Elitfönster

Environmental Product Declaration

In accordance with ISO 14025 and EN 15804:2012+A2:2019 for

Product family

Elitfönster Original Alu

Model

Outward opening Balcony Door Alu
Outward opening Balcony double Door Alu

Product name

AD/AD2

From

Elitfönster AB
Box 153
574 22 Vetlanda

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Programme
The International EPD® System, www.environdec.com

Programme operator
EPD International AB

EPD registration number
S-P-04897

An EPD should provide current information and may be updated if conditions change. The stated validity is therefore subject to the continued registration and publication at www.environdec.com

EPD®

ECO PLATFORM EPD VERIFIED

Environmental Product Declarations (EPD) present transparent, verified and comparable information about the life-cycle environmental impact of products.

The International EPD® System is a global program for environmental declarations based on ISO 14025 and EN 15804. The EPD online database currently contains more than 1100 EPDs for a wide range of product categories by organisations in 45 countries.

Company information

Owner of the EPD
Elitfönster AB
Honnörsgatan 2
352 36 Växjö

Description of the organisation
Elitfönster AB is with its wide range of windows, Sweden´s leading window manufacturers with traditions from Småland since 1924. The company has about 1,000 employees and is represented throughout Sweden.

Since 2004 Elitfönster AB has been a part of Inwido. As Europe´s leading window group, Inwido´s business concept is to develop and sell the market´s best customized window and door solutions through a decentralized structure and with a focus on the consumer-driven market, in order to create long-term sustainable growth, organically and through acquisitions. Inwido consists of 28 business units with approximately 4,300 employees in eleven countries.

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Product-related or management system-related certifications
ISO 9001:2015, ISO 14001:2015
Sunda Hus, Byggvarubedömningen, Basta

Average or specific EPD: Average
This EPD is averaged for the production of AD and AD2 in regard to the following differences.

- Standard and energy variations.
  The energy variation has up to 3% higher environmental impacts with the most differing impact category being abiotic depletion of elements (ADPE). Climate change has about 1% higher impacts for the energy type balcony door.
- Production sites
  Production is taking place in both Vetlanda and Lenhovda. An average weighted number is presented in the results table based on the production volume from the different sites. The most differing impacts is climate change from land use and land use change (GWP-LULUC). for Vetlanda it´s 7% lower than the weighted value and in Lenhovda it´s 3% higher. Climate change is 1% lower for Vetlanda and 0,4% higher in Lenhovda.
- Difference between AD and AD2
  AD and AD2 are very similar products and go through the same production steps. The largest result difference between them in mandatory LCIA categories is terrestrial eutrophication (EP-t) which is 6% higher for AD. Climate change is 3% higher for AD.

Since this difference is within +/-10%, for all cases described above, the results will be presented in one results table for 1 m^2 AD with energy glass.

Product information

Outward opening Balcony Door Alu – AD

An outward opening wooden balcony door with filling and external aluminum cladding and an insulating glass with 3 glass planes. The balcony doors casement is hung via hinges on the side piece and opens outward.

The weight of the finished balcony door is 30,30 kg per m^2.

According to the Construction Products Regulation CPR (EU) no. 305/2011, the essential properties of products must be declared in the CE marking and Declaration of Performance. The technical properties of the window are reported in the following Declaration of performance, which can be accessed on Elitfönster´s website.

DoP nr 61-29-CE1030201

A picture of Outward opening Balcony Door Alu – AD can be seen to the right.

Outward opening Balcony double Door Alu – AD2

An outward opening wooden balcony door consisting of two facing casements with filling and external aluminum cladding and an insulating glass with 3 glass planes.

The balcony double door casements is hung via hinges on the side pieces and opens outward.

The weight of the finished balcony double door is 30,35 kg per m^2.

According to the Construction Products Regulation CPR (EU) no. 305/2011, the essential properties of products must be declared in the CE marking and Declaration of Performance. The technical properties of the window are reported in the following Declaration of performance, which can be accessed on Elitfönster´s website.

DoP nr 61-29-CE1030201-2

A picture of Outward opening Balcony double Door Alu – AD2 can be seen to the right.

Product information

Energy glass:

Energy glass consists of a float glass that is coated with a thin film of metal oxide that lets through short-wave solar energy and reflects long-wave room heat.

The coating is almost completely transparent, but there is some difference in light input between coated glass and uncoated glass.

Coated glass is used to achieve better insulating ability in a glass, by combining different numbers of coated glass in a window or insulating glass, you can achieve different levels of insulating ability for a window.

The greater the number of energy glasses a window has, the better the insulation capacity, but also the darker the glass.

Gas:

An insulating glass consists of glass that are separated from each other by spacers, these spacers can be filled with gas such as argon to give the insulating glass a better insulating ability. Argon does not affect sunlight radiation but improves the insulating ability of the insulating glass. An insulating glass with two glasses consists of an argon gas-filled spacer, an insulating glass with three glasses has two spacers, here you can choose to fill one or both spacers with argon gas.

If you fill both distances with gas, you achieve a better insulation capacity than if only one distance is gas-filled.

By combining different sets of energy-coated glass and argon-filled glass spacers, you can get different glass properties for insulation and light input.

If you also combine these components with different types of glass spacing and dimensions of constituent components as well as different choices of type of glass, you have an almost infinite number of different combinations.

This EPD covers both standard and energy windows, the difference in results is described under "average or specific EPD". The results table is based on results of energy glass.

Standard:

The insulating glass consists of three glasses separated by two glass spacers made of plastic (hot edge). The inner glass is energy coated and the inner glass spacer is filled with argon.

Energy:

The same insulating glass construction as standard, except that both the inner and outer glass are energy-coated and that both glass spacers are filled with argon.

LCA information

Functional Unit	The functional unit used in this report is 1 m^2. The weight of finished AD is 30,30 kg per m^2. The weight of finished AD2 is 30,35 kg per m^2. Standard size for AD is 1230 x 2180 mm Standard size for AD2 is 1980 x 2180 mm
Reference Service Life (RSL)	The RSL is set to 50 years. The RSL is based on the fact that windows with aluminum-clad windows have a longer service life than similar windows made of PVC or wood.
Product group classification	UN CPC 42120
Goal and Scope	The result will be used to understand where the environmental burden for the product occurs during the life cycle and aim to lay a road map for development to reduce this burden. The result will be communicated by the International EPD system.
Manufacturing Site	Brogårdsgatan 1, 574 38, Vetlanda, Sverige, Industrigatan, 360 73, Lenhovda, Sverige
Geographical Area	Europe
Compliant with	This EPD follows the ¨Book-keeping¨ LCA approach which is defined as an attributional LCA in the ISO 14040 standard. The EPD is compliant with: • ISO 14025 • EN 15804:2012+A2:2019 • Product Category Rules PCR 2019:14. Construction products and construction services. Version 1.11 • Sub-PCR-007 Windows and doors (EN 17213)
Cut-Off Rules	The procedure below is followed for the exclusion of inputs and outputs according to the EN 15804:2012+ A2:2019 standard: • In the case of insufficient input data or data gaps for a unit process, the cut-off criterion is 1 % of renewable and non-renewable primary energy usage and 1 % of the total mass input to that unit process. • The maximum neglected input flows per declared module (A1- A3) is 5 % of energy usage and mass. No cut-offs have been made concerning specific data in this study.
Background Data	The data quality of the background data is considered good. All site-specific data is collected from the year 2019. ecoinvent is the world´s biggest LCI data library and the latest and most updated version was used. ecoinvent´s data library contain data for the specific geographical regions relevant for this study. The assessment considers all available data from the production process, including all raw materials and auxiliary materials used as well as the energy consumption in relation to available ecoinvent 3.8 datasets for the manufacture of concrete piles. The background data from ecoinvent 3.8 are from 2016-2020.
Electricity data	Electricity consumption in the A3 module comes from 100% wind power certified by Guarantee of Origin, Electricity is represented by data in ecoinvent 3.8 regionalized for Sweden.

Assumptions	Steel is sourced with 23% post-consumer iron scrap as is stated in the average European dataset for steel in ecoinvent 3.8 In A4 the transport distance is assumed to be 320 km, based on average distances 2020. When installing and uninstalling the window no environmental aspects in addition to using of electrical machines is assumed according to installation instructions from Elitfönster. The window is assumed to require 60 ml/m² of cleaning solution and 10 ml/m² of lubrication oil per year. The used window is assumed to be transported 50km to the closest waste management facility. There it is disassembled, and the following waste treatment activities performed: - Aluminum and steel are recycled at 90% collection rate - Glass is landfilled at 100% landfilling rate - Wood, paint, plastic, rubber and misc. is assumed to be incinerated with energy recovery at a municipal incineration plant at 90% incineration rate. Waste not recycled or incinerated is assumed to go to landfill.
Allocations	Polluter Pays / Allocation by Classification Two allocation rules are applied: 1) the raw material necessary for manufacturing is allocated to products based on complexity and product size of the declared unit 2) the energy necessary for manufacturing is allocated to products based on complexity and product size of the declared unit
Impact Assessment methods	Potential environmental impacts are calculated with Environmental Footprint 3.0 method as implemented in SimaPro 9.2. Resource use values are calculated from Cumulative Energy Demand V1.11.
Based on LCA Report	Miljögiraff report 1088 steg 4 – Livscykelanalys av fönster
LCA Practitioner	Viktor Hakkarainen, Miljögiraff AB
Software	SimaPro 9.2.0.1

The product documented within this EPD contains no substances in the REACH Candidate list. Furthermore, the product does not contain any substances from the Norwegian priority list.

The estimated impact results are only relative statements which do not indicate the end points of the impact categories, exceeding threshold values, safety margins or risks.

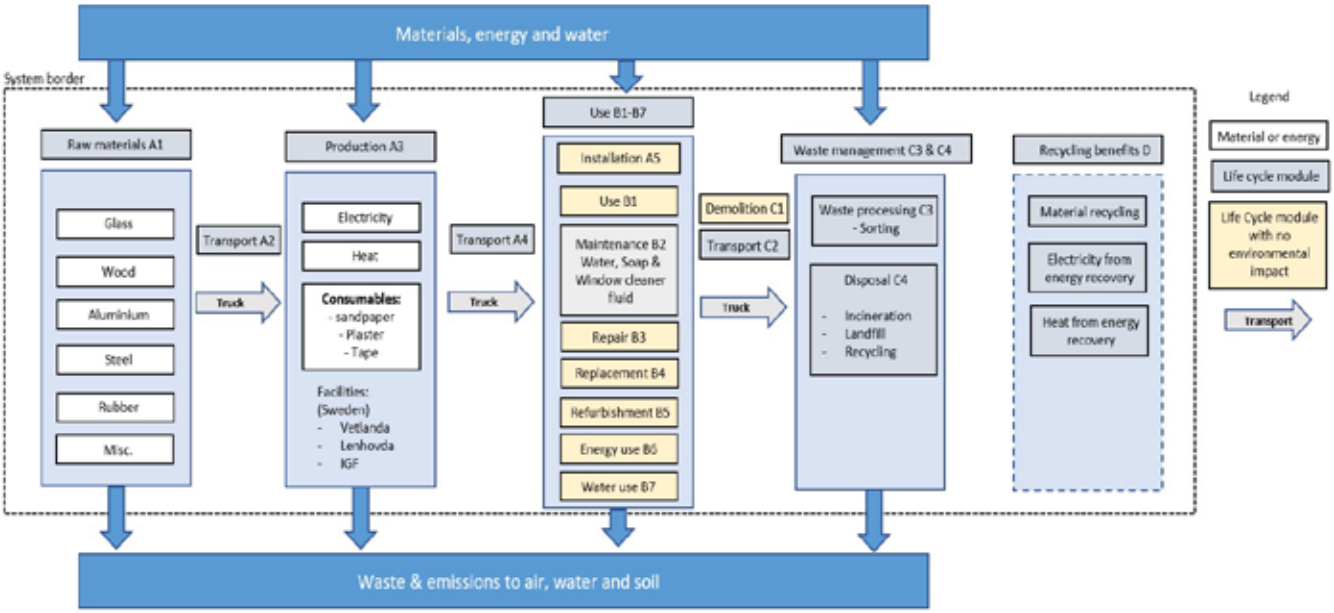
System Boundary

This is a Cradle to Grave with modules A+B+C+D (see Table 1 for included modules). The system boundary mean that all processes needed for raw material extraction, transport, manufacturing and disposal are included in the study.
For an overview of the included processes see Figure 2.

Table 1, show an overview of the included and accounted life cycle phases.

	Product stage		**Construction process stage**			**Use stage**							**End of life stage**					**Resource recovery stage**
	Raw material supply	Transport	Manufacturing	Transport	Construction installation	Use	Maintenance	Repair	Replacement	Refurbishment	Operational energy use	Operational water use	De-construction demo-lition	Transport	Waste processing	Disposal		Reuse-Recovery-Recycling-potential
Module	A1	A2	A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4		D
Modules declared	X	X	X	X	X	MND	X	MND	MND	MND	MND	MND	MND	X	X	X		X
Geography	Euro	Euro	SE	SE	SE		SE							SE	SE	SE		SE
Average data variability	-	<10%	<10%	-	-		-							-	-	-		-
Specific data	>90%					-					-	-	-	-	-	-		-

Figure 2, shows what is included in the different modules.



Content and life cycle information

The product consists of 17 raw materials.
The weight per FU and part recycled material can be seen in Table 2.

Table 2, show the weight and part recycled material for the raw material

Raw material	kg per m² AD	kg per m² AD2	Post-consumer material, weight-%
Glass	15,12	14,26	9,3
Argon	0,01 Standard	0,038	0
0,02 Energy	0,01 Standard	0,254	0
0,02 Energy	0	0,576	0
Distance list	0,16	0,18	0
Edge sealing compound	0,36	0,40	0
Butyl	0,06	0,04	0
Desiccant	0,14	0,15	0
Pinewood	14,23	12,64	0
Surface treatment for pine	2,06	2,01	0
Aluminium	2,78	2,82	0
Powder coating aluminium	0,09	0,09	0
Metal handle & Miscellaneous steel parts	1,56	1,74	23
Plastic	0,39	0,43	0
Rubber EPDM	0,32	0,32	0
Glue	0,02	0,02	0
Sealant	0,04	0,05	0
Waterproofing agent	0,003	0,003	0
Wood board	1,78	1,78	0

The wood raw material used is pine supplied by FSC-labeled and / or PEFC-labeled suppliers that glues and finger joins the wood raw material. The wood is cut and planed and processed in Elitfönster premises in Vetlanda, the finished wood details are surface treated with a water-based paint system. Elitfönster´s own glass factory, IGF in Lenhovda, uses flat glass from Europe´s largest glass manufacturer. IGF cuts the glass and manufactures the insulating glass. The glass is installed in the product in Elitfönster´s manufacturing unit in Vetlanda. Aluminum profiles are delivered by Hydro in Vetlanda, they are processed and powder coated on A-paint in Sävsjö, then transported to Elitfönster´s manufacturing unit in Vetlanda or Lenhovda for final assembly. The finished windows are packed on a wooden pallet with plywood slats and cardboard corners and plasticized with shrink plastic. The windows are transported on pallets by truck to the customer.

To produce 1 m² product, 17,6 kWh of electricity is used for AD and 13,6 kWh of electricity is used for AD2. 13,7 kWh of heat is used for AD and 9,93 kWh of heat is used for AD2.
Electricity is certified wind power electricity.
0,034 kg biogas is used to produce AD and 0,024 kg for AD2.

98-100% of the heat comes from own combustion from wood waste created during production, the rest comes from the district heating network in Vetlanda. District heating comes form 98-99% from renewable sources.

In total, around 20-25 % of the total incoming raw materials becomes production waste. A large part of the waste is wood.

During usage, no indoor emissions arise. The paint used is water based and all the other raw materials do not emit any emissions.

Due to the enhanced durability of an aluminum clad window´s physical properties, no change of IGU is required during the windows 50-year lifespan (Carlsson, 2009).

Content and life cycle information

This EPD uses input data from other EPDs, the used EPDs can be viewed below:

Table 3 Overview of utilized EPDs as input data

Material	EPD name	EPD specifications
Uncoated glass by Pilkington	Flat glass, toughened safety glass and laminated safety glass	Sector-EPD for flat plane glas Manufacturer: Pilkington AB EPD Owner: Bundesverband Flachglas e.V. EPD Author: ift Rosenheim GmbH EPD Platform: ift Rosenheim GmbH Geography: Germany Publication number: M-EPD-FEV-GB-002000 Publication date: 2017-12-18
Uncoated glass by Guardian	Uncoated flat glass, laminated safety glass and coated flat glass	Manufacturer: Guardian Europé S.a.r.l. EPD Owner: Guardian Europé S.a.r.l. EPD Author: ift Rosenheim GmbH EPD Platform: ift Rosenheim GmbH Geography: Germany Publication number: EPD-GFEV-GB-19.2 Publication date: 2021-06-29
Distance list	TGI-Spacer M	Manufacturer: Technoform EPD Owner: Technoform EPD Author: Technoform EPD platform: INIES Geography: France Publication number: 7-333:2019 Publication date: 2019-06-15
Pine by Stora Enso	Industrial Components	Manufacturer: Stora Enso EPD Owner: Stora Enso EPD Author: Stora Enso EPD platform: The International EPD® System Geography: Sweden, Finland, Estonia, Lithuania Publication number: S-P-02154 Publication date: 2020-08-03

Environmental Information – Outward opening Balcony Door Alu – AD

Energy glass, weighted production sites

Potential environmental impact – mandatory indicators according to EN 15804

Some numbers are presented in scientific notation, example: 5,2E-03 equals 0,0052

Impact category	Unit	A1	A2	A3	A1-A3	A4	A5	B2
Climate change – Fossil	kg CO2 eq	52,14	4,34	2,19	**58,67**	1,61	0,15	3,11
Climate change – Biogenic	kg CO2 eq	-20,50	0,01	9,27	**-11,22**	0,00	1,99	-0,57
Climate change – Land use and LU change	kg CO2 eq	0,53	0,00	0,01	**0,54**	0,00	0,00	0,18
Climate change	kg CO2 eq	32,21	4,36	11,47	**48,03**	1,62	2,14	2,72
Ozone depletion	kg CFC11 eq	3,89E-06	1,01E-06	2,02E-07	**5,10E-06**	3,73E-07	5,02E-09	5,64E-07
Acidification	mol H+ eq	0,32	0,02	0,02	**0,36**	0,01	0,00	0,02
Eutrophication, freshwater	kg P eq	1,95E-02	2,80E-04	7,28E-04	**2,06E-02**	1,04E-04	1,00E-05	1,08E-03
Eutrophication, freshwater	kg PO4 eq	6,00E-02	8,58E-04	2,23E-03	**6,31E-02**	3,19E-04	3,07E-05	3,30E-03
Eutrophication, marine	kg N eq	5,99E-02	5,36E-03	5,11E-03	**7,04E-02**	1,97E-03	1,74E-04	5,88E-03
Eutrophication, terrestrial	mol N eq	0,65	0,06	0,06	**0,76**	0,02	0,00	0,04
Photochemical ozone formation	kg NMVOC eq	1,50E-01	1,79E-02	1,66E-02	**1,84E-01**	6,59E-03	4,05E-04	1,71E-02
Resource use, minerals and metals	kg Sb eq	4,08E-04	1,51E-05	1,09E-04	**5,32E-04**	5,60E-06	1,10E-07	4,97E-05
Resource use, fossils[1]	MJ	870	66	26	**961,79**	24	0	59
Water use[1]	m^3 depriv.	14,86	0,19	0,67	**15,72**	0,07	0,00	24,46
Particulate matter	disease inc.	3,79E-06	3,01E-07	1,71E-06	**5,8E-06**	1,12E-07	3,68E-09	1,98E-07
Ionising radiation	kBq U-235 eq	10,51	0,34	0,27	**11,1**	0,13	0,00	0,32
Ecotoxicity, freshwater[1]	CTUe	1308	51	158	**1518**	19	1	116
Human toxicity, cancer[1]	CTUh	1,30E-07	1,66E-09	6,00E-09	**1,38E-07**	6,16E-10	8,38E-11	3,43E-09
Human toxicity, non-cancer[1]	CTUh	1,28E-06	5,37E-08	1,55E-07	**1,48E-06**	1,99E-08	3,62E-09	8,57E-08
Land use[1]	Pt	379	45	146	**570**	17	0	38

[1] Disclaimer 1 – The results of this environmental impact indicator shall be used with care as the uncertainties on these results are high or as there is limited experienced with the indicator.

[2] Disclaimer 2 – 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 nor due to radioactive waste disposal in underground facilities. Potential ionizing radiation from the soil, from radon and from some construction materials is also not measured by this indicator.

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Environmental Information – Outward opening Balcony Door Alu – AD

Impact category	Unit	C2	C3	C4	D
Climate change – Fossil	kg CO2 eq	0,38	0,04	6,36	**-19,35**
Climate change – Biogenic	kg CO2 eq	0,00	0,02	15,07	**-3,71**
Climate change – Land use and LU change	kg CO2 eq	0,00	0,00	0,00	**-0,52**
Climate change	kg CO2 eq	0,38	0,06	21,43	**-23,58**
Ozone depletion	kg CFC11 eq	8,74E-08	1,64E-09	1,15E-07	**-1,94E-06**
Acidification	mol H+ eq	0,00	0,00	0,00	**-0,13**
Eutrophication, freshwater	kg P eq	2,43E-05	1,56E-05	1,31E-04	**-1,12E-02**
Eutrophication, freshwater	kg PO4 eq	7,47E-05	4,78E-05	4,02E-04	**-3,43E-02**
Eutrophication, marine	kg N eq	4,62E-04	5,42E-05	2,09E-03	**-2,08E-02**
Eutrophication, terrestrial	mol N eq	0,01	0,00	0,02	**-0,21**
Photochemical ozone formation	kg NMVOC eq	1,55E-03	1,14E-04	5,63E-03	**-7,03E-02**
Resource use, minerals and metals	kg Sb eq	1,31E-06	6,67E-07	1,96E-06	**1,58E-04**
Resource use, fossils[1]	MJ	6	5	9	**-468**
Water use[1]	m^3 depriv.	0,02	0,06	0,02	**-1,73**
Particulate matter	disease inc.	2,62E-08	2,26E-09	8,07E-08	**-1,50E-06**
Ionising radiation	kBq U-235 eq	0,03	0,37	0,04	**-18,73**
Ecotoxicity, freshwater[1]	CTUe	4	2	15	**-441**
Human toxicity, cancer[1]	CTUh	1,44E-10	4,55E-11	4,46E-09	**-7,01E-08**
Human toxicity, non-cancer[1]	CTUh	4,67E-09	8,35E-10	4,39E-08	**-8,02E-07**
Land use[1]	Pt	4	1	9	**-281**

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Climate impact – IPCC 2013 GWP100

	Unit	A1	A2	A3	A1-A3	A4	A5	B2
GHG-GWP	Kg CO2,eq	51,37	4,31	2,19	57,87	1,60	0,15	3,08
	Unit	**C2**	**C3**	**C4**	**D**			
GHG-GWP	Kg CO2,eq	0,37	0,04	6,36	-19,26			

Use of resources

	Unit	A1	A2	A3	A1-A3	A4	A5	B2
PERE	MJ	218,6	0,9	73,2	**292,7**	0,3	0,0	15,2
PERM	MJ	269,5	0,0	25,9	**295,3**	0,0	0,0	0,0
PERT	MJ	488,1	0,9	99,0	**588,0**	0,3	0,0	15,2
PENRE	MJ	861,6	69,7	25,3	**956,6**	25,9	0,4	63,9
PENRM	MJ	42,1	0,0	2,0	**44,0**	0,0	0,0	0,0
PENRT	MJ	903,7	69,7	27,2	**1000,7**	25,9	0,4	63,9
SM	Kg	3,9	0,0	0,0	**3,9**	0,0	0,0	0,0
RSF	MJ	0,0	0,0	31,2	**31,2**	0,0	0,0	0,0
NRSF	MJ	0,0	0,0	0,0	**0,0**	0,0	0,0	0,0
FW	M3	0,28	0,01	0,02	**0,3**	0,00	0,00	0,71
	Unit	**C2**	**C3**	**C4**	**D**			
PERE	MJ	0,1	2,1	0,2	-242,1			
PERM	MJ	0,0	0,0	0,0	0,0			
PERT	MJ	0,1	2,1	0,2	-242,1			
PENRE	MJ	6,1	5,1	9,2	-485,2			
PENRM	MJ	0,0	0,0	0,0	0,0			
PENRT	MJ	6,1	5,1	9,2	-485,2			
SM	Kg	0,0	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	0,00	0,00	0,01	-0,07			

Abbreviations	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 re-sources; SM = Use of secondary material; RSF = Use of renewable secondary fuels; NRSF = Use of non-renewable secondary fuels; FW = Use of net fresh water

Waste production and output flows

Waste production

Indicator	Unit	A1	A2	A3	A1–A3	A4	A5	B2
Hazardous waste disposed	kg	0,32	0	0	**0,32**	0	0	0
Non-hazardous waste disposed	kg	8,80	0	0	**8,80**	0	0	0
Radioactive waste disposed	kg	1,95E-03	0	0	**1,95E-03**	0	0	0
Indicator	**Unit**	**C2**	**C3**	**C4**	**D**			
Materials for energy recovery	kg	0	0	0	0			
Exported energy, electricity	MJ	0	0	0	0			
Exported energy, thermal	MJ	0	0	0	0			

Output flows

Indicator	Unit	A1	A2	A3	A1–A3	A4	A5	B2
Components for re-use	kg	0,0E+00	0	0	**0,00E+00**	0	0	0
Material for recycling	kg	3,5E-02	0	2,57	**2,61**	0	0,01	0
Materials for energy recovery	kg	0,0E+00	0	3,85	**3,85**	0	1,29	0
Exported energy, electricity	MJ	2,5E-02	0	0	**0,03**	0	0	0
Exported energy, thermal	MJ	3,7E-02	0	0	**0,04**	0	0	0
Indicator	**Unit**	**C2**	**C3**	**C4**	**D**			
Components for re-use	kg	0	0	0	0			
Material for recycling	kg	0	0	3,49	0			
Materials for energy recovery	kg	0	0	11,86	0			
Exported energy, electricity	MJ	0	0	0	0			
Exported energy, thermal	MJ	0	0	0	0			

Information on biogenic carbon content

Results per functional or declared unit		
BIOGENIC CARBON CONTENT	**Unit**	**QUANTITY**
Biogenic carbon content in product	kg C	5,0
Biogenic carbon content in packaging	kg C	0,7

Note: 1 kg biogenic carbon is equivalent to 44/12 kg CO_2.

Annex C – Voluntary use stage scenario based on energy balance calculation – AD standard glass

Use stage environmental impacts illustrates the annual environmental impacts due to the energy balance of the windows, based on Stockholm heating demand average and an energy balance formula based on the described scenario.

General information		
		Comments
Heating method according to EN 17213 annex C	District heating from natural gas	LCI dataset: Heat, central or small-scale, natural gas {RER}| market group for | Cut-off, U
Cooling method according to EN 17213 annex C	Electricity powered air cooler	LCI dataset: Electricity, low voltage {SE}| market for | Cut-off, U
Climate Zone	III	According to Swedish building standards, used climate file: "Stockholm 1981-2010" from the Swedish Meteorological and Hydrological Institute
Annual average temperature	6,6 °C	Stockholm
Min indoor temperature	21 °C	Heating stops at this temperature
Max indoor temperature	27 °C	Cooling stops at this temperature
Cooling Factor	3	kWh cooling delivered per kWh of electricity
Model (Calculation)	Single room	
Orientation	West (270°)	
Calculation method	Hourly	
Modelling program	VIP-Energy 4.3.2	Modeled as a 1 m^2 room with concrete flooring and no walls or internal loads
Environmental Impact assessment model	Environmental Footprint 3.0	

Technical specifications	
U-value	1,15 w/m^2, K
Gg-value	60 %
Gw-value	25 %
Air leakage class	4
Air leakage flow at +/- 50 Pa	0,2 l/s,m^2
Daylight factor, LT-value	75 %
Glass/frame ratio	0,41
Total heating demand	97,03 kWh heat/year
Total cooling demand	6,87 kWh electricity/year

Annex C – Voluntary use stage scenario based on energy balance calculation – AD standard glass

The results below are the environmental impacts that are presented in line with instructions from EN 17213 appendix C. It is worth noting that some units are differing from units that are presented in results for the LCA. For comparison, multiply the result below by the following factors:

Acidification: 1.31 to report kg SO2, eq as mol H +, eq
Eutrophication: 0.33 to report kg PO4-3, eq. Kg P, eq
Photochemical Ozone Creation Potential: 1.69 to report kg C2H4, eq as kg NMVOC, eq

Yearly environmental impacts			
Environmental impact category	**Unit**	**Environmental impacts of heating, natural gas**	**Environmental impacts of cooling, electricity**
Global Warming Potential	kg $CO_{2,eq}$	26,56	0,26
Ozone Depletion Potential	kg $CFC\text{-}11_{eq}$	2,62E-06	1,29E-08
Acidification Potential	kg $SO_{2,eq}$	2,21E-02	1,05E-03
Eutrophication Potential	kg $PO_4^{-3},_{eq}$	2,75E-03	4,61E-04
Photochemical Ozone Creation Potential	kg C_2H_4	1,55E-02	5,67E-04
Abiotic Depletion Potential, minerals & metals	kg $Sb,_{eq}$	3,31E-05	2,23E-05
Abiotic Depletion Potential, fuels.	MJ	377	40

Annex C – Voluntary use stage scenario based on energy balance calculation – AD2 standard glass

Use stage environmental impacts illustrates the annual environmental impacts due to the energy balance of the windows, based on Stockholm heating demand average and an energy balance formula based on the described scenario.

General information		
		Comments
Heating method according to EN 17213 annex C	District heating from natural gas	LCI dataset: Heat, central or small-scale, natural gas {RER}| market group for | Cut-off, U
Cooling method according to EN 17213 annex C	Electricity powered air cooler	LCI dataset: Electricity, low voltage {SE}| market for | Cut-off, U
Climate Zone	III	According to Swedish building standards, used climate file: "Stockholm 1981-2010" from the Swedish Meteorological and Hydrological Institute
Annual average temperature	6,6 °C	Stockholm
Min indoor temperature	21 °C	Heating stops at this temperature
Max indoor temperature	27 °C	Cooling stops at this temperature
Cooling Factor	3	kWh cooling delivered per kWh of electricity
Model (Calculation)	Single room	
Orientation	West (270°)	
Calculation method	Hourly	
Modelling program	VIP-Energy 4.3.2	Modeled as a 1 m^2 room with concrete flooring and no walls or internal loads
Environmental Impact assessment model	Environmental Footprint 3.0	

Technical specifications	
U-value	1,18 w/m^2, K
Gg-value	60 %
Gw-value	24 %
Air leakage class	4
Air leakage flow at +/- 50 Pa	0,2 l/s,m^2
Daylight factor, LT-value	75 %
Glass/frame ratio	0,40
Total heating demand	100,7 kWh heat/year
Total cooling demand	6,31 kWh electricity/year

Annex C – Voluntary use stage scenario based on energy balance calculation – AD2 standard glass

The results below are the environmental impacts that are presented in line with instructions from EN 17213 appendix C. It is worth noting that some units are differing from units that are presented in results for the LCA. For comparison, multiply the result below by the following factors:

Acidification: 1.31 to report kg SO2, eq as mol H +, eq
Eutrophication: 0.33 to report kg PO4-3, eq. Kg P, eq
Photochemical Ozone Creation Potential: 1.69 to report kg C2H4, eq as kg NMVOC, eq

Yearly environmental impacts			
Environmental impact category	**Unit**	**Environmental impacts of heating, natural gas**	**Environmental impacts of cooling, electricity**
Global Warming Potential	kg $CO_{2,eq}$	27,57	0,24
Ozone Depletion Potential	kg $CFC\text{-}11_{eq}$	2,72E-06	1,19E-08
Acidification Potential	kg $SO_{2,eq}$	2,29E-02	9,60E-04
Eutrophication Potential	kg $PO_4^{-3},_{eq}$	2,85E-03	4,23E-04
Photochemical Ozone Creation Potential	kg C_2H_4	1,61E-02	5,21E-04
Abiotic Depletion Potential, minerals & metals	kg $Sb,_{eq}$	3,44E-05	2,05E-05
Abiotic Depletion Potential, fuels.	MJ	391	37

Annex C – Voluntary use stage scenario based on energy balance calculation – AD energy glass

Use stage environmental impacts illustrates the annual environmental impacts due to the energy balance of the windows, based on Stockholm heating demand average and an energy balance formula based on the described scenario.

General information		
		Comments
Heating method according to EN 17213 annex C	District heating from natural gas	LCI dataset: Heat, central or small-scale, natural gas {RER}| market group for | Cut-off, U
Cooling method according to EN 17213 annex C	Electricity powered air cooler	LCI dataset: Electricity, low voltage {SE}| market for | Cut-off, U
Climate Zone	III	According to Swedish building standards, used climate file: "Stockholm 1981-2010" from the Swedish Meteorological and Hydrological Institute
Annual average temperature	6,6 °C	Stockholm
Min indoor temperature	21 °C	Heating stops at this temperature
Max indoor temperature	27 °C	Cooling stops at this temperature
Cooling Factor	3	kWh cooling delivered per kWh of electricity
Model (Calculation)	Single room	
Orientation	West (270°)	
Calculation method	Hourly	
Modelling program	VIP-Energy 4.3.2	Modeled as a 1 m^2 room with concrete flooring and no walls or internal loads
Environmental Impact assessment model	Environmental Footprint 3.0	

Technical specifications	
U-value	1,03 w/m^2, K
Gg-value	53 %
Gw-value	22 %
Air leakage class	4
Air leakage flow at +/- 50 Pa	0,2 l/s,m^2
Daylight factor, LT-value	74 %
Glass/frame ratio	0,41
Total heating demand	87,07 kWh heat/year
Total cooling demand	5,87 kWh electricity/year

Annex C – Voluntary use stage scenario based on energy balance calculation – AD energy glass

The results below are the environmental impacts that are presented in line with instructions from EN 17213 appendix C. It is worth noting that some units are differing from units that are presented in results for the LCA. For comparison, multiply the result below by the following factors:

Acidification: 1.31 to report kg SO2, eq as mol H +, eq
Eutrophication: 0.33 to report kg PO4-3, eq. Kg P, eq
Photochemical Ozone Creation Potential: 1.69 to report kg C2H4, eq as kg NMVOC, eq

Yearly environmental impacts			
Environmental impact category	**Unit**	**Environmental impacts of heating, natural gas**	**Environmental impacts of cooling, electricity**
Global Warming Potential	kg $CO_{2,eq}$	23,84	0,23
Ozone Depletion Potential	kg $CFC\text{-}11_{eq}$	2,35E-06	1,11E-08
Acidification Potential	kg $SO_{2,eq}$	1,98E-02	8,93E-04
Eutrophication Potential	kg $PO_4^{-3},_{eq}$	2,47E-03	3,94E-04
Photochemical Ozone Creation Potential	kg C_2H_4	1,39E-02	4,84E-04
Abiotic Depletion Potential, minerals & metals	kg $Sb,_{eq}$	2,97E-05	1,91E-05
Abiotic Depletion Potential, fuels.	MJ	338	34

Annex C – Voluntary use stage scenario based on energy balance calculation – AD2 energy glass

Use stage environmental impacts illustrates the annual environmental impacts due to the energy balance of the windows, based on Stockholm heating demand average and an energy balance formula based on the described scenario.

General information		
		Comments
Heating method according to EN 17213 annex C	District heating from natural gas	LCI dataset: Heat, central or small-scale, natural gas {RER}| market group for | Cut-off, U
Cooling method according to EN 17213 annex C	Electricity powered air cooler	LCI dataset: Electricity, low voltage {SE}| market for | Cut-off, U
Climate Zone	III	According to Swedish building standards, used climate file: "Stockholm 1981-2010" from the Swedish Meteorological and Hydrological Institute
Annual average temperature	6,6 °C	Stockholm
Min indoor temperature	21 °C	Heating stops at this temperature
Max indoor temperature	27 °C	Cooling stops at this temperature
Cooling Factor	3	kWh cooling delivered per kWh of electricity
Model (Calculation)	Single room	
Orientation	West (270°)	
Calculation method	Hourly	
Modelling program	VIP-Energy 4.3.2	Modeled as a 1 m^2 room with concrete flooring and no walls or internal loads
Environmental Impact assessment model	Environmental Footprint 3.0	

Technical specifications	
U-value	1,06 w/m^2, K
Gg-value	53 %
Gw-value	21 %
Air leakage class	4
Air leakage flow at +/- 50 Pa	0,2 l/s,m^2
Daylight factor, LT-value	74 %
Glass/frame ratio	0,40
Total heating demand	90,69 kWh heat/year
Total cooling demand	5,37 kWh electricity/year

Annex C – Voluntary use stage scenario based on energy balance calculation – AD2 energy glass

The results below are the environmental impacts that are presented in line with instructions from EN 17213 appendix C. It is worth noting that some units are differing from units that are presented in results for the LCA. For comparison, multiply the result below by the following factors:

Acidification: 1.31 to report kg SO2, eq as mol H +, eq
Eutrophication: 0.33 to report kg PO4-3, eq. Kg P, eq
Photochemical Ozone Creation Potential: 1.69 to report kg C2H4, eq as kg NMVOC, eq

Yearly environmental impacts			
Environmental impact category	**Unit**	**Environmental impacts of heating, natural gas**	**Environmental impacts of cooling, electricity**
Global Warming Potential	kg $CO_{2,eq}$	24,83	0,21
Ozone Depletion Potential	kg $CFC\text{-}11_{eq}$	2,45E-06	1,01E-08
Acidification Potential	kg $SO_{2,eq}$	2,06E-02	8,17E-04
Eutrophication Potential	kg $PO_4^{-3},_{eq}$	2,57E-03	3,60E-04
Photochemical Ozone Creation Potential	kg C_2H_4	1,45E-02	4,43E-04
Abiotic Depletion Potential, minerals & metals	kg $Sb,_{eq}$	3,09E-05	1,75E-05
Abiotic Depletion Potential, fuels.	MJ	352	31

General information

Programme information	
Programme:	The International EPD® System
Address:	EPD International AB Box 210 60 SE-100 31 Stockholm Sweden
Website:	www.environdec.com
E-mail:	info@environdec.com

CEN standard EN 15804 serves as the Core Product Category Rules (PCR)

Product category rules (PCR): Construction products and construction services. Version 1.1

PCR review was conducted by: PCR Committee: IVL Swedish Environmental Research Institute, Swedish Environmental Protection Agency, SP Trä, Swedish Wood Preservation Institute, Swedisol, SCDA, Svenskt Limträ AB, SSAB
Moderator: Martin Erlandsson, IVL Swedish Environmental Research Institute

Independent third-party verification of the declaration and data, according to ISO 14025:2006:

☐ EPD process certification ☒ EPD verification

Third party verifier: Martyna Mikusinska, Sweco, Individual verifier approved by the International EPD® System

Procedure for follow-up of data during EPD validity involves third party verifier:

☐ Yes ☒ No

The EPD owner has the sole ownership, liability, and responsibility for the EPD.

EPDs within the same product category but from different programs may not be comparable. EPDs of construction products may not be comparable if they do not comply with EN 15804. For further information about comparability, see EN 15804 and ISO 14025.

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