ENVIRONMENTAL PRODUCT DECLARATION

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

ALUMINIUM WINDOWS

AEA

Asociación Española del Aluminio y Tratamientos de Superficie

EPD®

S-P-02163

GlobalEPD

A VERIFIED ENVIRONMENTAL DECLARATION

GlobalEPD-IntEPD S-P-02163

EPD Program	The International EPD® System. www.environdec.com
Programme operator	EPD International AB
CPC Code	42120 Doors, windows and their frames and thresholds for doors, of iron, steel or aluminium
Based on	PCR 2019:14 Construction Products v1.0 and C-PCR-007 (to PCR 2019:14) Windows and Doors (EN 17213:2020) version:2020-04-09
Declaration number	S-P-02163
Publication date	2020-07-22
Valid until	2025-07-22
Market coverage	Worldwide

(*) 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

SUMMARY

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ABOUT AEA

The Aluminium Spanish Association (Asociación Española de Aluminio – AEA) is a non-profit association that represents the Spanish aluminium industry and watches over the defense of its global interests.

The AEA is composed of 89 members, including extruders, lacquers and anodizers, as well as suppliers of quality services and raw materials such as primary and secondary aluminium, powder coating, thermal break profiles (TB) and chemical products for surface treatments.

The information in this document is based on data supplied by 18 AEA member who have produced a comprehensive industry-wide environmental product declaration (EPD) for aluminium windows. The data comes from 18 separate production facilities, with a total of 38 extrusion presses, 13 anodizing lines, 20 coating lines and 1 cast house that produces secondary extrusion billet starting from post-industrial and consumer aluminium scrap. 3 of these 18 companies have own cast house to recycle the post-industrial aluminium scrap produced in their installations. Two manufacturers of polyamide profiles (TB) and a manufacturer of chemical products (used in anodizing and coating) have also participated in the generation of the inventories. Four companies that design systems for facade cladding have also provided data. In aggregate, the data-contributing installations have a production capacity of more than 280.000 ton of aluminium profiles, about 74% of total AEA production and 62% of the total Spanish production.

PARTICIPATING COMPANIES

CORTIZO

ANODIAL

exlabesa
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Ensinger

itesal
sistemas

AV ALUMITRAN S.L.

ALUVAL
DISEÑO, FABRICACIÓN Y DISTRIBUCIÓN DE ALUMINIO

ALUEUROPA

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ALAS IBERIA
aluminium

TECHNOFORM

EXTRUAL
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ALSAN
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PRODUCT

Product description

This EPD covers aluminium windows assembled with extruded aluminum profiles manufactured by AEA members in Spain. The products considered in this declaration are different windows with frame width of 45 mm - 50 mm (grouped as window 45 - 50) and 70 mm - 75 mm (grouped as window 70 - 75).

The results are an average representative of the windows produced with aluminium profiles manufactured by AEA members. Averages are obtained through aggregating production-weighted data from the participating companies. For this reason, this EPD does not relate to specific products from one manufacturer, but covers average products that are not available for purchase on the market.

Applications

Windows are used in building and construction applications as cladding for facade hollows.

Technical data

Technical data for declared products can be found in the table below. Most relevant standards for applications of aluminium window in buildings are EN 14351-1 (performance characteristics) and EN 12519 (terminology).

Composition

The windows consist of an aluminium profile frame and an aluminium profile sash with an insulating glass unit (IGU). Aluminium profiles are powder coated to produce coloured and smooth surfaces, and thermally broken with a reinforced polyamide strip. Fittings are used to reinforce the frame and sash (corner conections) and to allow window opening (tilt & turn). To ensure the air and water tightness of the window, components made of EPDM and other plastics are installed (gaskets).

This EPD covers two product groups based on two representative products whose compositions are shown below. Products not contain any substance included in the list of Substances of Very High Concern with concentrations higher than 0.1% in weight.

Packaging

The windows are generally transported directly to the building site from carpentry in trucks or vans. These vehicles usually have an inverted “V” pallet, so that the windows are placed vertically during the journey. Windows are separated from each other by cardboard sheets or corners. The windows can be protected with plastic film and secured with straps or other elements. These packaging materials are included in the scope of this EPD.

Reference service life and use phase

According to the recently approved standard EN 17213 a reference service life of 30 years is assumed without IGU replacement.

	Window 45 - 50	Window 70 - 75
Frame width	45 mm - 50 mm	70 mm - 75 mm
Surface treatment	Powder coating	
Dimensions	1.23 m x 1.48 m	
Opening	turn and tilt single-sash	
Thermal break	12 mm	32 mm
IGU	4 - 16Ar - 4 BE	
Thermal insulation (W/m^2K) UNE-EN 10077-2	2	1,5
Air tightness UNE-EN 12207	Class 4	
Water tightness UNE-EN 12208	9A	E1200
Acoustic insulation Rw (C;Ctr) UNE-EN ISO 12354	31 (-1;-5)	
Wind load resistance UNE -EN 12210	C5	

	Window 45 - 50	Window 70 - 75
Aluminium profile	**14,0kg**	**16,1g**
Aluminium	85,0%	82,7%
Polyamide + glass fiber (TB)	8,2%	11,8%
Polyster (powder coating)	6,8%	5,4%
IGU	**30,0kg**	
Flat glass	47,6%	
Low emissive flat glass	47,6%	
Aluminium	1,0%	
Polybutadiene	0,05%	
Zeolite	2,3%	
Argon	0,1%	
Polysulphur	1,3%	
Fittings and gaskets	**4,8kg**	**7,1kg**
Aluminium die cast	20,0%	33,4%
Steel	4,1%	2,8%
Stainless steel	12,8%	12,2%
Zamak	20,6%	11,4%
ABS	1,7%	1,2%
EPDM	36,7%	34,2%
PA	2,9%	3,2%
PE	1,2%	1,5%
Total	**48,8 kg**	**53,1kg**
Recycled material	**11,8%**	**10,9%**
Renovable material	-	-

Packaging		
Cardboard	0,16kg - 0,33% (*)	0,16kg - 0,3% (*)
Plastic film	0,21kg - 0,43% (*)	0,21kg - 0,43% (*)
Biogenic carbon	0,064kg C	

(*) Versus product

Recycling and disposal

Aluminium products are highly recyclable. During aluminium profile production, all post-industrial scrap (extrusion drop-offs from cutting, unfit material and discards, etc.) is fed back into the billet production process. Proceed in the same way with the aluminum cutouts generated during the assembly of the window. Some AEA members operate their own scrap smelting facilities in addition to purchasing billet from external secondary smelters or from primary aluminium manufacturer.

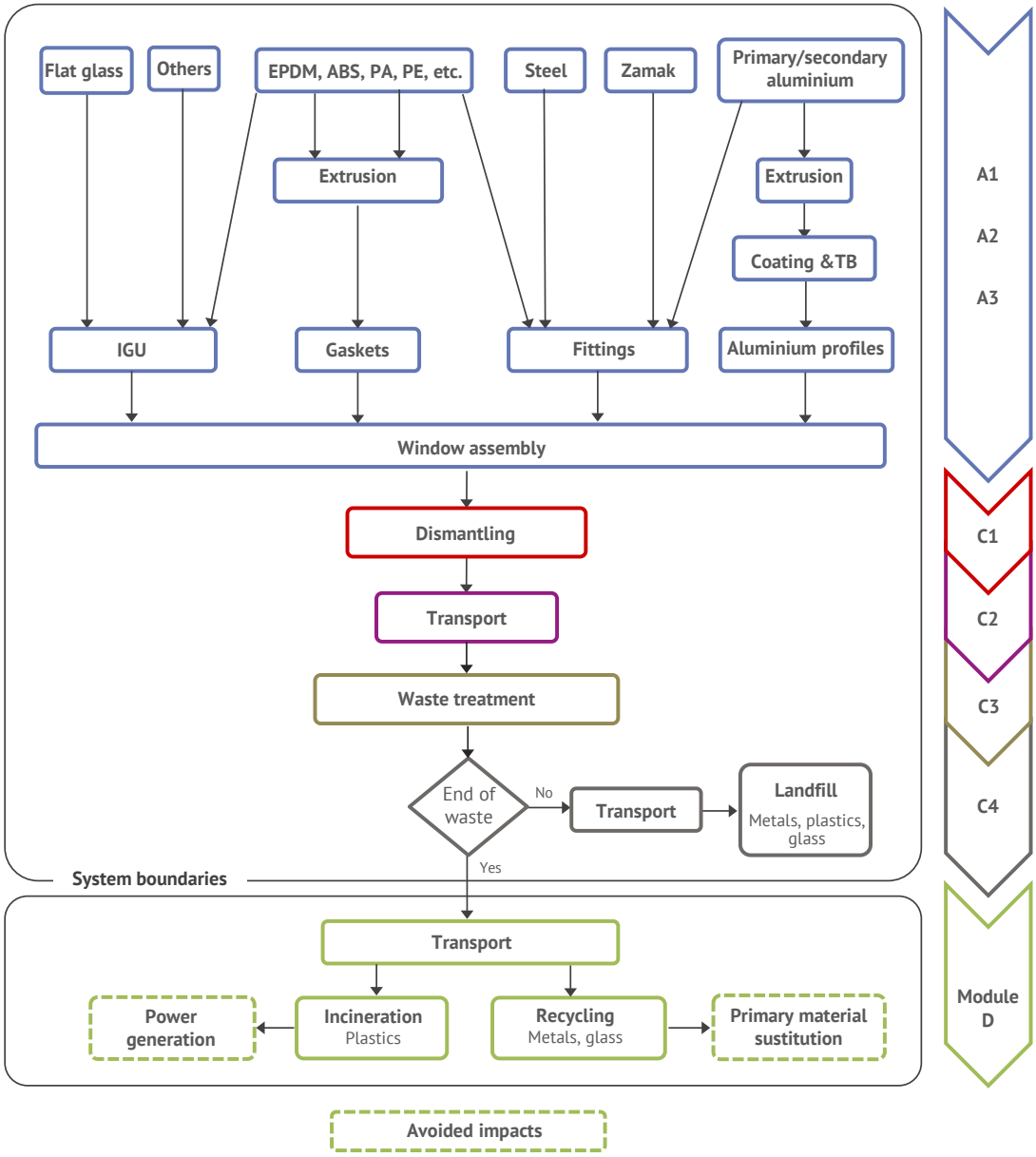
When an aluminium building product reaches the end of its life, it is systematically and selectively collected and sent to recycling facilities for secondary billet production. A collection rate for aluminium products next to 95% is well documented in construction sector and included as default value in EN 17213. Finally, recycling rate depends on smelting yield that includes metal losses during scrap preparation and melting.

Hence, aluminium supply at the beginning of the product system has a content of recycled material from post-industrial and post-consumer scrap with the consequent reduction of environmental burdens. In module D are reported only the net benefits of recycling, i.e. the burder savings at the end of life minus the benefits already considered in the module A1 due to secondary aluminium content. In this EPD, the scrap not collected at the end of life (5%) is sent to landfill.

For the rest of the components of the windows, i.e. IGU, fittings and gaskets, EoL scenarios have been setup according to default values specified in EN 17213.

System boundaries

The scope of the study is set to be "Cradle-to-gate with options". Processes included in the assessment are presented on the diagram below.



LCA INFORMATION

Declared unit

The declared unit is 1 m^2 of a single-sash window with a tilt and turn opening. According to EN 17213, indicators have been calculated for windows with a standard size of 1.23 m x 1.48 m and then divided by 1.84 m^2 to declare the environmental impacts and others parameters per 1 m^2 of product.

Goal and scope

This EPD evaluates the environmental impacts and parameters of 1 m^2 of window from cradle to gate with options (end of life and recycling). Hence, this is a cradle to gate EPD with C1-C2-C3-C4-D modules.

This EPD is the basis for B2B communication for customers and relevant stakeholders within the building sector.

System boundaries

This EPD provides information on the production stage of the aluminium profiles (raw material supply, transport to plants and manufacturing), IGU, fittings and gaskets and their end-of-life. Recycling potential of aluminium and others materials with burdens saving due to use in a second product systems is also reported. The information is presented in a modular way separated in the following stages.

A1-3 - Cradle to gate

The aggregation of the modules A1, A2 and A3 is allowed by EN 15804. This rule is applied in this EPD and denoted by A1-3. This module represents the manufacture and packaging of aluminium profiles (including extraction and processing of raw materials and the transport to production sites), the production of the rest of the components of the windows (IGU, fittings and gaskets), the transport of these components and the windows assembley. Packaging of windows is also included in this module.

C1 - De-construction

No information was found in the life cycle databases consulted for the dismantling operations of windows, nor was there a bibliography regarding the inputs or residues generated during these operations.Then there is no contribution on impact categories of this module. In order to make the results tables lighter, this module is not

Stage	Production			Construction		Use							End-of-life				Resource recovery
Module	Raw materials supply	Transport	Manufacturing	Transport	Installation	Use	Maintenance	Repair	Replacement	Refurbishment	Operational energy use	Operational water use	De-construction	Transport	Waste processing	Disposal	Reuse, recovery or recycling potentials
	A1	A2	A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
Declared module	X	X	X	ND	ND	ND	ND	ND	ND	ND	ND	ND	X	X	X	X	X
Geography	EU	EU	ES	-	-	-	-	-	-	-	-	-	ES	ES	ES	ES	EU
Specific data	97%			-	-	-	-	-	-	-	-	-	-	-	-	-	-
Variation - products (1)	±3.1%			-	-	-	-	-	-	-	-	-	-	-	-	-	-
Variation - plants (2)	+7.0% / -4.1%			-	-	-	-	-	-	-	-	-	-	-	-	-	-

(1) Maximum variation for all declared products - (2) Maximum variation for all manufacturers
ND - Not declared

shown.

C2 - Transport to waste processing

A distance of 200 km has been assumed for the transport to scrap dealers. Transport is calculated on the basis of a scenario with the parameters described in the attached table.

C3 - Waste processing for reuse, recovery and/or recycling

It has been assumed that during the scrapping operations the same electricity is consumed as during the assembly of windows.

C4 - Final disposal

End of life scenarios, routes for final disposal, recovery rates and efficiencies in recycling for all components are modelled based on default figures provided by EN 17213 (see attached table).

D - Allocation by reuse, recovery or recycling

For aluminium profiles, module D report the environmental burden of recycled scrap generated at the end of life minus that used at the production stage. Scrap inputs to the production stage are subtracted from scrap to be recycled at end of life in order to obtain the net scrap output from the product system. This remaining net scrap is then sent to recycling. Loads and benefits are assessed at the point of functional equivalence, i.e. where the substitution of primary aluminium takes place.

Parameters, C2 module	
Transport by road (1)	Lorry, 17.3 t max payload
Diesel consumption (l/km)	0.221
Distance (km)	200
Volume capacity utilization	100%
Mass capacity utilisation	67%

(1) Technology mix, Euro 0, 1, 2, 3, 4

Parameters, C3 module	
Energy carrier	Electricity, low voltage {ES}
Consumption (kWh) (1)	1.27

(1) For declared unit

Parameters, C4 and D modules	
Recovery rate for metals (recycling)	95%
Recovery rate for glass (recycling)	30%
Recovery rate for plastics (energy valorization)	95%
Metals and plastics to landfill	5%
Glass to landfill	70%
Efficiency for materials recycling	90%
Efficiency for energy valorization	60%

This criteria is also applied in the case of other metals and glass that are sent to recycling.

Time representativeness

All primary data used in this EPD are based on the 2017 production data for aluminium profiles manufactured by AEA members in their facilities in Spain. Data for IGU, fittings, gasket and other environmental aspects during windows assembly are based on information updated to 2020.

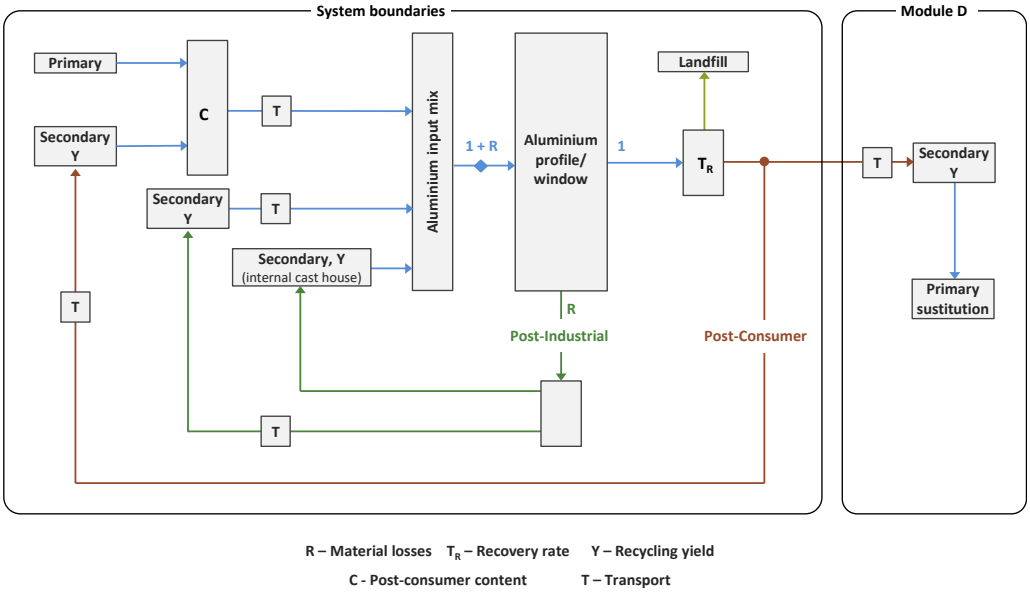
Database(s) and LCA software used

The data for primary aluminium billet and for scrap remelting (secondary aluminium billet) are based on LCI dataset published by European Aluminium in february 2018 and are the best available. For transport processes the ELCD 3.2 database was consulted. Other LCI datasets were sourced from Ecoinvent v3.3.

The LCA study was performed using an excel-based model. The impact assessment results were calculated using characterization factors of EF 2.0 method from EC-JRC available at http://eplca.jrc.ec.europa.eu/LCDN/developerEF.xhtml.

Data Quality

The data quality can be considered as good. The LCA models have been checked and most relevant flows are considered. In order to achieve precision, consistency and representativeness and to ensure reliable results, first-hand industry data were used. All foreground data were collected from AEA participating companies for their facilities using customized data collection templates. It was created representative production-weighted inventories. These



inventories are intended to represent average of aluminium profile production for building by AEA members. The age of these data is three years. Exhaustive data for fittings and gaskets were provided by two manufacturers with a complete inventory of all components present in the windows.

Regionally specific datasets were used to model the energy consumption (electricity, natural gas or diesel). For transport, production of raw materials or end-of-life processes datasets were chosen according to their technological and geographical representation of the actual process. The technological and geographical representativeness of 71% of the processes included in the LCA is guaranteed, among which are the most contributing to environmental impacts of the windows (for example 97% for climate change). For the rest of the processes, only geographical or technological representativeness is guaranteed.

Estimates and Assumptions

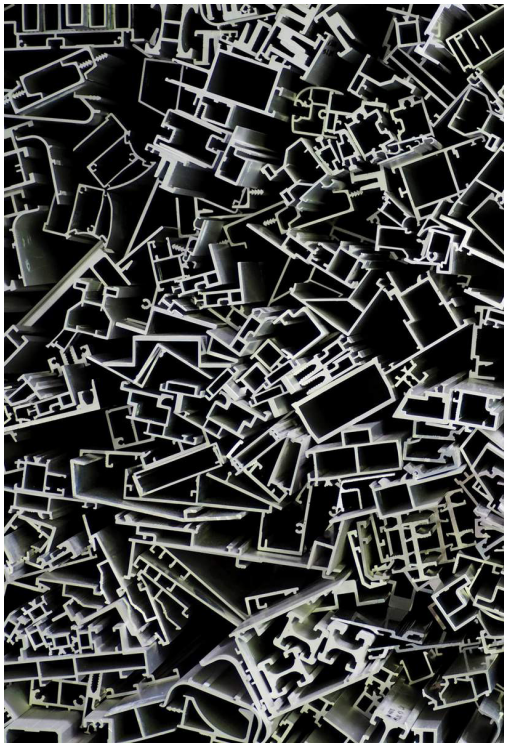
For aluminium profiles, activity data was obtained from inventories that were completed by all the participating companies based on their data on production, consumption of raw materials and energy, and the generation of waste, effluents and emissions. From these inventories, a unitary process was generated for each manufacturer and for each of the phases of the profile manufacturing process. Finally, the unit processes that support this EPD were obtained from the weighted average of the unit processes of all manufacturers for the same phase of the manufacturting process.

In those cases in which the manufacturers could not complete all the environmental aspects that have been included in the calculation, the weighted average value of these environmental aspects has been used. In this way, the integrity of all inventories is guaranteed, making the comparison between them more consistent with the ultimate aim of obtaining maximum and minimum values. At this point it is noteworthy that in most cases, the inventories provided by manufacturers present the most relevant environmental aspects (consumption of energy or main raw materials), being necessary to complete them with those with a lower incidence on the final result.

It was not possible to distinguish the consumption of electricity and natural gas between the production stages of profiles. Based on the total energy consumption in the plants, electricity and natural gas used in the different stages was estimated under the criteria of the technical staff of plants. Total energy consumption was attributed entirely to extrusion, coating and cast house.

Once the energy consumption was attributed to extrusion, coating, anodizing and cast house, it was apportioned among the total production of semi-finished products for each stage. It has proceeded in the same way for raw materials and waste generation.

Because tens of different chemicals are used for surface treatments before coating, their consumption were modeled based on the surface of an average profile. The surface treatments chosen are the most complete and those that require the use of the greatest amount of chemicals per square meter of treated surface, thus attending to a conservative assumption.



Aluminium billets are made from primary aluminium and secondary aluminium (from post-industrial and post-consumer scrap). Billet manufacturers have provided production data for both in order to calculate the recycled content in the aluminum input to the product system: 61% from primary aluminium and 39% from recycling which corresponds to the average recycling input rate of aluminium globally.

Any aluminium scrap produced along the manufacturing of profiles and the cutouts generated in windows assembly are sent back to recycling. This recycling loop has been modeled in all cases as an effective closed loop since there are not inherent properties losses. Hence aluminium windows are the only product exiting the module A1-3 and the system does not deliver co-products. In this way, all aluminium scrap was modeled as burden free when entering the system. Transport to recycling facilities for the scrap generated by from AEA members and carpentry is included anyway.

Materials and weights for fittings and gaskets were obtained from two manufacturers. The average of these inventories has been used as input data to model these components. In the case of IGU, the weight of some components such as glass, aluminum, zeolite, argon, and sealants have been calculated using geometric assumptions based on theirs specifications and using density values from material databases. Environmental aspects as water and electricity consumed during IGU manufacturing and glass cutouts generated were obtained from ecoinvent database.

The window assembly is not performed by AEA members but by other companies as carpentry. Aluminium profiles, fittings and gaskets are transported first to ditribution centers and then to the carpentry on demand. Power consumed in milling and profile cutting is included in the model. These operations are performed in dry conditions and no lubricants are used while shavings and cutouts are sent to recycling. For this phase have been included the EoL of aluminium profiles packaging and the manufacturing of packaging materials of windows. Path for IGU is different because it is transported to building site directly from the place where was manufactured by glaziers.

As it is a sector EPD, the maximum and minimum variation of all indicators has been declared. This range contains the desviation due to the different production facilities included in the study, and also due to the different products represented by the average product. The maximum and minimum values for module A1-3 have been obtained by one side from the individual evaluation for each of the manufacturers that have provided inventories for aluminium profiles, and by other hand, from the evaluation of the two windows of each group (window 45 - 50 and window 70 - 75).

RESULTS

WINDOW 45 -50

BASIC ENVIRONMENTAL IMPACTS	UNIT	A1-3	C2	C3	C4	D	A1-3 mín	A1-3 máx
CC-2013	kg CO_2 eq	115	0,463	0,483	0,297	-12,4	133	155
CC-total	kg CO_2 eq	117	0,469	0,500	0,314	-12,7	136	159
CC-fossil	kg CO_2 eq	117	0,469	0,497	0,314	-12,7	136	159
CC-biogenic	kg CO_2 eq	0,112	0	4,00E-04	0	-1,90E-02	0,145	0,157
CC-luluc	kg CO_2 eq	0,146	0	1,82E-03	0	-2,56E-02	0,201	0,233
OD	kg CFC-11 eq	6,26E-06	7,18E-10	5,81E-08	3,45E-08	-4,88E-07	6,79E-06	9,25E-06
A	mol H^+ eq	0,796	3,13E-03	3,90E-03	1,19E-03	-0,147	0,912	1,029
EAF	kg PO_4^{-3} eq	9,00E-02	5,04E-04	6,15E-04	2,18E-03	-1,86E-02	1,13E-01	1,23E-01
EAM	kg N eq	0,126	1,48E-03	5,54E-04	6,99E-04	-2,09E-02	0,144	0,161
ET	mol N eq	1,33	1,62E-02	5,70E-03	5,45E-03	-0,238	1,48	1,66
POF	kg NMVOC eq	0,371	4,10E-03	1,59E-03	1,52E-03	-6,12E-02	0,419	0,474
AD-non fossil	kg Sb eq	4,00E-03	1,84E-08	3,59E-07	1,25E-07	-3,19E-03	3,35E-03	3,39E-03
AD-fossil	MJ	1545	6,53	9,33	3,217	-185	1764	2125
WU	m^3 eq	5,01	4,92E-03	0,165	3,75E+00	7,64	4,87	6,23
ADDITIONAL ENVIRONMENTAL IMPACTS	UNIT	A1-3	C2	C3	C4	D	A1-3 mín	A1-3 máx
PM	Disease incidence	6,99E-06	2,70E-08	8,70E-09	1,67E-08	-1,17E-06	7,52E-06	8,67E-06
IR	kBq U235 eq	11,4	1,14E-03	0,209	9,24E-03	-3,03	11,7	14,7
EF	CTUe	586	1,50E-02	3,79	33,3	-124	731	787
HT-c	CTUh	7,62E-06	2,42E-10	1,64E-08	9,25E-09	-7,47E-07	1,10E-05	1,21E-05
HT-nc	CTUh	3,57E-05	1,47E-09	7,19E-08	3,52E-07	-2,09E-05	3,49E-05	3,66E-05
LU	Dimensionless	513	0	3,92	3,33	-66,8	416	979

ENVIRONMENTAL IMPACTS. CC-2013: Climatic Change according to EN 15804:2012+A1:2013; **CC-total**: Climatic Change - total; **CC-fossil:** Climatic Change - fossil; **CC-biogenic**: Climate change - biogenic; **CC-luluc**: Climate change - land use and land use change; **OD**: Ozone depletion; **A**: Acidification ; **EAF**: Eutrophication aquatic freshwater; **EAM**: Eutrophication aquatic marine; **ET**: Eutrophication terrestrial; **POF**: Photochemical ozone formation; **AD- non fossil**: Abiotic resource depletion - minerals and metals; **AD-fossil**: Abiotic resource depletion - fossils; **WU**: Water use; **PM**: Particulate matter emissions; **IR**: Ionising radiation; **EF**: Ecotoxicity - freshwater; **HT-c**: Human toxicity, cancer effects; **HT-nc**: Human toxicity, non-cancer effects; **LU**: Land use.

WINDOW 45 - 50

RESOURCE USE	UNIT	A1-3	C2	C3	C4	D	A1-3 min	A1-3 max
PERE	MJ	341	8,72E-03	1,45E+00	3,39E-02	-57,7	351	454
PERM	MJ	0	0	0	0	0	0	0
PERT	MJ	341	8,72E-03	1,45E+00	3,39E-02	-57,7	351	454
PENRE	MJ	1571	6,53E+00	9,51	3,34E+00	-189	1800	2163
PENRM	MJ	0	0	0	0	0	0	0
PENRT	MJ	1571	6,53E+00	9,51	3,34E+00	-189	1800	2163
SM	kg	3,36	0	0	0	0	3,53	4,06
RSF	MJ	0	0	0	0	0	0	0
NRSF	MJ	0	0	0	0	0	0	0
FW	m^3 eq	267	0	3,10	6,81E-02	-48,8	381	429
WASTE CATEGORIES	UNIT	A1-3	C2	C3	C4	D	A1-3 mín	A1-3 máx
HWD	kg	3,20	5,74E-07	0	2,23E-07	0	2,98	4,27
NHWD	kg	15,2	2,59E-04	0	11,7	-2,17	14,4	19,5
RWD	kg	3,60E-02	0	0	0	0	3,50E-02	4,47E-02
OUTPUT FLOWS	UNIT	A1-3	C2	C3	C4	D	A1-3 mín	A1-3 máx
CRU	kg	0	0	0	0	0	0	0
MFR	kg	4,81	0	13,4	0	0	4,18	6,41
MER	kg	0	0	1,07	0	0	0	0
EE	MJ	0	0	32,3	0	0	0	0

RESOURCE USE. PERE: Renewable primary energy as energy carrier; **PERM**: Renewable primary energy resource as material utilization; **PERT**: Total use of renewable primary energy resources; **PENRE**: Non-renewable primary energy as energy carrier; **PENRM**: Non-renewable primary energy as material utilization; **PENRT**: Total use of non-renewable primary energy resources; **SM**: Use of secondary materials; **RSF**: Use of renewable secondary fuels; **NRSF**: Use of non-renewable secondary fuels; **FW**: Use of net fresh water.

WASTE CATEGORIES. HWD: Hazardous waste disposed; **NHWD**: Non-hazardous waste disposed; **RWD**: Radioactive waste disposed.

OUTPUT FLOWS. CRU: Components for re-use; **MFR**: Materials for recycling; **MER**: Materials for energy recovery; **EE**: Exported energy per energy carrier.

BASIC ENVIRONMENTAL IMPACTS	UNIT	A1-3	C2	C3	C4	D	A1-3 min	A1-3 max
CC-2013	kg CO_2 eq	142	0,513	0,483	0,322	-18,2	107	127
CC-total	kg CO_2 eq	146	0,520	0,500	0,341	-18,5	109	130
CC-fossil	kg CO_2 eq	145	0,520	0,497	0,341	-18,5	109	129
CC-biogenic	kg CO_2 eq	0,150	0	4,00E-04	0	-2,05E-02	0,107	0,119
CC-luluc	kg CO_2 eq	0,209	0	1,82E-03	0	-3,11E-02	0,139	0,168
OD	kg CFC-11 eq	7,28E-06	7,95E-10	5,81E-08	3,50E-08	-6,70E-07	5,82E-06	8,03E-06
A	mol H^+ eq	0,965	3,47E-03	3,90E-03	1,25E-03	-0,187	0,749	0,854
EAF	kg PO_4^{-3} eq	1,16E-01	5,58E-04	6,15E-04	2,43E-03	-1,90E-02	8,69E-02	9,58E-02
EAM	kg N eq	0,153	1,64E-03	5,54E-04	7,48E-04	-2,65E-02	0,118	0,133
ET	mol N eq	1,57	1,79E-02	5,70E-03	5,73E-03	-0,298	1,25	1,41
POF	kg NMVOC eq	0,444	4,55E-03	1,59E-03	1,60E-03	-7,80E-02	0,348	0,398
AD-non fossil	kg Sb eq	3,36E-03	2,04E-08	3,59E-07	1,29E-07	-2,59E-03	3,99E-03	4,03E-03
AD-fossil	MJ	1872	7,24	9,33	3,343	-280	1448	1771
WU	m^3 eq	5,61	5,45E-03	0,165	3,75E+00	10,25	4,35	5,56
ADDITIONAL ENVIRONMENTAL IMPACTS	UNIT	A1-3	C2	C3	C4	D	A1-3 mín	A1-3 máx
PM	Disease incidence	8,13E-06	2,99E-08	8,70E-09	1,72E-08	-1,63E-06	6,44E-06	7,47E-06
IR	kBq U235 eq	12,9	1,26E-03	0,209	9,46E-03	-4,45	10,3	12,9
EF	CTUe	750	1,66E-02	3,79	37,1	-109	569	619
HT-c	CTUh	1,13E-05	2,69E-10	1,64E-08	1,00E-08	-8,68E-07	7,35E-06	8,31E-06
HT-nc	CTUh	3,56E-05	1,63E-09	7,19E-08	3,91E-07	-1,78E-05	3,50E-05	3,66E-05
LU	Dimensionless	606	0	3,92	3,39	-78,0	349	838

ENVIRONMENTAL IMPACTS. CC-2013: Climatic Change according to EN 15804:2012+A1:2013; **CC-total**: Climatic Change - total; **CC-fossil:** Climatic Change - fossil; **CC-biogenic**: Climate change - biogenic; **CC-luluc**: Climate change - land use and land use change; **OD**: Ozone depletion; **A**: Acidification ; **EAF**: Eutrophication aquatic freshwater; **EAM**: Eutrophication aquatic marine; **ET**: Eutrophication terrestrial; **POF**: Photochemical ozone formation; **AD- non fossil**: Abiotic resource depletion - minerals and metals; **AD-fossil**: Abiotic resource depletion - fossils; **WU**: Water use; **PM**: Particulate matter emissions; **IR**: Ionising radiation; **EF**: Ecotoxicity - freshwater; **HT-c**: Human toxicity, cancer effects; **HT-nc**: Human toxicity, non-cancer effects; **LU**: Land use.

WINDOW 70 - 75

RESOURCE USE	UNIT	A1-3	C2	C3	C4	D	A1-3 min	A1-3 max
PERE	MJ	398	9,65E-03	1,45E+00	3,59E-02	-92,4	300	390
PERM	MJ	0	0	0	0	0	0	0
PERT	MJ	398	9,65E-03	1,45E+00	3,59E-02	-92,4	300	390
PENRE	MJ	1908	7,24E+00	9,51	3,47E+00	-284	1475	1799
PENRM	MJ	0	0	0	0	0	0	0
PENRT	MJ	1908	7,24E+00	9,51	3,47E+00	-284	1475	1799
SM	kg	3,80	0	0	0	0	3,12	3,60
RSF	MJ	0	0	0	0	0	0	0
NRSF	MJ	0	0	0	0	0	0	0
FW	m^3 eq	393	0	3,10	7,56E-02	-57,0	257	299
WASTE CATEGORIES	UNIT	A1-3	C2	C3	C4	D	A1-3 mín	A1-3 máx
HWD	kg	3,58	6,36E-07	0	2,61E-07	-1	2,66	3,82
NHWD	kg	17,1	2,87E-04	0	11,8	-3,82	12,8	17,4
RWD	kg	4,03E-02	0	0	0	0	3,13E-02	3,99E-02
OUTPUT FLOWS	UNIT	A1-3	C2	C3	C4	D	A1-3 mín	A1-3 máx
CRU	kg	0	0	0	0	0	0	0
MFR	kg	5,33	0	15,3	0	0	3,79	5,75
MER	kg	0	0	1,48	0	0	0	0
EE	MJ	0	0	44,6	0	0	0	0

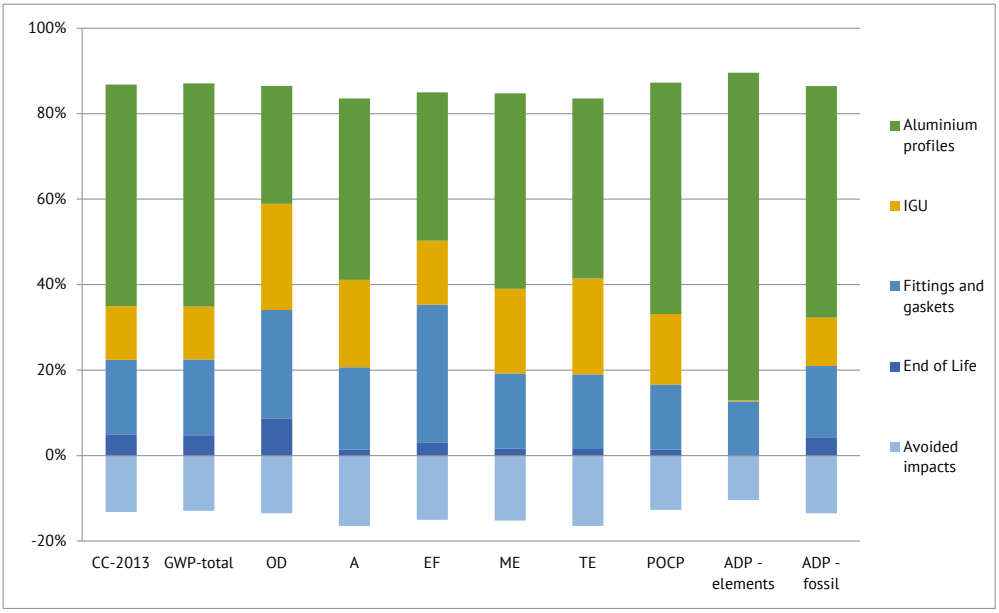
RESOURCE USE. PERE: Renewable primary energy as energy carrier; **PERM**: Renewable primary energy resource as material utilization; **PERT**: Total use of renewable primary energy resources; **PENRE**: Non-renewable primary energy as energy carrier; **PENRM**: Non-renewable primary energy as material utilization; **PENRT**: Total use of non-renewable primary energy resources; **SM**: Use of secondary materials; **RSF**: Use of renewable secondary fuels; **NRSF**: Use of non-renewable secondary fuels; **FW**: Use of net fresh water.

WASTE CATEGORIES. HWD: Hazardous waste disposed; **NHWD**: Non-hazardous waste disposed; **RWD**: Radioactive waste disposed.

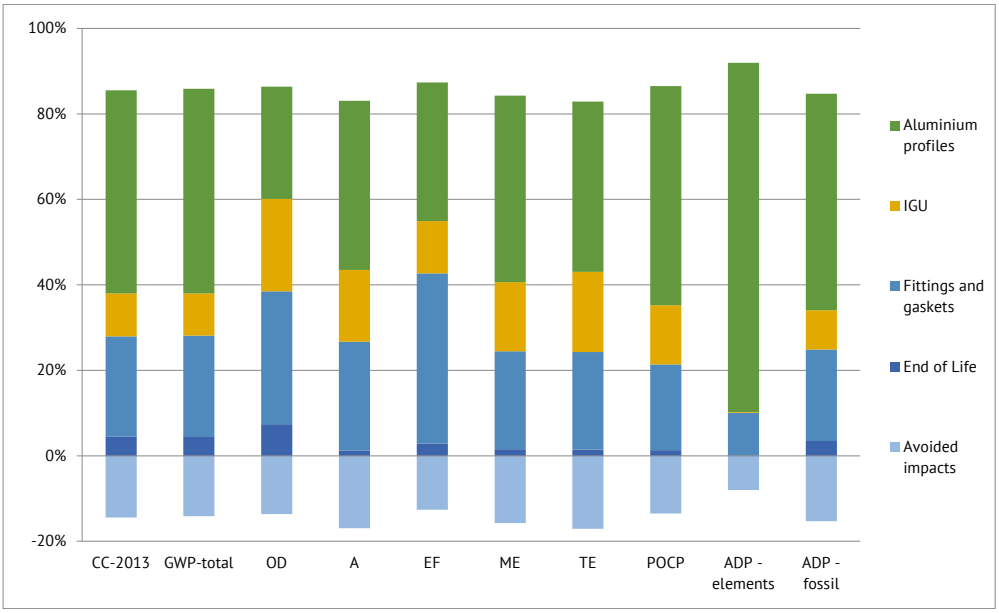
OUTPUT FLOWS. CRU: Components for re-use; **MFR**: Materials for recycling; **MER**: Materials for energy recovery; **EE**: Exported energy per energy carrier.

SUPPLEMENT INFORMATION

WINDOW 45 - 50



WINDOW 70 - 75



The most important contribution of the environmental impacts come from the aluminium profile althought IGU, fitting and gaskets have also important contribution. Most indicators are strongly influenced by the mass of aluminium present in windows frame and sash; the glass of the IGU; and aluminium, stainless steel and EPDM of fittings and gaskets.

The environmental benefits (module D) come not only from the recycling of aluminium profiles but also from recycling of metal fittings and glass, and in a much reduced way from power generated during the energy valorization of plastics. The contribution of the EoL of windows (modules C1 to C4) is very limited compared to modules A1-A3 and module D.

VERIFICATION

This declaration is an environmental product declaration (EPD) in accordance with ISO 14025 and the requirements given in the product category rules document for Construction Products and Construction Services (EN 15804) and the general program guidelines by The International EPD® System. The specifications of the standard EN 17213 of environmental product declarations for windows and pedestrian doorsets have also been met. The results shown in this EPD are based on the LCA report for sector EPD of the Spanish Association of Aluminium of July 7, 2020 according to standard 14044.

This EPD is not comparative assertions and are either not comparable or have limited comparability when they cover different life cycle stages or are based on different Product Category Rules. EPDs of construction products may not be comparable if they do not comply with EN 15804. This DAP is not representative of any particular manufacturer or any of its products; on the other hand, it is the average of the products manufactured by the members of the AEA.

EPD Programme	The International EPD® System EPD International AB Box 210 60 SE-100 31 Stockholm Sweden www.environdec.com info@environdec.com
EPD registration number	S-P-02163
EPD owner	Asociación Española del Aluminio y Tratamientos de Superficie
Declared unit	1 m^2 of a tilt and turn window with a single-sash
System boundaries	Cradle to gate with options
Published	2020 - 07 - 17
Valid until	2025 - 07 - 17
Reference year for data	2017
Geographical scope	Wordwide
Product group classification	UN CPC Code: 42120 Doors, windows and their frames and thresholds for doors, of iron, steel or aluminium
Product Category Rules	PCR 2019:14 Construction Products v1.0 and C-PCR-007 (to PCR 2019:14) Windows and Doors (EN 17213:2020) version:2020-04-09
PCR review was conducted by	Technical Committee of The International EPD® System
Independent verification of the declaration and data, according to ISO 14025:2006	☒ External ☐ Internal ☐ EPD®
Third-party verifier	Eva Martínez Herrero Centro Tecnológico de Miranda de Ebro www. ctme.es
EPD prepared by	IDNÓVAM Innovación y desarrollo para el ambiente info@idnovam.com

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- EN 17213:2019 - Windows and doors - Environmental Product Declarations - Product category rules for windows and pedestrian doorsets
- ISO 14025/ DIN EN ISO 14025:2009-11: Environmental labels and declarations - Type III environmental
- ISO 14040-44/ DIN EN ISO 14040:2006-10, Environmental management - Life cycle assessment-Principles
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