DICHIARAZIONE AMBIENTALE DI PRODOTTO – DAP/EPD

Secondo ISO 14025 y EN 15804-2012+A2:2019 per:

PROFILI LACCATI

EMAC® EL TOQUE FINAL
EMAC® GRUPO I ESPAÑA I USA I ITALIA I

AEA
Asociación Española del Aluminio y Tratamientos de Superficie

EPD®
S-P-01409

ODS



Sector EPD of average product: Powder Coated Aluminium Profiles

EPD Programme	The International EPD® System. www.environdec.com
Programme operator	EPD International AB
EPD registration number	EPD-IES-0035436:001
Version date	2026-10-27
Valid date	2031-10-27

Il Gruppo EMAC® è leader nelle soluzioni per la giunzione dei diversi materiali presenti in un progetto edilizio. La sua ampia gamma di soluzioni comprende profili tecnici e decorativi, zerbini tecnici d'ingresso, giunti di dilatazione e strutturali e soluzioni per l'accessibilità e la sicurezza universale per pavimenti, pareti, facciate e pavimentazioni urbane, accompagnate da un servizio immediato unico nel settore.

Il Gruppo EMAC® è una **multinazionale di riferimento** composta da diverse aziende presenti sul mercato nazionale e internazionale. Presente in oltre 110 paesi e con filiali negli **Stati Uniti e in Italia**, fornisce le soluzioni EMAC® ai mercati più esigenti del mondo.

In EMAC® Gruppo, fedeli al nostro impegno per la sostenibilità e l'edilizia responsabile, mettiamo a disposizione dei nostri clienti informazioni ambientali relative ai materiali utilizzati nelle nostre soluzioni.

Per questo adottiamo come riferimento la **Dichiarazione ambientale di prodotto (DAP o EPD, Environmental Product Declaration) settoriale per profili in alluminio laccati**, elaborata dall'Associazione spagnola dell'alluminio e dei trattamenti superficiali (AEA).

Applicazioni

Questa dichiarazione è una **DAP settoriale**, rappresentativa di diversi produttori appartenenti all'Associazione spagnola dell'alluminio e dei trattamenti superficiali (AEA).

Si applica ai profili in alluminio laccati utilizzati principalmente nell'edilizia e nei prodotti da costruzione, come profili, finestre, porte, facciate continue, sistemi di facciata, lucernari, tende da sole, ecc.

Prodotto

I prodotti coperti da questa DAP sono profili in alluminio **laccati**, corrispondenti a un prodotto medio rappresentativo della produzione settoriale.

Obiettivo e ambito

Questa DAP **valuta i parametri ambientali dell'analisi del ciclo di vita (ACV) e dell'inventario del ciclo di vita (ICV)** della produzione di profili in alluminio da parte dei membri dell'AEA (Associazione spagnola dell'alluminio e dei trattamenti superficiali), **dalla culla al cancello** con opzioni (smaltimento finale).

Questa DAP costituisce la base per le comunicazioni tra aziende e può essere utilizzata da tutte le parti terze interessate del settore delle costruzioni.

Verifica

La Dichiarazione ambientale di prodotto è stata elaborata in conformità alla norma **ISO 14025:2006** e alla norma **EN 15804:2012+A2:2019/AC:2021**, seguendo le regole di categoria di prodotto PCR 2019:14, versione 2.0.1, relative ai prodotti da costruzione.

La DAP è registrata nel programma **The International EPD® System**, il cui operatore è EPD International AB.

La verifica indipendente è stata effettuata da Eva Martínez Herrero, del **Centro tecnologico di Miranda de Ebro (CTME)**, e approvata da International EPD® System.

Validità

Con il supporto del nostro partner tecnologico **ITENE** (Instituto Tecnológico del Embalaje, Transporte y Logística) abbiamo ottenuto la convalida dalle **società di certificazione** dell'edilizia sostenibile **LEED e BREEAM che confermano** la validità della presente DAP, tenendo conto che **è d'obbligo specificare** che si tratta di **informazioni basate sui valori medi del settore** e che in nessun caso si può affermare che la DAP settoriale rappresenti esattamente un prodotto unico e concreto.

ENVIRONMENTAL PRODUCT DECLARATION

In accordance with ISO 14025:2006 and EN 15804:2012+A2:2019/AC:2021 for:

ASOCIACIÓN ESPAÑOLA DEL ALUMINIO Y TRATAMIENTOS DE SUPERFICIE

Sector EPD of average product: Powder Coated Aluminium Profiles

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An EPD may be updated or depublished if conditions change. To find the latest version of the EPD and to confirm its validity, see www.environdec.com

GENERAL INFORMATION

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

Product Category Rules (PCR)

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

Product Category Rules (PCR): PCR 2019:14 v2.0.1 CONSTRUCTION PRODUCTS 2025-06-05.

PCR review was conducted by: Rob Rouwette (chair), Noa Meron (co-chair)

Third-party verification

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

- ■ Individual EPD verification without a pre-verified LCA/EPD tool
- □ Individual EPD verification with a pre-verified LCA/EPD tool
- □ EPD process certification without a pre-verified LCA/EPD tool
- □ EPD process certification with a pre-verified LCA/EPD tool
- □ Fully pre-verified EPD tool

Third-party verifier: Eva Martínez Herrero, CTME, evamtz@ctme.es

Approved by: 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 published in different EPD programmes, may not be comparable. For two EPDs to be comparable, they shall:

• be based on the same PCR (including the same first-digit version number) or be based on fully aligned PCRs or versions of PCRs;

• cover products with identical functions, technical performances and use (e.g. identical declared/functional units);

• have identical scope in terms of included life-cycle stages (unless the excluded life-cycle stage is demonstrated to be insignificant);

• apply identical impact assessment methods (including the same version of characterisation factors); and

• be valid at the time of comparison.

For further information about comparability, see EN 15804 and ISO 14025.



INFORMATION ABOUT EPD OWNER

EPD Owner
Asociación Española del Aluminio y Tratamientos de Superficie
c/ Príncipe de Vergara, 74
28006 Madrid
www.asoc-aluminio.es
Contact: Alfonso Melguizo Serrano, informes@asoc-aluminio.es

Life Cycle Assessment (LCA): Diego Ruiz (UNED), druiz@ccia.uned.es

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 12 AEA member who have produced a comprehensive industry-wide environmental product declaration (EPD) for aluminium profiles. The data comes from 18 separate production facilities, with a total of 38 extrusion presses, 13 anodizing lines, 20 coating lines and 3 cast house that produces secondary extrusion billet starting from post-industrial and consumer aluminium scrap. In aggregate, the data-contributing installations have a production capacity of more than 430000 ton of aluminium profiles.

PRODUCT INFORMATION

Product description

AEA members produce in their facilities a wide variety of profiles for use in construction. The products covered by this EPD are extruded aluminium profiles (CPC 41532).

It excludes downstream fabrication operations such as machining and assembly due to the wide diversity of such operations.

Applications

Aluminium profiles are primarily used in building and construction applications, including windows, doors, curtain walls, façade systems, skylights, canopies, etc.

Technical data

Technical data is representative of 6000 series aluminium alloys (6xxx alloy, tempers T1-T6), which is the predominant production for AEA members.

Property	Value	
Young's modulus	68 - 80 GPa	UNE-EN ISO 6892
Yield strength (elastic limit)	95 - 610 Mpa	UNE-EN ISO 6892
Tensile strength	180 - 620 Mpa	UNE-EN ISO 6892
Hardness - Vickers	60 - 160 HV	UNE-EN ISO 6507
Fatigue strength (10^7 cycles)	57 - 210 Mpa	UNE 7118
Density	2550 – 2900 kg/m^3	
Melting point	495 - 640 °C	
Thermal conductivity	118 - 174 W/m.°C	
Specific heat capacity	890 - 1020 J/kg.°C	

Packaging

Aluminium profiles are often delivered according to the customer's own specifications. The main packaging materials used are wood, plastic film, plastic strapping, and cardboard.



Product lifespan and use phase

Product lifespan will vary depending on the final application, but is typically long due to aluminium´s high corrosion resistance. It can accept a service life of 50 years according to bibliography. Similarly, further processing (other than coating or thermal improvement), assembly and/or installation of extruded aluminum products are outside the scope of this EPD.

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.

In the same way, 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.

In both cases recycling rate depends on smelting yield that includes metal losses during scrap preparation and melting. Smelting yield is highy influenced by the presence of non aluminium material (as TBB and/or coating) and the origin of the scrap (post-industrial or post-consumer).

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 recycling benefits 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 is sent to landfill.

CONTENT DECLARATION

Aluminium profiles can be produced as standard or customer design so there is a wide variety of profiles. Therefore, the composition of the final product can also be very different between designs. This EPD covers an average product based on a production-volume-weighted average, with its composition detailed below. The product does not contain any substance included in the list of Substances of Very High Concern with concentrations higher than 0.1% in weight.

Product components	Weight, kg	Post-consumer material, weight-%	Biogenic material, weight-% and kg C/kg
Aluminium	0.958	10.4%	0
Coating powder	0.042	0	0
Total	1	9.96%	0
Packaging materials	**Weight, kg**	**Weight-% (vs product)**	**Weight biogenic carbon, kg C/kg**
Plastic	0.007	0.7%	0
Cardboard	0.015	1.5%	0.007
Wood	0.020	2.0%	0.010
Total	0.042	4.2%	0.017

LCA INFORMATION

Declared unit

The declared unit is one kilogram of powder coated aluminium profile intended for use in buildings and construction products such as windows, doors, curtain walls, façade systems, skylights, awnings, and similar applications. The conversion factor for the declared unit is 0.592 kg/m

Goal and scope

This EPD evaluates the environmental impacts of 1 kg aluminium profile from Cradle to gate with modules C1–C4 and module D (A1–A3 + C + D). This EPD is the basis for B2B communication. Intended use clients and relevant stakeholders within the building sector.

System boundaries

This is a cradle-to-gate EPD with modules C1–C4 and module D. This EPD provides information on the production stage of the aluminium profiles (raw material supply, transport to plant and manufacturing) with disposal at end-of-life. Recycling potential of aluminium 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). Packaging of profiles is also included in module. The biogenic CO_2 balance associated with the packaging has been accounted for in module A3.

C1 - De-construction

This module considers the energy consumption associated with the dismantling and removal of aluminium profiles from the building at the end of their service life.

C2 - Transport to waste processing

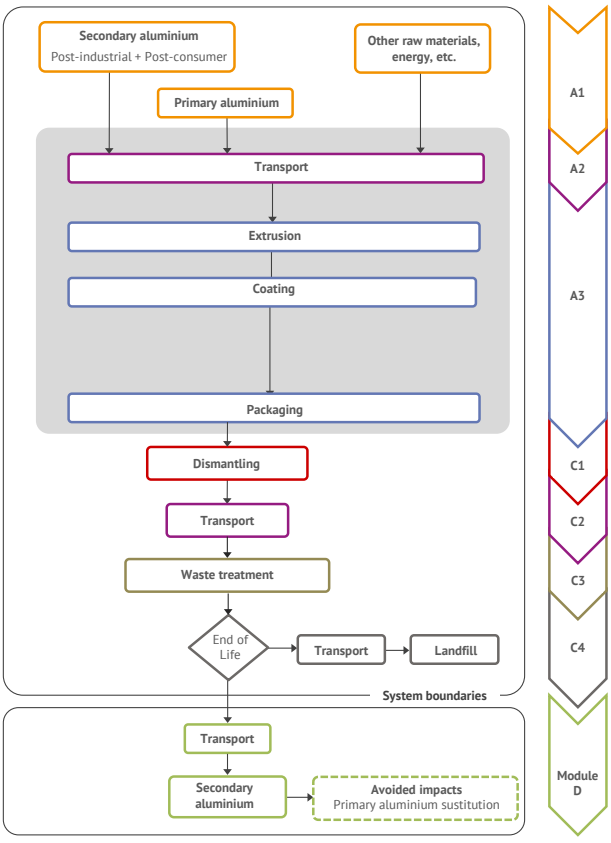
A distance of 200 km has been assumed for the transport to scrap dealers. Transport is calculated on the basis of a scenario with the parameters described in the attached table.

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

This module considers the energy consumption associated with the fragging of metal during waste treatment processes.

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.



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.

Time representativeness

The primary data used for the development of this EPD were provided by the participating manufacturers and have a temporal representativeness ranging from 2020 to 2025.

Database(s) and LCA software used

The supply of aluminium billets comprises a combination of primary aluminium, pre-consumer scrap and post-consumer scrap. For primary aluminium, the data used are based on the Environmental Profile Report for the European Aluminium Industry (European Aluminium, 2025), which provides information on European primary aluminium production and imports from different regions of the world. LCI datasets used to model the supply of primary aluminium, pre-consumer and post-consumer aluminium were obtained from the ecoinvent 3.12 database, using the corresponding datasets for each of the regions of origin identified in the report, as well as the dataset corresponding to European production. Likewise, the remaining processes included in the LCA model were modelled using ecoinvent 3.12 datasets.

The LCA study was performed using an excel-based model. The impact assessment results were calculated using characterization factors of EN 15804+A2 standard (based on EF 3.1). All processes related to aluminium and energy used at the facilities are modelled including the corresponding infrastructure.

Data Quality

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 members 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.

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	-	-	-	-	-	-	-	-	-	EU	EU	EU	EU	EU
Share of primary data	5.5 %			-	-	-	-	-	-	-	-	-	-	-	-	-	-
Variation - products [1]	-			-	-	-	-	-	-	-	-	-	-	-	-	-	-
Variation - plants [2]	20.4%			-	-	-	-	-	-	-	-	-	-	-	-	-	-

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

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.

According to Annex E of EN 15804 + A2, an assessment of the data quality was carried out. In terms of technical representativeness, processes with a "very good" quality level account for about 96% of the GWP-GHG indicator. In terms of geographical representativeness, processes with a "very good" quality level account for about 95% of the GWP-GHG value.

Estimates and Assumptions

Primary aluminium is supplied from European production (51.0%) and imports from different regions, comprising 15.2% from the Middle East and Central Asia, 14.7% from the rest of Europe, 9.3% from Africa, 4.9% from North America, 3.9% from Asia, 0.5% from Oceania and 0.5% from South and Central America. Based on this supply mix, the production-weighted GWP-GHG intensity of primary aluminium is 10.63 kg CO_2-eq/kg. Secondary aluminium is modelled separately for post-consumer and pre-consumer scrap, with GWP-GHG intensities of 0.74 and 6.73 kg CO_2-eq/kg, respectively.

The electricity mix used in the model for the manufacturing processes is based on the Spanish residual electricity mix, with a carbon footprint (GWP-GHG) of 0.413 kg CO_2-eq/kWh. This value includes the impacts associated with energy infrastructure and power plant construction.

Disposal and recovery rates for building are modelled based on figures reported by the European Aluminium Association (see references). It was assumed a 95% for recovery rate while the remaining 5% goes to landfill.

Allocation

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 the different processes. The contribution of packaging to electricity consumption is not relevant (but it is included in the rest of processes).

Process	Source type	Source	Reference year	Data category	GWP-GHG A1-A3
Manufacturing of product	Collected data	EPD owner	2020-2025	Primary data	0.2%
Generation of electricity used in manufacturing of product	Databases	Ecoinvent v3.12	2025	Primary data	5.3%
Transport of raw materials to manufacturing site	Database	Ecoinvent v3.12	2025	Representative secondary data	1.3%
Production of aluminium	Databases	Ecoinvent v3.12	2025	Representative secondary data	87.7%
Production of packaging	Databases	Ecoinvent v3.12	2025	Representative secondary data	0.4%
Other processes	Databases	Ecoinvent v3.12	2025	Representative secondary data	5.0%

The share of primary data is calculated based on GWP-GHG results. It is a simplified indicator for data quality that supports the use of more primary data, to increase the representativeness of and comparability between EPDs. Note that the indicator does not capture all relevant aspects of data quality and is not comparable across product categories.

Once the energy consumption was attributed to these processes 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.

The extrusion and powder coating processes generate both useful profile and pre-consumer scrap, which has a considerable residual value and has therefore been considered as a co-product. An allocation criterion based on economic value has been used between both fractions, extruded and powder coated profile and pre-consumer scrap in these processes.

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. In the recycling process, smelting yield for each scrap fraction was taken into account.

Cut-off rules

The modules A4 and A5, and from B1 to B7 are excluded. Similarly, the following sources of emissions have not been included: construction/production of capital goods, maintenance and support activities (employee facilities, etc.), production of packaging of raw materials and auxiliary materials and human resources and travel of employees.

Assumptions for developing module C1 [1]	
Energy	Diesel
Consumption (kWh)	0.0011

Assumptions for developing module C2 [1]	
Road transport, truck	Transport, freight, lorry 16-32 metric ton, EURO 6
Diesel consumption (l/km)	0.221
Distance(km)	200
Capacity utilization, mass	100%
Capacity utilization, volume	67%

Assumptions for developing module C3 [1]	
Energy	Diesel
Consumption (kWh)	0.0074

Scenario for modules C4 and D [1]	
kg collected separately	1
kg collected with construction waste	0
kg for reuse	0
kg for recycling	0.95
kg for energy recovery	0
kg product or material for final disposal	0.05

[1] Per declared unit

ENVIRONMENTAL PERFORMANCE

The estimated impact results are only relative statements, which do not indicate the endpoints of the impact categories, exceeding threshold values, safety margins and/or risks. The results of the end-of-life stage (modules C1-C4) should be considered when using the results of the product stage (modules A1-A3). ND: Module not declared.

ENVIRONMENTAL IMPACTS	UNIT	A1-3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
GWP-total	kg CO_2 eq	9.31E+00	ND	ND	ND	ND	ND	ND	ND	ND	ND	3.47E-04	3.00E-02	2.34E-03	1.27E-03	-7.47E+00
GWP-fossil	kg CO_2 eq	9.16E+00	ND	ND	ND	ND	ND	ND	ND	ND	ND	3.47E-04	3.00E-02	2.34E-03	1.27E-03	-7.34E+00
GWP-biogenic	kg CO_2 eq	3.13E-02	ND	ND	ND	ND	ND	ND	ND	ND	ND	1.51E-08	1.04E-06	1.02E-07	1.59E-06	-1.72E-02
GWP-luluc	kg CO_2 eq	1.16E-01	ND	ND	ND	ND	ND	ND	ND	ND	ND	1.26E-08	4.74E-07	8.47E-08	7.34E-07	-1.14E-01
OD	kg CFC-11 eq	1.35E-07	ND	ND	ND	ND	ND	ND	ND	ND	ND	5.28E-12	6.81E-10	3.56E-11	2.42E-11	-9.32E-08
A	mol H^+ eq	6.12E-02	ND	ND	ND	ND	ND	ND	ND	ND	ND	2.95E-06	3.72E-05	1.98E-05	5.02E-06	-4.63E-02
EAF	kg P eq	3.52E-04	ND	ND	ND	ND	ND	ND	ND	ND	ND	2.58E-10	1.85E-08	1.73E-09	8.88E-09	-2.81E-04
EAM	kg N eq	7.75E-03	ND	ND	ND	ND	ND	ND	ND	ND	ND	1.38E-06	8.37E-06	9.26E-06	2.22E-06	-6.13E-03
ET	mol N eq	8.65E-02	ND	ND	ND	ND	ND	ND	ND	ND	ND	1.51E-05	9.12E-05	1.01E-04	2.01E-05	-6.78E-02
POF	kg NMVOC eq	3.49E-02	ND	ND	ND	ND	ND	ND	ND	ND	ND	4.28E-06	7.30E-05	2.88E-05	7.17E-06	-2.67E-02
AD-non fossil [1]	kg Sb eq	3.32E-05	ND	ND	ND	ND	ND	ND	ND	ND	ND	9.22E-12	7.82E-10	6.20E-11	1.56E-10	6.58E-05
AD-fossil [1]	MJ	1.25E+02	ND	ND	ND	ND	ND	ND	ND	ND	ND	4.53E-03	3.99E-01	3.05E-02	1.93E-02	-9.42E+01
WU [1]	m^3 eq	1.90E+00	ND	ND	ND	ND	ND	ND	ND	ND	ND	2.81E-06	1.30E-04	1.89E-05	-7.81E-03	-1.06E+00
GWP-GHG [*]	kg CO_2 eq	9.31E+00	ND	ND	ND	ND	ND	ND	ND	ND	ND	3.47E-04	3.00E-02	2.34E-03	1.27E-03	-7.47E+00
PM [1]	Disease incidence	6.44E-07	ND	ND	ND	ND	ND	ND	ND	ND	ND	4.34E-12	1.80E-09	2.92E-11	1.17E-10	-5.52E-07
IR [2]	kBq U235 eq	3.93E-01	ND	ND	ND	ND	ND	ND	ND	ND	ND	3.37E-07	3.83E-05	2.27E-06	7.66E-06	-2.73E-01
EF [1]	CTUe	2.36E+01	ND	ND	ND	ND	ND	ND	ND	ND	ND	1.66E-04	1.44E-02	1.12E-03	6.15E+00	-7.17E+00
HT-c [1]	CTUh	1.21E-08	ND	ND	ND	ND	ND	ND	ND	ND	ND	1.93E-14	1.85E-12	1.30E-13	3.95E-13	-9.97E-09
HT-nc [1]	CTUh	9.37E-08	ND	ND	ND	ND	ND	ND	ND	ND	ND	9.40E-12	2.00E-10	6.32E-11	8.41E-11	-7.75E-09
LU [1]	Dimensionless	1.36E+01	ND	ND	ND	ND	ND	ND	ND	ND	ND	5.63E-06	5.07E-04	3.78E-05	2.75E-02	-4.94E+00

ENVIRONMENTAL IMPACTS. GWP-total: Global warming potential - total; **GWP-fossil:** Global warming potential - fossil; **GWP-biogenic**: Global warming potential - biogenic; **GWP-luluc**: Global warming potential - 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.

[1] 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. [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. [*] This indicator accounts for all greenhouse gases except biogenic carbon dioxide uptake and emissions and biogenic carbon stored in the product. As such, the indicator is identical to GWP-total except that the CF for biogenic CO2 is set to zero.

RESOURCE USE	UNIT	A1-3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
PERE	MJ	3.14E+01	ND	ND	ND	ND	ND	ND	ND	ND	ND	8.31E-06	9.80E-04	5.59E-05	2.53E-04	-2.84E+01
PERM	MJ	5.95E-01	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
PERT	MJ	3.20E+01	ND	ND	ND	ND	ND	ND	ND	ND	ND	8.31E-06	9.80E-04	5.59E-05	2.53E-04	-2.84E+01
PENRE	MJ	1.06E+02	ND	ND	ND	ND	ND	ND	ND	ND	ND	4.52E-03	3.97E-01	3.04E-02	1.90E-02	-8.07E+01
PENRM	MJ	3.15E-01	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
PENRT	MJ	1.06E+02	ND	ND	ND	ND	ND	ND	ND	ND	ND	4.52E-03	3.97E-01	3.04E-02	1.90E-02	-8.07E+01
SM	kg	3.75E-01	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
RSF	MJ	0.00E+00	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
NRSF	MJ	0.00E+00	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
FW	m^3 eq	1.19E+02	ND	ND	ND	ND	ND	ND	ND	ND	ND	3.25E-05	3.04E-03	2.19E-04	1.14E-03	-1.12E+02
WASTE																
HWD	kg	7.59E-03	ND	ND	ND	ND	ND	ND	ND	ND	ND	3.10E-08	2.65E-06	2.09E-07	1.28E-07	6.19E-03
NHWD	kg	4.26E-01	ND	ND	ND	ND	ND	ND	ND	ND	ND	1.33E-07	1.34E-05	8.95E-07	5.03E-02	-2.40E-01
RWD	kg	2.91E-04	ND	ND	ND	ND	ND	ND	ND	ND	ND	1.84E-10	2.41E-08	1.24E-09	4.83E-09	-2.08E-04
OUTPUT FLOWS																
CRU	kg	0.00E+00	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
MFR	kg	2.14E-01	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.00E+00	0.00E+00	9.50E-01	0.00E+00	0.00E+00
MER	kg	0.00E+00	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
EEE	MJ	0.00E+00	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
ETE	MJ	0.00E+00	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00

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; **EEE**: Exported electric energy; **ETE**: Exported thermic energy.

END OF LIFE SCENARIOS

ENVIRONMENTAL IMPACTS	UNIT	100% Landfill					100% Recycling				
		C1	C2	C3	C4	D	C1	C2	C3	C4	D
GWP-total	kg CO_2 eq	3.47E-04	3.00E-02	2.34E-03	2.54E-02	1.04E+00	3.47E-04	3.00E-02	2.34E-03	0.00E+00	-7.92E+00
GWP-fossil	kg CO_2 eq	3.47E-04	3.00E-02	2.34E-03	2.53E-02	1.02E+00	3.47E-04	3.00E-02	2.34E-03	0.00E+00	-7.78E+00
GWP-biogenic	kg CO_2 eq	1.51E-08	1.04E-06	1.02E-07	3.18E-05	2.39E-03	1.51E-08	1.04E-06	1.02E-07	0.00E+00	-1.82E-02
GWP-luluc	kg CO_2 eq	1.26E-08	4.74E-07	8.47E-08	1.47E-05	1.58E-02	1.26E-08	4.74E-07	8.47E-08	0.00E+00	-1.20E-01
OD	kg CFC-11 eq	5.28E-12	6.81E-10	3.56E-11	4.85E-10	1.30E-08	5.28E-12	6.81E-10	3.56E-11	0.00E+00	-9.88E-08
A	mol H^+ eq	2.95E-06	3.72E-05	1.98E-05	1.00E-04	6.44E-03	2.95E-06	3.72E-05	1.98E-05	0.00E+00	-4.91E-02
EAF	kg P eq	2.58E-10	1.85E-08	1.73E-09	1.78E-07	3.90E-05	2.58E-10	1.85E-08	1.73E-09	0.00E+00	-2.97E-04
EAM	kg N eq	1.38E-06	8.37E-06	9.26E-06	4.44E-05	8.53E-04	1.38E-06	8.37E-06	9.26E-06	0.00E+00	-6.50E-03
ET	mol N eq	1.51E-05	9.12E-05	1.01E-04	4.02E-04	9.43E-03	1.51E-05	9.12E-05	1.01E-04	0.00E+00	-7.19E-02
POF	kg NMVOC eq	4.28E-06	7.30E-05	2.88E-05	1.43E-04	3.72E-03	4.28E-06	7.30E-05	2.88E-05	0.00E+00	-2.83E-02
AD-non fossil [1]	kg Sb eq	9.22E-12	7.82E-10	6.20E-11	3.12E-09	-9.15E-06	9.22E-12	7.82E-10	6.20E-11	0.00E+00	6.97E-05
AD-fossil [1]	MJ	4.53E-03	3.99E-01	3.05E-02	3.86E-01	1.31E+01	4.53E-03	3.99E-01	3.05E-02	0.00E+00	-9.99E+01
WU [1]	m^3 eq	2.81E-06	1.30E-04	1.89E-05	-1.56E-01	1.47E-01	2.81E-06	1.30E-04	1.89E-05	0.00E+00	-1.12E+00
GWP-GHG [*]	kg CO_2 eq	3.47E-04	3.00E-02	2.34E-03	2.54E-02	1.04E+00	3.47E-04	3.00E-02	2.34E-03	0.00E+00	-7.92E+00
PM [1]	Disease incidence	4.34E-12	1.80E-09	2.92E-11	2.33E-09	7.68E-08	4.34E-12	1.80E-09	2.92E-11	0.00E+00	-5.86E-07
IR [2]	kBq U235 eq	3.37E-07	3.83E-05	2.27E-06	1.53E-04	3.80E-02	3.37E-07	3.83E-05	2.27E-06	0.00E+00	-2.90E-01
EF [1]	CTUe	1.66E-04	1.44E-02	1.12E-03	1.23E+02	9.97E-01	1.66E-04	1.44E-02	1.12E-03	0.00E+00	-7.60E+00
HT-c [1]	CTUh	1.93E-14	1.85E-12	1.30E-13	7.90E-12	1.39E-09	1.93E-14	1.85E-12	1.30E-13	0.00E+00	-1.06E-08
HT-nc [1]	CTUh	9.40E-12	2.00E-10	6.32E-11	1.68E-09	1.08E-09	9.40E-12	2.00E-10	6.32E-11	0.00E+00	-8.21E-09
LU [1]	Dimensionless	5.63E-06	5.07E-04	3.78E-05	5.50E-01	6.86E-01	5.63E-06	5.07E-04	3.78E-05	0.00E+00	-5.23E+00

ENVIRONMENTAL IMPACTS. GWP-total: Global warming potential - total; **GWP-fossil:** Global warming potential - fossil; **GWP-biogenic**: Global warming potential - biogenic; **GWP-luluc**: Global warming potential - 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.

[1] 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. [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. [*] This indicator accounts for all greenhouse gases except biogenic carbon dioxide uptake and emissions and biogenic carbon stored in the product. As such, the indicator is identical to GWP-total except that the CF for biogenic CO2 is set to zero.

RESOURCE USE	UNIT	100% Landfill					100% Recycling				
		C1	C2	C3	C4	D	C1	C2	C3	C4	D
PERE	MJ	8.31E-06	9.80E-04	5.59E-05	5.07E-03	3.95E+00	8.31E-06	9.80E-04	5.59E-05	0.00E+00	-3.01E+01
PERM	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
PERT	MJ	8.31E-06	9.80E-04	5.59E-05	5.07E-03	3.95E+00	8.31E-06	9.80E-04	5.59E-05	0.00E+00	-3.01E+01
PENRE	MJ	4.52E-03	3.97E-01	3.04E-02	3.79E-01	1.12E+01	4.52E-03	3.97E-01	3.04E-02	0.00E+00	-8.55E+01
PENRM	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
PENRT	MJ	4.52E-03	3.97E-01	3.04E-02	3.79E-01	1.12E+01	4.52E-03	3.97E-01	3.04E-02	0.00E+00	-8.55E+01
SM	kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
RSF	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	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	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
FW	m^3 eq	3.25E-05	3.04E-03	2.19E-04	2.27E-02	1.56E+01	3.25E-05	3.04E-03	2.19E-04	0.00E+00	-1.19E+02
WASTE											
HWD	kg	3.10E-08	2.65E-06	2.09E-07	2.56E-06	-8.60E-04	3.10E-08	2.65E-06	2.09E-07	0.00E+00	6.56E-03
NHWD	kg	1.33E-07	1.34E-05	8.95E-07	1.01E+00	3.33E-02	1.33E-07	1.34E-05	8.95E-07	0.00E+00	-2.54E-01
RWD	kg	1.84E-10	2.41E-08	1.24E-09	9.67E-08	2.89E-05	1.84E-10	2.41E-08	1.24E-09	0.00E+00	-2.21E-04
OUTPUT FLOWS											
CRU	kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
MFR	kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.00E+00	0.00E+00	0.00E+00
MER	kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
EEE	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
ETE	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00

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INFORMATION RELATED TO SECTOR EPD

This sector EPD is representative of the members of the Asociación Española del Aluminio y Tratamientos de Superficie(AEA). The complete list of member companies is available at https://www.asoc-aluminio.es/asociados.

For the development of the EPD, a common inventory template was defined and completed by all participating companies using their total production data, total consumption of raw materials and energy, waste generation, emissions and effluents, and other relevant activity data.

Based on the inventory provided by each manufacturer, a specific inventory was developed for each stage of the process, modelled as unit processes. For each of these unit processes, a reference output flow was defined corresponding to each successive stage leading to the final product.

Once the unit process inventories had been developed for each manufacturer, a production-weighted average was calculated for each input and output of each unit process. These weighted averages were then used to obtain the average unit processes underlying this sector EPD.

This EPD covers the average values of a complete product category of aluminium profiles and has a representativeness of 66% with respect to the total production of all AEA members. Therefore, the declared product corresponds to an average product within this category and not to a specific product available for purchase on the market.

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ABBREVIATIONS

- AEA - Spanish Aluminium and Surface Treatment Association
- CEN - European Committee for Standardization
- CPC - Central Product Classification
- EPD - Environmental Product Declaration
- GPI - General Programme Instructions
- IES - International EPD System
- ISO - International Organization for Standardization
- LCA - Life Cycle Assessment
- LCI - Life Cycle Inventory
- LCIA - Life Cycle Impact Assessment
- PCR - Product Category Rules
- c-PCR - Complementary Product Category Rules
- RSL - Reference Service Life
- TBB - Thermal Break Bridge
- UNE - Spanish Association for Standardization

REFERENCES

- General Programme Instructions of The International EPD® System. Version 5.0.1.
- PCR 2019:14 v2.0.1, Construction Products.
- EN 15804:2012+A2:2019/AC:2021, Sustainability of construction works - Environmental Product Declarations - Core rules for the product category of construction products
- c-PCR-007: Windows and doors (EN 17213), version 1.0.1. EPD International AB, Stockholm, Sweden.
- ISO 14025/ DIN EN ISO 14025:2009-11: Environmental labels and declarations - Type III environmental
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- Ecoinvent Database. http://www.ecoinvent.org/database/.
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- Aluminium Recycling in LCA – European Aluminium Association, 2013.

VERSION HISTORY

- EPD-IES-0035436:001 Original version of the EPD

AEA

Asociación Española del Aluminio
y Tratamientos de Superficie