

ENVIRONMENTAL PRODUCT DECLARATION

as per ISO 14025 and EN 15804+A2

Owner of the Declaration	VELUX Group
Publisher	Institut Bauen und Umwelt e.V. (IBU)
Programme holder	Institut Bauen und Umwelt e.V. (IBU)
Declaration number	EPD-VEL-20230050-IBA1-EN
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Valid to	10.05.2028

**Window operator for VELUX INTEGRA GPU, top-hung window
VELUX Group**

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General Information**VELUX Group****Programme holder**

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Declaration number

EPD-VEL-20230050-IBA1-EN

This declaration is based on the product category rules:

Drive systems for automatic doors and gates, 01.08.2021
(PCR checked and approved by the SVR)

Issue date

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Window operator for VELUX INTEGRA GPU, top-hung window**Owner of the declaration**

VELUX Group
Ådalsvej 99
2970 Hørsholm
Denmark

Declared product / declared unit

The declared unit is one piece of electrical window operator.

Scope:

The EPD is a specific EPD covering VELUX electrical window operator for the mains connected top-hung window type VELUX INTEGRA GPU. The operator consists of two chain operators, a rain sensor, a power supply, a control unit and a remote. The products are manufactured by the VELUX Group at a production site in the Czech Republic. 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	
<input type="checkbox"/>	internally
<input checked="" type="checkbox"/>	externally



Dr.-Ing. Nikolay Minkov,
(Independent verifier)

Product

Product description/Product definition

EPD covering VELUX electrical window operator for the mains connected top-hung window type VELUX INTEGRA GPU. The operator consists of two chain operators, a rain sensor, a power supply, a control unit and a remote. The products are manufactured by the VELUX Group at a production site in the Czech Republic.

For the placing on the market of the product in the European Union/European Free Trade Association (EU/EFTA) (with the exception of Switzerland) *Regulation (EU) No. 305/2011 (CPR)* applies. The products are in compliance with the *Machinery Directive 2006/42/EC*, the *Radio Equipment Directive 2014/53/EU* and the *RoHS Directive 2011/65/EU*. A declaration of conformity is available from the manufacturer.

Application

The VELUX electrical window operator is installed in new windows before distribution to customers.

Technical Data

The CE marking for electrical window operators does not specify the need for a Declaration of Performance. Instead, a Declaration of Conformity is required. The performance values relevant for the product are specified in the table below.

Constructional data

Name	Value	Unit
Protection class	IP 44	class
Voltage	230	V

LCA: Calculation rules

Declared Unit

The declared unit is one piece. This corresponds to an electrical window operator system, including two chain operators, a power supply, a rain sensor, a control unit and a remote.

Name	Value	Unit
Declared unit	1	pce.
Weight	1,93	kg
Conversion factor to kg	0,52	-

A data quality and a sensitivity analysis show that the results are robust with regard to data quality and appropriateness. There is low variability of production processes and product variations have a limited influence on the results.

System boundary

Type of EPD:
Cradle to gate - with options. The following life cycle phases were considered:

Product stage:

A1 - Raw material supply: extraction and processing, production of the pre-products (e.g. motor suspension, polychlorinated biphenyl (PCB), battery...). Packaging is not included, since the products are integrated with the window. VELUX roof window EPD's include the packaging. An exception

Base materials/Ancillary materials

Product content

Name	Value	Unit
Other plastic components	20	%
Cables	23	%
Other metal components	40	%
PCBA	4	%
Motor	5	%
Battery	1	%
Other (epoxy and paper)	6	%

A small cardboard box is used for packaging a component. The weight is 0,05 kg.

This product/article/at least one partial article contains substances listed in the *candidate list* (date: 08.06.2022) exceeding 0.1 percentage by mass: **NO**.

Reference service life

No reference service life (RSL) is defined for the operators as the use stage modules are not included in the EPD. There is no generally acknowledged or common way to assess the RSL for this type of product. Furthermore, the lifetime of the products depends greatly on the use pattern and environmental conditions in use, which differs for different users and which is difficult to predict at the time of sale.

is a small cardboard box for one of the components.

A2 - Transport: Transport of pre-products and packaging components to the manufacturing sites

A3 - Manufacturing: The products are produced/assembled at the VELUX production site, where the finished window operator is ready for shipment.

End of life stage:

C1 - De-construction/demolition: de-construction of the product with the use of manual hand tools.

C2 - Transport: transport of the product to waste treatment including to and from sorting and shredding facilities.

C3 - Waste processing: includes sorting, shredding, incineration and recycling processes.

C4 - Disposal: disposal of all materials

Benefits and loads beyond the system boundaries:

D - Reuse, recovery and recycling potential: benefits from plastic incineration processes and material recycling. End-of-life includes all activities from when the product reaches the end of its service life and no longer provides any

functionality until all materials and components are processed for reuse/recycling/energy recovery or are disposed of.

The applied end-of-life scenario follows the requirements in the PCR Part A, chapter 6.2 regarding complex products, with a combination of recycling, thermal waste treatment and landfilling. 100% of the material is considered in the end of life scenario. Generally, metals, cables, batteries and polychlorinated biphenyl (PCB)'s are recycled, plastic parts are incinerated with energy recovery and magnets are landfilled.

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.

The used background software and database is *GaBi (DB version 2021.2)*

LCA: Scenarios and additional technical information

Characteristic product properties biogenic carbon

The product does not contain biogenic carbon.

Information on describing the biogenic Carbon Content at factory gate

Name	Value	Unit
Biogenic carbon content in product	-	kg C
Biogenic carbon content in accompanying packaging	0.04	kg C

Assembly (A5)

Name	Value	Unit
Cardboard box for recycling	0.05	kg

No Reference Service Life (RFL) is declared, because the use stage modules are not declared.

End of life (C1-C4)

Name	Value	Unit
Collected separately Electronics	1.8	kg
Recycling	1.27	kg
Energy recovery	0.48	kg
Landfilling	0.03	kg

Reuse, recovery and/or recycling potentials (D), relevant scenario information

Name	Value	Unit
Replaced materials	0.64	kg
Replaced thermal energy	3.9	MJ
Replaced electricity	2.2	MJ

LCA: Results

DESCRIPTION OF THE SYSTEM BOUNDARY (X = INCLUDED IN LCA; ND = 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	MND	MND	MND	MND	MNR	MNR	MNR	MND	MND	X	X	X	X	X

RESULTS OF THE LCA - ENVIRONMENTAL IMPACT according to EN 15804+A2: 1 pcs window operator

Parameter	Unit	A1	A2	A3	C1	C2	C3	C4	D
GWP-total	kg CO ₂ eq	1.11E+01	4.1E-01	7.37E-01	0	1.2E-02	1.75E+00	7.58E-05	-1.9E+00
GWP-fossil	kg CO ₂ eq	1.12E+01	4.08E-01	6.34E-01	0	1.19E-02	1.75E+00	7.79E-05	-1.9E+00
GWP-biogenic	kg CO ₂ eq	-1.29E-01	9.81E-05	1.03E-01	0	-1.52E-05	1.2E-03	-2.26E-06	-9.21E-04
GWP-luluc	kg CO ₂ eq	1.49E-02	1.37E-03	1.58E-04	0	9.78E-05	1.56E-04	2.29E-07	-6.48E-04
ODP	kg CFC11 eq	1.21E-09	4.61E-17	5.6E-13	0	1.53E-18	6.65E-09	3.03E-19	-2.22E-15
AP	mol H ⁺ eq	4.67E-02	9.38E-03	1.2E-03	0	3.73E-05	6.07E-04	5.55E-07	-5.06E-03
EP-freshwater	kg P eq	1.4E-04	5.5E-07	3.09E-06	0	3.54E-08	1.09E-05	1.31E-10	-1.12E-06
EP-marine	kg N eq	7.94E-03	2.58E-03	3.01E-04	0	1.72E-05	1.91E-04	1.44E-07	-9.91E-04
EP-terrestrial	mol N eq	8.31E-02	2.83E-02	3.14E-03	0	1.92E-04	2.26E-03	1.58E-06	-1.07E-02
POCP	kg NMVOC eq	2.53E-02	7.01E-03	8.31E-04	0	3.36E-05	5.04E-04	4.36E-07	-3.17E-03
ADPE	kg Sb eq	8.99E-04	1.99E-08	5.23E-08	0	9.09E-10	2.18E-07	7.35E-12	-3.01E-05
ADPF	MJ	1.65E+02	5.14E+00	9.3E+00	0	1.59E-01	2.07E+00	1.03E-03	-2.08E+01
WDP	m ³ world eq deprived	4.74E+01	1.82E-03	3.63E-02	0	1.04E-04	5.01E-01	8.36E-06	-5.56E-02

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 pcs window operator

Parameter	Unit	A1	A2	A3	C1	C2	C3	C4	D
PERE	MJ	2.77E+01	1.34E-01	2.13E+00	0	8.87E-03	7.23E-01	1.39E-04	-1.93E+00
PERM	MJ	0	0	0	0	0	0	0	0
PERT	MJ	2.77E+01	1.34E-01	2.13E+00	0	8.87E-03	7.23E-01	1.39E-04	-1.93E+00
PENRE	MJ	1.44E+02	5.15E+00	9.3E+00	0	1.59E-01	1.86E+01	1.03E-03	-2.08E+01
PENRM	MJ	2.14E+01	0	0	0	0	-1.65E+01	0	0
PENRT	MJ	1.65E+02	5.15E+00	9.3E+00	0	1.59E-01	2.07E+00	1.03E-03	-2.08E+01
SM	kg	1.07E-01	0	0	0	0	0	0	0
RSF	MJ	0	0	0	0	0	0	0	0
NRSF	MJ	0	0	0	0	0	0	0	0
FW	m ³	1.11E+00	1.58E-04	2.77E-03	0	1.02E-05	1.2E-02	2.55E-07	-4.55E-03

PERE = Use of renewable primary energy excluding non-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 pcs window operator

Parameter	Unit	A1	A2	A3	C1	C2	C3	C4	D
HWD	kg	4.37E-05	1.35E-10	1.39E-08	0	8.02E-12	4.4E-10	1.1E-13	-1.54E-09
NHWD	kg	6.21E-01	6.24E-04	1.18E-02	0	2.36E-05	8E-02	5.16E-03	-2.47E-02
RWD	kg	2.82E-03	5.94E-06	1.02E-03	0	1.93E-07	2.16E-04	1.08E-08	-7.52E-04
CRU	kg	0	0	0	0	0	0	0	0
MFR	kg	0	0	0	0	0	7.36E-01	0	0
MER	kg	0	0	0	0	0	4.69E-01	0	0
EEE	MJ	0	0	0	0	0	0	0	2.58E+00
EET	MJ	0	0	0	0	0	0	0	4.61E+00

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 pcs window operator

Parameter	Unit	A1	A2	A3	C1	C2	C3	C4	D
PM	Disease incidence	7.6E+01	3.62E+00	1.03E+00	0	1.12E-01	1.06E+01	5.53E-04	-3.02E+00
IR	kBq U235 eq	2.89E+01	6.44E-02	1.63E+00	0	2.16E-03	1.55E+00	3.17E-05	-1.54E+00
ETP-fw	CTUe	4.11E-01	3.3E-02	5.14E-03	0	1.07E-03	2.12E-02	4.48E-06	-1.1E-01
HTP-c	CTUh	4.64E-18	1.23E-21	7.23E-21	0	3.99E-23	5.67E-20	9.47E-25	-2.48E-19
HTP-nc	CTUh	2.64E-09	7.02E-11	4.09E-11	0	2.27E-12	7.87E-10	8.43E-14	-5.13E-11
SQP	SQP	8.15E-09	1.59E-12	2.82E-11	0	5.3E-14	2.66E-11	2.54E-15	-1.94E-09

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

IBU PCR Part A

IBU PCR Part A: Institut Bauen und Umwelt e.V., Product Category Rules for Building-Related Products and Services. Calculation Rules for the Life Cycle Assessment and Requirements on the Project Report according to EN 15804+A2:2019.

of the Council, 9 March 2011, Laying down harmonised conditions for the marketing of construction products.

Directive 2011/65/EU

Directive 2011/65/EU of the European Parliament and of the Council, 8 June 2011, on the restriction of the use of certain hazardous substances in electrical and electronic equipment.

IBU PCR Part B

IBU PCR Part B: Institut Bauen und Umwelt e.V., Requirements on the EPD for Drive systems for automatic doors and gates, version 1.6.

Directive 2006/42/EC

Directive 2006/42/EC of the European Parliament and of the Council, 17 May 2006 on Machinery.

IBU 2021

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.

EN 14351-1:2006+A2:2016

EN14351-1:2006+A2:2016, Windows and doors - Product standard, performance characteristics - Part 1: Windows and external pedestrian doorsets.

EN 13501-1

EN13501-1, 2018: Fire classification of construction products and building elements - Part 1: Classification using data from reaction to fire tests.

EN 15804:2019+A2

EN 15804:2019+A2: Sustainability of construction works - Environmental Product Declarations - Core rules for the product category of construction products.

DIN EN ISO 14025:2011-10

DIN EN ISO14025:2011-10, Environmental labels and declarations - Type III environmental declarations - Principles and procedures.

Directive 2014/53/EU

Directive 2014/53/EU of the European Parliament and of the Council of 16 April 2014 on the harmonisation of the laws of the Member States relating to the making available on the market of radio equipment.

Regulation (EU) No 305/2011

Regulation (EU) No 305/2011 of the European Parliament and



Directive 2011/65/EU

Directive 2011/65/EU of the European Parliament and of the Council of 8 June 2011 on the restriction of the use of certain hazardous substances in electrical and electronic equipment.

Directive 2006/42/EC

DIRECTIVE 2006/42/EC OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL of 17 May 2006 on machinery.

Candidate list

Candidate List of substances of very high concern for

Authorisation, 08.06.2022.

GaBi LCA software and database

The LCA modelling software is GaBi program version 10.5.1.124 with corresponding databases from Sphera Solutions GmbH. Documentation hyperlink www.gabi-software.com/support/gabi.



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