- [5] EN 15804:2012+A1:2013
Nachhaltigkeit von Bauwerken – Umweltdeklarationen für Produkte – Regeln für Produktkategorien.
Beuth Verlag GmbH, Berlin
- [6] EN 15942:2011
Nachhaltigkeit von Bauwerken – Umweltproduktdeklarationen – Kommunikationsformate zwischen Unternehmen
Beuth Verlag GmbH, Berlin
- [7] ISO 21930:2007-10
Hochbau – Nachhaltiges Bauen – Umweltproduktdeklarationen von Bauprodukten
Beuth Verlag GmbH, Berlin
- [8] Leitfaden zur Planung und Ausführung der Montage von Fenstern und Haustüren.
Hrsg.: RAL-Gütegemeinschaft Fenster und Haustüren e.V.
Frankfurt, 2010
- [9] EN ISO 14025:2011-10
Umweltkennzeichnungen und -deklarationen Typ III Umweltdeklarationen – Grundsätze und Verfahren.
Beuth Verlag GmbH, Berlin
- [10] EN ISO 16000-9:2006-08
Innenraumluchtverunreinigungen – Teil 9: Bestimmung der Emissionen von flüchtigen organischen Verbindungen aus Bauprodukten und Einrichtungsgegenständen – Emissionsprüfkammer-Verfahren.
Beuth Verlag GmbH, Berlin
- [11] EN ISO 16000-11:2006-06
Innenraumluchtverunreinigungen – Teil 11: Bestimmung der Emissionen von flüchtigen organischen Verbindungen aus Bauprodukten und Einrichtungsgegenständen – Probenahme, Lagerung der Proben und Vorbereitung der Prüfstücke.
Beuth Verlag GmbH, Berlin
- [12] DIN ISO 16000-6:2004-12
Innenraumluchtverunreinigungen – Teil 6: Bestimmung von VOC in der Innenraumluft und in Prüfkammern, Probenahme auf TENAX TA®, thermische Desorption und Gaschromatografie mit MS/FID.
Beuth Verlag GmbH, Berlin
- [13] DIN EN ISO 14040:2009-11
Umweltmanagement – Ökobilanz – Grundsätze und Rahmenbedingungen.
Beuth Verlag GmbH, Berlin
- [14] DIN EN ISO 14044:2006-10
Umweltmanagement – Ökobilanz – Anforderungen und Anleitungen.
Beuth Verlag GmbH, Berlin
- [15] prEN 14351-2:2009-05
Fenster und Türen – Produktnorm, Leistungseigenschaften – Teil 2: Innentüren ohne Feuerschutz- und/oder Rauchdichtheitseigenschaften.
Beuth Verlag GmbH, Berlin
- [16] prEN 16034:2010-01
Fenster, Türen und Tore – Produktnorm, Leistungseigenschaften – Feuer- und/oder Rauchschutzeigenschaften.
Beuth Verlag GmbH, Berlin
- [17] DIN EN 12457-1:2003-01
Charakterisierung von Abfällen – Auslaugung; Übereinstimmungsuntersuchung für die Auslaugung von körnigen Abfällen und Schlämmen – Teil 1: Einstufiges Schüttelverfahren mit einem Flüssigkeits-/Feststoffverhältnis von 2 l/kg und einer Korngröße unter 4 mm (ohne oder mit Korngrößenreduzierung).
Beuth Verlag GmbH, Berlin
- [18] DIN EN 12457-2:2003-01
Charakterisierung von Abfällen – Auslaugung; Übereinstimmungsuntersuchung für die Auslaugung von körnigen Abfällen und Schlämmen – Teil 2: Einstufiges Schüttelverfahren mit einem Flüssigkeits-/Feststoffverhältnis von 10 l/kg und einer Korngröße unter 4 mm (ohne oder mit Korngrößenreduzierung).
Beuth Verlag GmbH, Berlin
- [19] DIN EN 12457-3:2003-01
Charakterisierung von Abfällen – Auslaugung; Übereinstimmungsuntersuchung für die Auslaugung von körnigen Abfällen und Schlämmen – Teil 3: Zweistufiges Schüttelverfahren mit einem

Product group: Glass elements

- Flüssigkeits/Feststoffverhältnis von 2 l/kg und 8 l/kg für Materialien mit hohem Feststoffgehalt und einer Korngröße unter 4 mm (ohne oder mit Korngrößenreduzierung).
Beuth Verlag GmbH, Berlin
- [20] DIN EN 12457-4:2003-01
Charakterisierung von Abfällen – Auslaugung; Übereinstimmungsuntersuchung für die Auslaugung von körnigen Abfällen und Schlämmen – Teil 4: Einstufiges Schüttelverfahren mit einem Flüssigkeits-/Feststoffverhältnis von 10 l/kg für Materialien mit einer Korngröße unter 10 mm (ohne oder mit Korngrößenreduzierung).
Beuth Verlag GmbH, Berlin
- [21] DIN EN 13501-1:2010-01
Klassifizierung von Bauprodukten und Bauarten zu ihrem Brandverhalten – Teil 1: Klassifizierung mit den Ergebnissen aus den Prüfungen zum Brandverhalten von Bauprodukten.
Beuth Verlag GmbH, Berlin
- [22] DIN EN 14351-1:2010-08
Fenster und Türen – Produktnorm, Leistungseigenschaften – Teil 1: Fenster und Außentüren ohne Eigenschaften bezüglich Feuerschutz und/oder Rauchdichtheit.
Beuth Verlag GmbH, Berlin
- [23] DIN 4102-1:1998-05
Brandverhalten von Baustoffen und Bauteilen – Teil 1: Baustoffe; Begriffe, Anforderungen und Prüfungen.
Beuth Verlag GmbH, Berlin
- [24] OENORM S 5200:2009-04-01
Radioaktivität in Baumaterialien.
Beuth Verlag GmbH, Berlin
- [25] DIN/CEN TS 14405:2004-09
Charakterisierung von Abfällen – Auslaugungsverhalten – Perkolationsprüfung im Aufwärtsstrom (unter festgelegten Bedingungen).
Beuth Verlag GmbH, Berlin
- [26] VDI 2243:2002-07
Recyclingorientierte Produktentwicklung.
Beuth Verlag GmbH, Berlin
- [27] Richtlinie 2009/2/EG der Kommission zur 31. Anpassung der Richtlinie 67/548/EWG des Rates zur Angleichung der Rechts- und Verwaltungsvorschriften für die Einstufung, Verpackung und Kennzeichnung gefährlicher Stoffe an den technischen Fortschritt (15. Januar 2009)
- [28] ift-Richtlinie NA-01/3
Allgemeiner Leitfaden zur Erstellung von Typ III Umweltproduktdeklarationen.
ift Rosenheim, November 2015
- [29] Arbeitsschutzgesetz – ArbSchG
Gesetz über die Durchführung von Maßnahmen des Arbeitsschutzes zur Verbesserung der Sicherheit und des Gesundheitsschutzes der Beschäftigten bei der Arbeit, 5. Februar 2009 (BGBl. I S. 160, 270)
- [30] Bundesimmissionsschutzgesetz – BImSchG
Gesetz zum Schutz vor schädlichen Umwelteinwirkungen durch Luftverunreinigungen, Geräusche, Erschütterungen und ähnlichen Vorgängen, 26. September 2002 (BGBl. I S. 3830)
- [31] Chemikaliengesetz – ChemG
Gesetz zum Schutz vor gefährlichen Stoffen Unterteilt sich in Chemikaliengesetz und eine Reihe von Verordnungen; hier relevant: Gesetz zum Schutz vor gefährlichen Stoffen, 2. Juli 2008 (BGBl. I S.1146)
- [32] Chemikalien-Verbotsverordnung – ChemVerbotsV
Verordnung über Verbote und Beschränkungen des Inverkehrbringens gefährlicher Stoffe, Zubereitungen und Erzeugnisse nach dem Chemikaliengesetz, 21. Juli 2008 (BGBl. I S. 1328)
- [33] Gefahrstoffverordnung – GefStoffV
Verordnung zum Schutz vor Gefahrstoffen, 23. Dezember 2004 (BGBl. I S. 3758)
- [34] „PCR Teil A: Allgemeine Produktkategorieeregeln für Umweltproduktdeklarationen nach EN ISO 14025 und EN 15804“.
ift Rosenheim, Januar 2018
- [35] „PCR Fenster, Flachdachfenster, Lichtkuppeln und Lichtbänder. Product Category Rules nach ISO 14025 und EN 15804“.
ift Rosenheim, Januar 2018
- [36] PCR Fassade und Dächer aus Glas und Kunststoff. Product Category Rules nach ISO 14025 und EN 15804“.
ift Rosenheim, November 2018
- [37] prEN 17213:2018-01
„Fenster und Türen“ – Umweltproduktdeklarationen – Produktkategorieeregeln für Fenster und Türen
Beuth Verlag GmbH, Berlin
- [38] Forschungsvorhaben „EPDs für transparente Bauelemente“.
ift Rosenheim, 2011



8 Annex

Description of life cycle scenarios for Glass Skylight FE, Glass Skylight F100, Glass Skylight FE Passive House and Smoke Lift ME

Product stage			Construction stage		Use stage							End of life stage				Benefits and loads beyond the system boundaries
A1	A2	A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
Raw material supply	Transport	Manufacture	Transport	Construction / Installation	Use	Inspection, maintenance, cleaning	Repair	Exchange / Replacement	Improvement / Modernisation	Operational energy use	Operational water use	Deconstruction	Transport	Waste management	Disposal	Re-use Recovery Recycling potential
✓	✓	✓	✓	✓	—	✓	✓	—	—	—	—	—	✓	✓	✓	✓

For the calculation of the scenarios a building life time of 50 years was considered (see RSL 4 use stage).

The scenarios were based on information provided by the manufacturer. The scenarios were furthermore based on the research project "EPDs for transparent building components [38].

Note: The standard scenarios selected are presented in bold type. They were also used for calculating the indicators in the summary table.

- ✓ Included in the LCA
- Not included in the LCA



Product group: Glass elements

A4 Transport to construction site		
No.	Scenario	Description
A4.1	Direct delivery to construction site / branch domestic	40 t truck Euro 4, 30% capacity used, approx. 350 km distance to domestic construction site, return trip with 0% load
A4.2	Direct delivery to construction site / branch abroad	40 t truck Euro 4, 40% capacity used, approx. 900 km distance to construction sites abroad, return trip with 0% loading

A4 Transport to construction site		Glass Skylight FE		Glass Skylight F100	
Environmental impacts	unit	A4.1	A4.2	A4.1	A4.2
Global warming potential	kg CO ₂ -equiv.	6,09	8,54	5,45	7,64
Depletion potential of stratospheric ozone layer	kg R11-equiv.	1,28E-13	1,80E-13	1,15E-13	1,61E-13
Acidification potential of soil and water	kg SO ₂ -equiv.	2,61E-02	3,59E-02	2,33E-02	3,22E-02
Eutrophication potential	kg PO ₄ ³⁻ -equiv.	6,64E-03	9,15E-03	5,94E-03	8,19E-03
Formation potential of tropospheric ozone	kg C ₂ H ₄ -equiv.	-1,00E-02	-1,38E-02	-8,98E-03	-1,23E-02
Depletion of abiotic resources (ADP elements)	kg Sb-equiv.	6,35E-07	8,91E-07	5,68E-07	7,97E-07
Depletion of abiotic resources (ADP fossil fuels)	MJ	81,90	115,00	73,30	103,00
Use of resources	unit	A4.1	A4.2	A4.1	A4.2
Renewable primary energy as energy source	MJ	5,53	7,76	7,80	6,95
Renewable primary energy for material use	MJ	0,00	0,00	0,00	0,00
Total use of renewable primary energy	MJ	5,53	7,76	7,80	6,95
Non-renewable primary energy as energy source	MJ	82,10	115,00	116,00	103,00
Non-renewable primary energy for material use	MJ	0,00	0,00	0,00	0,00
Total use of non-renewable primary energy	MJ	82,10	115,00	116,00	103,00
Use of secondary materials	kg	0,00	0,00	0,00	0,00
Renewable secondary fuels	MJ	0,00	0,00	0,00	0,00
Non-renewable secondary fuels	MJ	0,00	0,00	0,00	0,00
Use of fresh water resources	m ³	6,41E-03	9,00E-03	9,04E-03	8,06E-03
Waste categories and output material flows	unit	A4.1	A4.2	A4.1	A4.2
Disposed hazardous waste	kg	5,27E-06	7,39E-06	7,43E-06	6,62E-06
Disposed non-hazardous waste	kg	6,13E-03	8,60E-03	8,64E-03	7,70E-03
Radioactive waste	kg	9,92E-05	1,39E-04	1,40E-04	1,25E-04
Components for further use	kg	0,00	0,00	0,00	0,00



Product group: Glass elements

Materials for recycling	kg	0,00	0,00	0,00	0,00
Materials for energy recovery	kg	0,00	0,00	0,00	0,00
Exported electrical energy	MJ	0,00	0,00	0,00	0,00
Exported thermal energy	MJ	0,00	0,00	0,00	0,00

A4 Transport to construction site	unit	Glass Skylight FE Passive House		Smoke Lift ME	
		A4.1	A4.2	A4.1	A4.2
Environmental impacts	unit	A4.1	A4.2	A4.1	A4.2
Global warming potential	kg CO ₂ -equiv.	8,58	12,00	6,87	9,64
Depletion potential of stratospheric ozone layer	kg R11-equiv.	1,81E-13	2,54E-13	1,45E-13	2,04E-13
Acidification potential of soil and water	kg SO ₂ -equiv.	3,67E-02	5,07E-02	2,94E-02	4,06E-02
Eutrophication potential	kg PO ₄ ³⁻ -equiv.	9,36E-03	1,29E-02	7,50E-03	1,03E-02
Formation potential of tropospheric ozone	kg C ₂ H ₄ -equiv.	-1,41E-02	-1,95E-02	-1,13E-02	-1,56E-02
Depletion of abiotic resources (ADP elements)	kg Sb-equiv.	8,95E-07	1,26E-06	7,17E-07	1,01E-06
Depletion of abiotic resources (ADP fossil fuels)	MJ	115,00	162,00	92,50	130,00
Use of resources	unit	A4.1	A4.2	A4.1	A4.2
Renewable primary energy as energy source	MJ	7,80	11,00	6,25	8,77
Renewable primary energy for material use	MJ	0,00	0,00	0,00	0,00
Total use of renewable primary energy	MJ	7,80	11,00	6,25	8,77
Non-renewable primary energy as energy source	MJ	116,00	163,00	92,80	130,00
Non-renewable primary energy for material use	MJ	0,00	0,00	0,00	0,00
Total use of non-renewable primary energy	MJ	116,00	163,00	92,80	130,00
Use of secondary materials	kg	0,00	0,00	0,00	0,00
Renewable secondary fuels	MJ	0,00	0,00	0,00	0,00
Non-renewable secondary fuels	MJ	0,00	0,00	0,00	0,00
Use of fresh water resources	m ³	9,04E-03	1,27E-02	7,24E-03	1,02E-02
Waste categories and output material flows	unit	A4.1	A4.2	A4.1	A4.2
Disposed hazardous waste	kg	7,43E-06	1,04E-05	5,95E-06	8,35E-06
Disposed non-hazardous waste	kg	8,64E-03	1,21E-02	6,92E-03	9,71E-03
Radioactive waste	kg	1,40E-04	1,96E-04	1,12E-04	1,57E-04
Components for further use	kg	0,00	0,00	0,00	0,00
Materials for recycling	kg	0,00	0,00	0,00	0,00
Materials for energy recovery	kg	0,00	0,00	0,00	0,00
Exported electrical energy	MJ	0,00	0,00	0,00	0,00
Exported thermal energy	MJ	0,00	0,00	0,00	0,00



A5 Construction / Installation

In case of deviating consumption during the construction or installation of the products forms part of the site management and is covered at the building level and not within the EPD.

There are environmental impacts resulting from the disposal of packagings.
It is deemed that packaging materials are delivered to a suitable treatment of waste. Credits fom A5 are shown in module D.

Since this is the only scenario, the results are shown in the summary table.

B1 Use of the installed product (not considered)

See chapter 5 Use stage – Emissions to the environment. Emissions cannot be quantified.

B2 Inspection, maintenance, cleaning**B2.1 Cleaning**

No.	Scenario	Description
B2.1	Rare manually	Manually with suitable detergent, annually during functional test of SHEVS (refer to B2.2) use of 16,5 l water/waste water per 50 years

Ancillary materials, energy use and waste as well as transport distances during cleaning are negligible.

Since this is the only scenario, the results are shown in the summary table.

B2.2 Maintenance

No.	Scenario	Description
B2.2	Normal use	Annual functional test of SHEVS, visual inspection, lubrication and maintenance if necessary Use: 0,5 kg lubricants per 50 years

Operating supplies, the use of energy / water, losses of material and waste materials as well as transport distances during maintenance can be neglected.

Since this is the only scenario, the results are shown in the summary table.

B3 Repair

No.	Scenario	Description
B3	Normal use	One replacement ^{*)} : hardware 0,59 kg, seals 1,28 kg

* Assumptions for evaluation of possible environmental impacts; statements made do not constitute any guarantee or warranty of performance.

Current information in the respective instructions for installation, operation, maintenance and disassembly for Glass Skylight FE, Glass Skylight F100, Glass Skylight FE Passive House and Smoke Lift ME can be found on www.lamilux.de.

The service life of Glass Skylight FE, Glass Skylight F100, Glass Skylight FE Passive House and Smoke Lift ME from LAMILUX Heinrich Strunz GmbH is declared with 50 years. For the scenario B3 the respective components of the parts are accounted, if their service life is less than the given period of 50 years.

Operating supplies, the use of energy / water, losses of material and waste materials as well as transport distances during repair can be neglected.

Calculation of replacement parts are based on the same information, quota and benefits regarding waste management as „first parts“ (see C2-C4).

Since this is the only scenario, the results are shown in the summary table.

B4 Replacement / Exchange (not considered)

In this EPD, only informative information is given to allow consideration at building level.

With a service life of 50 years and the scheduled building service life of 50 years, no replacements are planned.

Current information in the respective instructions for installation, operation, maintenance and disassembly for Glass Skylight FE, Glass Skylight F100, Glass Skylight FE Passive House and Smoke Lift ME can be found on www.lamilux.de.

Operating supplies, the use of energy / water, losses of material and waste materials as well as transport distances during exchange / replacement can be neglected.

B5 Improvement / Modernisation (not considered)

No improvement / modernisation of Glass Skylight FE, Glass Skylight F100, Glass Skylight FE Passive House and Smoke Lift ME is planned.

Current information in the respective instructions for installation, operation, maintenance and disassembly for Glass Skylight FE, Glass Skylight F100, Glass Skylight FE Passive House and Smoke Lift ME can be found on www.lamilux.de.

B6 Operational energy use (not considered)

Energy use for construction parts for smoke and heat exhaust ventilation systems (SHEVS) can be found in the EPDs „Electrical drives and pneumatic cylinders for SHEV and ventilation systems” and “Electrical control units and pneumatic valves / alert stations for SHEV and ventilation systems” of the „Verband Fensterautomation und entrauchung e.V. (VFE)“. These construction parts have not been taken into consideration in this EPD.

B7 Operational water use (not considered)

No water consumption when used as intended. Water consumption for cleaning is specified in module B2.1.

C1 Deconstruction (not considered)						
No.	Scenario	Description				
C1	Deconstruction	Dismantling rate of 99% is taken as basis, as process of deconstruction is simple. Further dismantling rates possible, appropriately substantiates.				
There are no relevant inputs or outputs in this scenario. Energy consumption during deconstruction can be neglected. Resulting efforts are marginal.						
In case of deviating consumption the removal of the products forms part of the site management and is covered at the building level.						
C2 Transport						
No.	Scenario	Description				
C2	Transport	Transport to the collecting point, using a 40 t truck, 80 % capacity used, approx. 50 km distance				
Since this is the only scenario, the results are shown in the summary table.						
C3 Waste management						
No.	Scenario	Description				
C3	Disposal	Share for the return of materials: Glass 90% in melting Aluminium 98% in melting Other metals 95% in melting Rest 90% thermal use in incineration plants				
The below table presents the disposal processes and their percentage by mass/weight. The calculation is based on the above mentioned shares in per cent related to the declared unit of the product system						
C3 Disposal		Unit	PG1	PG2	PG3	PG4
Collection process, collected separately		kg	0,0	0,0	0,0	0,0
Collection process, collected as mixed construction waste		kg	59,1	49,5	95,7	71,0
Recovery system, for re-use		kg	0,0	0,0	0,0	0,0
Recovery system, for recycling		kg	39,9	27,1	57,1	51,4
Recovery system, for energy recovery		kg	14,4	17,6	30,8	13,8
Disposal		kg	4,8	4,9	7,8	5,8
Since this is the only scenario, the results are shown in the overall table.						

C4 Disposal		
No.	Scenario	Description
C4	Disposal	The non-measurable quantities and losses of the re-use/recycling chain (C1 and C3) are modelled as “disposed”.
<p>The consumption of scenario C4 results from physical pre-treatment, waste recycling and operating of the disposal site. The benefits obtained here from the substitution of primary material production are allocated to module D, e.g. electricity and heat from waste incineration.</p>		
D Benefits and loads beyond the system boundaries		
No.	Scenario	Description
D	Recycling potential	Aluminium recyclate from C3.1 excluding the recyclate used in A3 replaces 100% of aluminium compound; Steel scrap from C3.1 excluding the recyclate used in A3 replaces 100% of steel; Glass recyclate from C3 excluding the recyclate used in A3 replaces 100 % of container glass; Credits from WtE facility: Electricity replaces EU-28 electricity mix; thermal energy replaces thermal energy out of natural gas
<p>The values in module D results from both, the recycling of the packaging material in module A5 and the deconstruction at the end of the service life.</p>		

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Notes

This EPD is mainly based on the work and findings of the Institut für Fenstertechnik e.V., Rosenheim (ift Rosenheim) and specifically on the ift-Richtlinie NA-01/3 Allgemeiner Leitfaden zur Erstellung von Typ III Umweltproduktdeklarationen. (Guideline NA-01/3 - Guidance on preparing Type III Environmental Product Declarations).

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