Environmental Product Declaration

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

Aluminium windows series 'AWS60'

by

Serr.All. Industria Serramenti S.r.l.

Program:	International EPD® System , www.environdec.com
Program Operator :	EPD International AB
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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

General information

Program information

Program:	The International EPD® System
Address:	EPD International AB Box 210 60 SE-100 31 Stockholm Sweden
Website:	www.environdec.com
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Responsibility for PCRs, LCA and independent third-party verification
Product Category Rules (PCRs)
The standard EN 15804 serves as the Core Product Category Rules (PCRs)
Product Category Rules (PCRs): PCR 2019:14 "Construction products" v.1.11. e C-PCR-007 (TO PCR 2019:14) Windows and door (EN 17213:2020) version 2020-04-09.
The PCR review was conducted by: The Technical Committee of the International EPD® System
Life Cycle Assessment (LCA)
LCA study conducted by: Daniela Leonardi, Federico Sisani - TREE S.r.l., Via Settevalli 131/F - 06129 Perugia (PG) Italy.
Third-party verification
Independent third-party verification of the declaration and data, according to ISO 14025, by: ☒ EPD verification by an accredited certification body Third-party verification: RINA is an approved certification body responsible for third-party verification The certification body is authorised by: Accredia
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.

Company information

Owner of the EPD: Serr.All. Industria Serramenti S.r.l.

Contact person: Nicola Moriconi, R&D Analyst, nicola.moriconi@serrall.com, +39 366 7563936

Description of the organisation: Serrall S.r.l. was founded in 1979 as a manufacturer of aluminium windows and doors. In 1980 it expanded into modular constructions and acoustic insulation. In 2017 it merged with Panurania to form Urania Group with its brands Panurania, Serrall and Panhouse. In 2019, Urania Group renews its commitment to be the supplier of panels and fixtures for its customers by opening a new office in France. Urania Group is also committed to a 4x0 mission: zero structural problems, zero rework, zero visible fixings, zero material waste.
Serrall designs and manufactures aluminium and PVC windows and doors for traditional and modular construction. Aluminium products are manufactured by machining both cold and thermal cut materials. Precision welding systems are used for PVC frames and high-performance cutting and bending equipment for processing zinc, stainless steel and aluminium sheets.
Serrall also designs and manufactures thermo-acoustic and thermo-insulating panels, preparing them already for assembly.

Product-related or management system-related certifications: ISO 9001 and UNI EN 14351-1

Name and location of production site(s): Plant in Corciano (PG) Via Anna Maria Mozzoni, 10 Z.I. Taverne - 06073 Corciano, Perugia (PG) Italy.

Product information

Product name: Aluminium window series 'AWS60'

Product identifier: AWS60

Product description: Window made of thermal break extruded aluminium profiles, frame construction depth 60 mm, sash construction depth 70 mm, EPDM sealing gaskets (DIN 6873), glazing thickness up to 52 mm, simply-smart system, installation on any panel thickness through adaptable subframe systems. CE-marked in accordance with UNI EN 14351-1.

UN CPC Code: 4212, Doors, windows and their frames and thresholds for doors, of iron, steel or aluminium.

Geographical scope: Italy and European countries depending on market conditions.

LCA information

Declared unit: 1 m^2 of aluminium window frame. According to EN 17213, the indicators were calculated for windows with a standard size of 1.48 m x 2.18 m (area > 2.3 m^2).

Aim and scope of the study: This EPD assesses the environmental impacts and parameters of 1 m^2 of aluminium window frames "from cradle to gate with options" (end-of-life and recycling). Therefore this is a "cradle to gate with options" EPD with modules A4-A5,C1-C4 and D.

System diagram:

Life cycle stages	Information modules	Type of EPD			
		a) Cradle to gate with module C1-C4 and module D [1)]	b) Cradle to gate with module C1-C4, module D and optional modules [2)]	c) Cradle to grave and module D	f) Construction service EPD: Cradle to gate with modules A1-A5 and optional modules
A1-A3 Product stage	A1) Raw material supply A2) Transport A3) Manufacturing	Mandatory	Mandatory	Mandatory	Mandatory
A4-A5 Construction process stage	A4) Transport A5) Construction installation	—	Optional for goods Mandatory for services (see alternative f) *Recommended if a default scenario can be defined*	Mandatory	Mandatory
B Use stage	B1) Use B2) Maintenance B3) Repair B4) Replacement B5) Refurbishment B6) Operational energy use B7) Operational water use	—	Optional	Mandatory	Optional
C End of life stage	C1) Deconstruction, demolition C2) Transport C3) Waste processing C4) Disposal	Mandatory	Mandatory	Mandatory	Optional
D Benefits and loads beyond the system boundary	D) Reuse, recovery, recycling, potential	Mandatory	Mandatory	Mandatory	—
Declared or functional unit		Declared unit	Declared unit	Functional unit	Declared unit
Inclusion of reference service life (RSL)		Optional	Mandatory if any module in B is included	Mandatory	—

1, 2) An EPD may exclude the declaration of modules C1-C4 and module D if the requirements listed in Section 2.2.2 are met. These EPDs are then referred to as "d) Cradle to gate (A1–A3)" and "e) Cradle to gate with options", respectively.

Reference service life: No RSL was declared. This EPD is based on a "from cradle to gate with options" assessment.

Temporal representativeness: 2021

Database and LCA software used: Ecoinvent 3.6 and SimaPro 9.1.1. 1

The assessment of impacts was calculated using the EN 15804+A2 /EF 3.0 *normalisation and weighting set method.*

System boundaries:

Modules A1-A3: In module A1, the procurement of raw materials, the packaging of raw materials (or secondary packaging) and electrical consumption were considered. In module A2, the transport of raw materials, the transport of finished product packaging, the transport of auxiliary materials and in-plant transport (internal logistics) were considered. In module A3, auxiliary materials and their packaging, waste produced by the factory, packaging of the finished product and atmospheric emissions from the production process were considered.

Modules A4-A5: The distribution of the finished AWS60 product to the installation sites (A4) and its transport (A5) were considered.

Module C1: This phase was not included in the study as it was considered negligible.

Module C2: This module concerns the process of transporting waste from the installation site to the disposal site. The following assumptions were made for the distance between installation site and disposal site/centre: transport to treatment - average distance 20 km, transport to disposal - average

distance 30 km. The percentages (%) of transport to disposal and treatment are estimated according to paragraph B.3 of EN 17213:2020.
Modules C3-C4: With regard to treatment and disposal at the end of the useful life of the window frame, the scenarios considered most significant were chosen. Regarding the treatment and disposal scenario, it was assumed that at the end of the product's useful life, it would be disposed of according to the breakdown adopted by the EN 17213:2020 standard for the materials making up the metal-framed window frame (Annex B.3 End-of-life).

Module D: In this module, net quantities (expressed as the difference between output and input quantities at the system boundaries) in kg/m^2 of materials recovered from the recycling process were considered. The waste sent to the recycling processes was multiplied by substitution factors (see values below) of virgin raw materials, in order to consider the actual production of secondary raw material. The following virgin raw material substitution factors were assumed (Rigamonti, L., Grosso, M., 2009. Waste recycling. Life cycle analysis of packaging materials) according to the material considered:

- 80% for plastics (HDPE, PET, Polypropylene, etc.);
- 50% for paper and cardboard;
- 100% for wood, ferrous materials, steel and aluminium;
- 80% for glass.

The energy contribution from the utilisation of incineration materials was also taken into account: for the AWS60 frame, the PVC of the fabric and the plastics of the ACCESSORIESes and polyamide were considered. These quantities were combined with the Lower Heating Value of the ACCESSORIESes/polyamide (30.79 MJ/kg), and multiplied by the thermal (0.62) and electrical (0.23) efficiency.

Assumptions: For aluminium modelling, the 'European Aluminium Mix' production process was considered, which reports 48% primary aluminium and 52% recycled aluminium (broken down respectively: 31% as post-consumer and 21% as pre-consumer). The data for this modelling were provided by the International Aluminium Institute (IAI) publications 'IAI Material Flow Model - 2021 Update' and supplemented with those of the European Aluminium Association (2019).

Cut-off rules: The inventory data considered in the study represent at least 95% of the total inflows (mass and energy) to Upstream processes, Core processes and Downstream processes. Whatever is not included in the LCA has been specified.
The following fall within the cut-off threshold:

- Iron packaging of raw materials (since returnable);
- End-of-life treatment of finished product packaging;
- Materials and products for extraordinary maintenance of machinery in the plant.

Allocation rules: In order to carry out the calculation of the emissions associated with the production of the different fixture products under analysis, in accordance with the reference PCRs, an initial allocation procedure was carried out through which the product system was divided into sub-processes in order to clearly identify the inventory data to be considered in the study for the product under examination. In particular, the system was organised into the sub-processes production, transport, etc. Following this initial subdivision, since the sub processes identified were common to all the products analysed, a further allocation was made, this time involving the inputs/outputs that were divided between the different products studied.
As the processes to which the raw materials for the production of the different outputs are subjected are identical for each group of window frames (PVC and aluminium), the allocation of the inputs was conducted through physical properties of the different products, i.e. mass. Specifically from the specific weight of each product studied, it was possible for the selected unit of analysis (m^2 finished product) to separate the input materials so as to reflect the physical relationships between the different products.
With regard to the production process understood as energy consumption associated with machinery, auxiliary materials, materials used for the packaging phase, waste produced, emissions released into the environment, etc., the quantity for each product was determined by dividing the total consumption

by the total production of Serr.All. S.r.l. In this case, therefore, reference was made to the entire production of fixtures for the year 2021.
Data quality: For this LCA study, specific data (primary data) was used for the processes that concern the internal processing phases of the Serr.All factory. Therefore, all quantities of raw materials used, energy consumption, waste, and emissions that concern the production cycle of the fixtures are specific data, data provided directly by the company.
Specific data are the distances calculated by the suppliers of the raw materials used and the means of transport used to transport them to the plant (primary data). For upstream processes, available databases were used (secondary data) to schematise the production processes associated with the various input materials (Ecoinvent data). For the disposal phase, assumptions were made on specific scenarios deemed valid (secondary data).

Further information: www.serrall.com/it

Name and contact details of the LCA study manager: Eng. Daniela Leonardi, Tree S.r.l. - Via Settevalli, 131/F 06129 Perugia (PG), Tel: +39 075 5057502, info@tre-eng.com.

Modules declared, geographical scope, share of specific data and data variation:

	Product phase			Construction process phase		Use phase							End-of-life phase				Resource recovery phase
	Procurement of raw materials	Transport	Manufacturing	Transport	Construction installation	Use	Maintenance	Reparation	Replacement	Renovation	Operational Energy Use	Operational Water Use	Demolition, de-construction	Transport	Waste treatment	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	-	-	-	-	-	-	-	X	X	X	X	X
Geographical scope	EUR	EUR	ITA	GLO*	GLO*	-	-	-	-	-	-	-	GLO **	GLO **	GLO	GLO	GLO
Specific data used	97%					-	-	-	-	-	-	-	-	-	-	-	-
Variation - products						-	-	-	-	-	-	-	-	-	-	-	-
Variation - sites						-	-	-	-	-	-	-	-	-	-	-	-

*In the case study, France (FR) was considered as the specific geographical area for phases A4-A5.

**In the case study, a transport distance for waste treatment and disposal of 20 and 30 km respectively was considered, even if this takes place outside national (IT) borders.

Content information

Components for producing 1 m^2 of aluminium window frame series 'AWS60'

Product Components	Weight, kg	Post-consumer material, weight-%	Renewable material, weight-%
ALUMINIUM	11,38	31%	--
GLASS	10,41	-	-
ACCESSORIES	3,25	-	-
CANVAS	4,23	-	-
SKIP	1,63	-	-
POLYAMIDE	1,63	-	-
TOTAL	32,53	-	-
Packaging materials	**Weight, kg**	**Weight-% (compared to product)**	
WOOD	7,470	-	
PLASTIC	0,045	-	
STEEL	0,002	-	
TOTAL	7,517	-	

Within the products under study, there are no Substances of Very High Concern (SVHCs). Within the products under study, the materials (additives) used comply with EC Regulation 1907/2006 (REACH), as also indicated in the declaration provided by the manufacturer of the products.

Environmental Information

Potential environmental impact – mandatory indicators according to EN 15804

Results per 1 m^2 of aluminium fixtures																		
Indicator	**Unit**	**A1**	**A2**	**A3**	**Tot. A1-A3**	**A4**	**A5**	**B1**	**B2**	**B3**	**B4**	**B5**	**B6**	**B7**	**C1**	**C2**	**C3**	**C4**	**D**
GWP-fossil	kg CO_2 eq.	1,94E+02	1,95E+00	5,12E+00	2,01E+02	2,77E-01	4,12E-07	ND	ND	ND	ND	ND	ND	ND	0,00E+00	1,22E-01	1,11E+01	7,25E-02	-6,63E+01
GWP-biogenic	kg CO_2 eq.	1,40E+00	1,02E-03	3,39E-01	1,74E+00	1,37E-04	1,79E-09	ND	ND	ND	ND	ND	ND	ND	0,00E+00	6,54E-05	1,88E-02	3,98E-04	-5,20E-01
GWP-luluc	kg CO_2 eq.	8,33E-01	6,89E-04	1,79E-02	8,52E-01	1,19E-04	7,44E-10	ND	ND	ND	ND	ND	ND	ND	0,00E+00	4,28E-05	-3,44E-04	2,84E-05	-9,14E-01
GWP-total	kg CO_2 eq.	1,96E+02	1,95E+00	5,48E+00	2,03E+02	2,77E-01	4,15E-07	ND	ND	ND	ND	ND	ND	ND	0,00E+00	1,23E-01	1,11E+01	7,30E-02	-6,77E+01
ODP	kg CFC 11 eq.	1,45E-05	4,40E-07	6,36E-07	1,56E-05	6,11E-08	1,74E-14	ND	ND	ND	ND	ND	ND	ND	0,00E+00	2,78E-08	3,10E-07	1,86E-08	-5,61E-06
AP	mol H^+ eq.	1,32E+00	8,26E-03	2,70E-02	1,35E+00	1,11E-03	2,06E-09	ND	ND	ND	ND	ND	ND	ND	0,00E+00	5,01E-04	-2,86E-03	4,81E-04	-4,44E-01
EP-freshwater	kg P eq.	7,06E-02	1,44E-04	1,50E-03	7,22E-02	2,36E-05	2,04E-10	ND	ND	ND	ND	ND	ND	ND	0,00E+00	8,97E-06	-4,09E-04	9,71E-06	-2,10E-02
EP-marine	kg N eq.	2,25E-01	2,54E-03	7,88E-03	2,35E-01	3,21E-04	3,90E-10	ND	ND	ND	ND	ND	ND	ND	0,00E+00	1,50E-04	9,22E-04	4,76E-04	-6,24E-02
EP-terrestrial	mol N eq.	2,18E+00	2,78E-02	7,13E-02	2,27E+00	3,51E-03	3,92E-09	ND	ND	ND	ND	ND	ND	ND	0,00E+00	1,64E-03	4,40E-03	1,74E-03	-6,54E-01
POCP	kg NMVOC eq.	6,51E-01	8,43E-03	2,65E-02	6,86E-01	1,08E-03	1,06E-09	ND	ND	ND	ND	ND	ND	ND	0,00E+00	5,03E-04	1,05E-03	5,07E-04	-2,17E-01
ADP-minerals& metals*	kg Sb eq.	3,84E-03	5,38E-05	9,28E-05	3,98E-03	9,93E-06	7,61E-13	ND	ND	ND	ND	ND	ND	ND	0,00E+00	3,32E-06	1,97E-05	4,77E-07	-5,26E-04
ADP-fossil**	MJ	2,57E+03	2,93E+01	8,30E+01	2,68E+03	4,12E+00	5,34E-06	ND	ND	ND	ND	ND	ND	ND	0,00E+00	1,85E+00	1,21E+00	1,39E+00	-7,31E+02
WDP	m^3	7,92E+01	8,17E-02	1,58E+00	8,09E+01	1,26E-02	6,42E-08	ND	ND	ND	ND	ND	ND	ND	0,00E+00	5,14E-03	2,06E+01	1,41E-02	-1,55E+01
Acronyms	GWP-fossil = Global Warming Potential fossil fuels; GWP-biogenic = Global Warming Potential biogenic; GWP-luluc = Global Warming Potential land use and land use change; ODP = Depletion potential of the stratospheric ozone layer; AP = Acidification potential, Accumulated Exceedance; EP-freshwater = Eutrophication potential, fraction of nutrients reaching freshwater end compartment; EP-marine = Eutrophication potential, fraction of nutrients reaching marine end compartment; EP-terrestrial = Eutrophication potential, Accumulated Exceedance; POCP = Formation potential of tropospheric ozone; ADP-minerals&metals = Abiotic depletion potential for non-fossil resources; ADP-fossil = Abiotic depletion for fossil resources potential; WDP = Water (user) deprivation potential, deprivation-weighted water consumption																		

*** Disclaimer: The results of this environmental impact indicator shall be used with care as the uncertainties of these results are high or as there is limited experience with the indicator.*

Potential environmental impact – additional mandatory and voluntary indicators

Results per 1 m^2 of aluminium fixtures																			
Indicator	**Unit**	**A1**	**A2**	**A3**	**Tot. A1-A3**	**A4**	**A5**	**B1**	**B2**	**B3**	**B4**	**B5**	**B6**	**B7**	**C1**	**C2**	**C3**	**C4**	**D**
GWP-GHG	kg CO_2 eq.	1,90E+02	1,93E+00	5,07E+00	1,97E+02	2,74E-01	4,06E-07	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0,00E+00	1,21E-01	1,11E+01	6,93E-02	-6,50E+01
PM	Disease incidence	1,41E-05	1,44E-07	4,78E-07	1,47E-05	1,69E-08	1,50E-14	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0,00E+00	8,54E-09	-8,60E-08	9,01E-09	-4,99E-06
IRP*	kBq U235 eq.	1,85E+01	1,51E-01	5,13E-01	1,92E+01	2,18E-02	6,00E-08	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0,00E+00	9,52E-03	1,76E-02	7,13E-03	-6,59E+00
ETP-fw**	CTUe	6,76E+03	2,35E+01	1,24E+02	6,91E+03	3,47E+00	7,33E-06	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0,00E+00	1,48E+00	7,08E+02	3,54E+02	-1,57E+03
HTP-c**	CTUh	3,92E-07	6,73E-10	1,13E-08	4,04E-07	1,08E-10	8,88E-17	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0,00E+00	4,16E-11	8,59E-10	3,30E-11	-1,55E-07
HTP-nc**	CTUh	5,61E-06	2,54E-08	9,88E-08	5,74E-06	3,66E-09	3,58E-15	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0,00E+00	1,61E-09	1,41E-07	9,12E-10	-2,37E-06
SQP**	dimensionless	6,28E+02	1,95E+01	1,39E+03	2,04E+03	2,45E+00	8,34E-07	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0,00E+00	1,27E+00	-9,97E+00	2,76E+00	-1,31E+02
Acronyms	GWP-GHG = Global Warming Potential, Greenhouse Gas; PM = Potential Human Exposure Efficiency; IRP = Potential Human Exposure Relative to U235; ETP-fw = Potential Comparative Toxicity Unit for Ecosystems; HTP-c = Potential Comparative Toxicity Unit for Humans; HTP-nc = Potential Comparative Toxicity Unit for Humans; SQP = Potential Soil Quality Index																		

** This impact category mainly concerns the possible impact of low-dose ionising radiation on human health from the nuclear fuel cycle. It does not take into account effects from possible nuclear accidents, occupational exposure or the disposal of radioactive waste in underground facilities. Potential ionising radiation from soil, radon and some building materials is also not measured by this indicator.*

*** Disclaimer: The results of this environmental impact indicator should be used with caution as the uncertainties of these results are high or experience with the indicator is limited.*

Use of resources

Results per 1 m^2 of aluminium fixtures																			
Indicator	**Unit**	**A1**	**A2**	**A3**	**Tot. A1-A3**	**A4**	**A5**	**B1**	**B2**	**B3**	**B4**	**B5**	**B6**	**B7**	**C1**	**C2**	**C3**	**C4**	**D**
PERE	MJ	3,21E+02	4,18E-01	6,86E+01	3,90E+02	7,00E-02	5,86E-07	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0,00E+00	2,61E-02	0,00E+00	3,54E-02	-3,49E+02
PERM	MJ	6,79E+00	0,00E+00	1,34E+02	1,41E+02	0,00E+00	0,00E+00	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
PERT	MJ	3,28E+02	4,18E-01	2,03E+02	5,31E+02	7,00E-02	5,86E-07	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0,00E+00	2,61E-02	0,00E+00	3,54E-02	-3,49E+02
PENRE	MJ	1,80E+03	2,91E+01	7,70E+01	1,91E+03	4,09E+00	5,33E-06	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0,00E+00	1,84E+00	1,23E+00	1,35E+00	-7,30E+02
PENRM	MJ	4,13E-02	0,00E+00	1,01E+00	1,05E+00	0,00E+00	0,00E+00	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
PENRT	MJ	1,80E+03	2,91E+01	7,80E+01	1,91E+03	4,09E+00	5,33E-06	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0,00E+00	1,84E+00	1,23E+00	1,35E+00	-7,30E+02
SM	kg	7,10E+00	5,91E-03	6,17E-02	7,17E+00	9,39E-04	1,12E-09	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0,00E+00	3,63E-04	0,00E+00	3,05E-04	-2,98E-01
RSF	MJ	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
NRSF	MJ	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	5,63E-09	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0,00E+00	0,00E+00	2,74E-02	0,00E+00	-4,08E+00
FW	m^3	2,91E+00	3,10E-03	5,11E-02	2,97E+00	4,90E-04	2,94E-09	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0,00E+00	1,95E-04	6,21E-01	1,51E-03	-9,27E-01
Acronyms	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

Results per 1 m² of aluminium fixtures																			
Indicator	**Unit**	**A1**	**A2**	**A3**	**Tot. A1-A3**	**A4**	**A5**	**B1**	**B2**	**B3**	**B4**	**B5**	**B6**	**B7**	**C1**	**C2**	**C3**	**C4**	**D**
Hazardous waste disposed	kg	7,93E-02	7,70E-05	1,85E-04	7,96E-02	1,11E-05	1,89E-12	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0,00E+00	4,84E-06	-7,14E-02	1,53E-06	-8,72E-04
Nonhazardous waste disposed	kg	3,11E+01	1,34E+00	1,59E+00	3,40E+01	1,62E-01	2,56E-08	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0,00E+00	8,83E-02	3,57E+00	8,20E+00	-1,73E+01
Radioactive waste disposed	kg	7,08E-03	1,99E-04	2,86E-04	7,57E-03	2,78E-05	1,68E-11	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0,00E+00	1,26E-05	3,34E-05	8,53E-06	-2,53E-03

Output flows

Results per 1 m² of aluminium fixtures																			
Indicator	**Unit**	**A1**	**A2**	**A3**	**Tot. A1-A3**	**A4**	**A5**	**B1**	**B2**	**B3**	**B4**	**B5**	**B6**	**B7**	**C1**	**C2**	**C3**	**C4**	**D**
Components for re-use	kg	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
Material for recycling	kg	0,00E+00	0,00E+00	3,05E+00	3,05E+00	0,00E+00	0,00E+00	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0,00E+00	0,00E+00	1,73E+01	0,00E+00	0,00E+00
Materials for energy recovery	kg	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0,00E+00	0,00E+00	6,80E+00	0,00E+00	0,00E+00
Exported energy, electricity	MJ	0,00E+00	0,00E+00	2,63E-02	2,63E-02	0,00E+00	0,00E+00	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0,00E+00	0,00E+00	0,00E+00	0,00E+00	-3,96E+01
Exported energy, thermal	MJ	0,00E+00	0,00E+00	7,09E-02	7,09E-02	0,00E+00	0,00E+00	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0,00E+00	0,00E+00	0,00E+00	0,00E+00	-1,07E+02

Information on biogenic carbon content

Results per 1 m^2 of aluminium fixtures		
BIOGENIC CARBON CONTENT	**Unit**	**QUANTITY**
Biogenic carbon content in product	kg C	-
Biogenic carbon content in packaging	kg C	4.39

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

Interpretation of results

The results show that in the lifecycle of Serrall's aluminium windows series 'AWS60', the greatest impact for the impact categories considered by the method used EN 15804+A2/EF 3.0 (normalisation and weighting set) is due to phase A1) Procurement of raw materials (98.3%).

In fact, the raw materials used to manufacture the product, including: 33.2 double glazing with low emissivity glass (25.3%) and the external all 104mm RAL 9010 profile (9.43%) compared to the other phases analysed. Phase A1 contributes the most on all impact categories analysed.

Next, there are significant impacts for phase A4) Transport for the distribution of the finished product to the installation sites. Due essentially to the overland transport (by lorry) of the fixtures in France, Germany, Spain, the Netherlands and Belgium.

In phase A3) Production, the greatest impact, for the Climate Change-fossil impact category, for the aluminium windows frame series 'AWS60' is given by the phase related to the packaging of the finished product (53.1%). In phase A2) Transport, the greatest impact for the analysed Climate Change category is given by the transport of raw materials by the supplier's carrier (65.7%).

With module D 'benefits and loads beyond the system boundaries', the actual avoided production of raw materials was calculated, taking into account the quantities of waste sent to recycling processes (ferrous materials, aluminium, plastics, glass) and the energy recovery from incinerated materials. The positive contributions of module D are most evident on the impact categories Climate Change, Eutrophication and Acidification.

References

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