

Environmental Product Declaration



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

Recycled aluminium extruded profiles

from

ALUTITAN spa



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

Programme information

Programme:	The International EPD® System
Address:	EPD International AB Box 210 60 SE-100 31 Stockholm Sweden
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Accountabilities for PCR, LCA and independent, third-party verification
Product Category Rules (PCR)
CEN standard EN 15804 serves as the Core Product Category Rules (PCR)
Product Category Rules (PCR): <i>PCR 2019:14 VERSION 1.3.4</i>
PCR review was conducted by: <i>Luca Pollarini, Margotta Consulting, l.pollarini@margo.it</i>
Life Cycle Assessment (LCA)
LCA accountability: <i>Luca Pollarini, Margotta Consulting</i>
Third-party verification
Independent third-party verification of the declaration and data, according to ISO 14025:2006, via: ☒ EPD verification by accredited certification body Third-party verification: <i>Bureau Veritas</i> , it is an approved certification body accountable for the third-party verification The certification body is accredited by: <i>Accredia, by the UNI CEI EN ISO/IEC 17029:2020, certificate number 0009VV</i> Procedure for follow-up of data during EPD validity involves third party verifier: ☐ Yes ☒ No

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EPDs within the same product category but registered in different EPD programmes, or not compliant with EN 15804, may not be comparable. For two EPDs to be comparable, they must be based on the same PCR (including the same 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 equivalent system boundaries and descriptions of data; apply equivalent data quality requirements, methods of data collection, and allocation methods; apply identical cut-off rules and impact assessment methods (including the same version of characterisation factors); have equivalent content declarations; and be valid at the time of comparison. For further information about comparability, see EN 15804 and ISO 14025.

Company information

Owner of the EPD: ALUTITAN S.p.A.

Contact: Stefano De Cerreto

Description of the organisation: Alutitan produces aluminium extruded profiles, especially according to customer's specifications. Alutitan operates for multiple market sectors: industrial, construction, furniture, transport, electrical engineering; and it is part of a group of companies operating in aluminium extrusion, mechanical workings and aluminium surface treatments.

Product-related or management system-related certifications: ISO 9001; ISO 14001; IATF 16949; Factory Production Control for structural metallic products EN 15088.

Name and location of production site(s): ALUTITAN S.p.A. via dei Faggi, 31/25 – 47894 Chiesanuova, San Marino

Product information

Product name: Recycled aluminium extruded profile

Product identification: recycled profile is obtained from secondary aluminium, that is obtained from aluminium scrap. The aluminium scrap is about 84%, the remaining part, about 16%, is primary aluminium.

Recycled aluminium profile has the same characteristic of primary aluminium profile.

Aluminium profile is a wrought product of uniform cross-section along its entire length, including the forms of bars and tubes, supplied in straight lengths. The product complies with the European standard on aluminium and aluminium alloys - extruded rod/bar, tube and profiles, as EN 755-1 or EN 12020-1 (precision profiles 6060 / 6063), EN 573-3 chemical composition, EN 755-2 Mechanical properties. Structural product for construction works under Regulation (EU) No 305/2011 complies with EN 15088.

Product description: wrought product obtained by extrusion of recycled aluminium alloy Al-Mg-Si (6xxx) billet.

Aluminium is a light alloy, durable, food safe and completely recyclable.

Intended for a wide variety of application and markets: as industrial, construction, furniture, transport, electrical engineering ...

UN CPC code: 41532 "Bars, rods and profiles, of aluminium"

Geographical scope: EU 27

LCA information

Functional unit / declared unit: Kg 1 of aluminium extruded profile;

Gross-weight of product: Kg/m³ 2.700;

Reference service life: not defined, as semi-finished product a wide variety of uses are foreseen

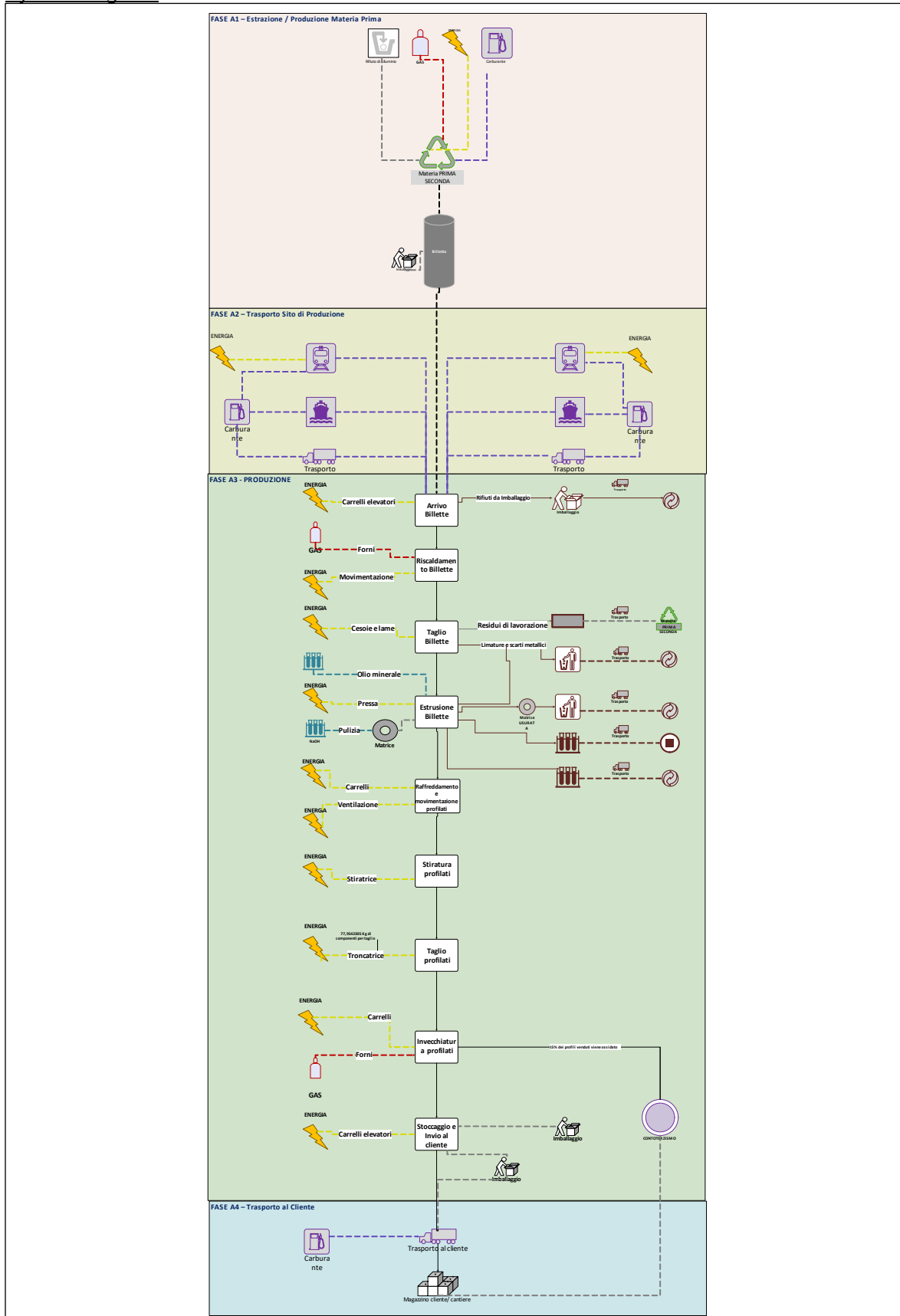
Time representativeness: year 2023

Database(s) and LCA software used: database Ecolnvent v3.10, software SimaPro

Description of system boundaries:

From cradle to gate with options, aggregated modules A1 – A3, A4, A5 (balancing out reporting), C, D. Modules not declared: modules C3, B1 – B7

System diagram:



Module A1 – Extraction/Production of Raw Material

The extraction and processing of the raw material, bauxite from which aluminum is extracted, is a process with high environmental impacts and which occurs mainly outside the European Union, while the recovery of aluminum for the production of secondary raw material has much lower environmental impacts and is an activity that is very present both in Italy and in EU.

Module A2 – Transport to the production site

The transport of raw materials and secondary raw materials is mainly in the form of ships, even though there are numerous Italian suppliers.

Module A3 – Production

To obtain an extruded aluminium profile the mainly processing steps are: raw-billettes handling, heating and cutting of the billettes, extruding process of the billettes to obtain the profile, aluminium profile cooling and stretching, eventual ageing (oxidation process) of the aluminium profile.

Module A4 – Distribution of the product

The transport consists exclusively of land transports performed with heavy vehicles.

Module A5 – Installation of the product

Module A5 has been introduced for "Balancing out Reporting", in reference to the calculation of the GWP biogenic from packaging materials.

Modules C1-C4

The modelling of aluminum waste disposal scenarios used for building construction is based on the assumption that aluminum profiles and extruded and oxidized aluminum profiles do not degenerate over time and can almost always, be separated from buildings before demolition operations.

Therefore, for step C1 has been considered the dismantling activities. C2 module considers the transport of the dismantled aluminium materials to the recovery site.

C3 module is not accounted for, because in general the aluminum profile does not require any particular treatment before to be sent for recovery processes. C4 corresponding to the disposal of aluminum waste. It has considered that the recovery rate of aluminum scrap is close to 95%, indicating that an estimate of 5% of the weight of aluminum profiles are disposed.

Module D – benefits deriving from recovery

The recovery potential of aluminum is estimated to be 95%; the simple process of melting the scrap and casting allows the recovery in the form of ingots or billets.

More information:

Cut-off: Raw materials, energy, packaging materials, water and waste are basically fully included. Consumables cut-off at 1% by mass.

Data quality: data quality assessment was made, at a preliminary level, by verifying the reliability of the information through a cross-check of the same. Most are specific data, data referred to phases A2, A3 and A4 derive directly from management software used by the organization, while for phase A1 the data quality can be considered lower regarding the modelling of the activities necessary to produce the raw material or the secondary raw material. The calculations on the impacts show limited uncertainty:

Allocation: was made based on mass distribution. The incoming goods were then aggregated within the product system and divided by the total kilograms of product sold.

Modules declared, geographical scope, share of specific data (in GWP-GHG results) and data variation (in GWP-GHG results):

	Product stage			Construction process stage		Use stage							End of life stage				Resource recovery stage
	Raw material supply	Transport	Manufacturing	Transport	Construction installation	Use	Maintenance	Repair	Replacement	Refurbishment	Operational energy use	Operational water use	De-construction demolition	Transport	Waste processing	Disposal	Reuse-Recovery-Recycling-potential
Module	A1	A2	A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
Modules declared	X	X	X	X	X	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	X	X	X	X	X
Geography	EU 27	EU 27	EU 27	EU 27	EU27	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	EU27	EU27	EU 27	EU 27	EU27
Specific data used	Proxy data			>90%	Proxy Data	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	Proxy data	Proxy data	Proxy data	Proxy data	Proxy Data
Variation – products	N.D.			N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.
Variation – sites	N.D.			N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.

The **Module A5** has been introduced for "Balancing out Reporting", in reference to the calculation of the GWP biogenic.

Content information

Product components	Weight, kg	Post-consumer material, weight-%	Biogenic material, weight-% and kg C/kg
Secondary aluminium	0,838	19,2%	0
Primary aluminium	0,162	0	0
TOTAL	1	16,1%	0
Packaging materials	Weight, kg	Weight-% (versus the product)	Weight biogenic carbon, kg C/kg
Paper and cardboard	1,60E-02	0,01%	0,405
Iron straps	1,63E-05	0,00%	0,000
Pallets and wooden boards	1,15E-03	0,01%	0,595
Plastic films	8,00E-04	0,00%	0,000

The product does not contain substances which exceed the limits for registration with the European Chemicals Agency regarding the "Candidate List of Substances of Very High Concern for Authorisation".

Dangerous substances from the candidate list of SVHC for Authorisation	EC No.	CAS No.	Weight-% per functional or declared unit
N. A.	N. A.	N. A.	0

Results of the environmental performance indicators (Kg 1 of aluminium extruded profile)

Mandatory impact category indicators according to EN 15804

Results per functional or declared unit								
Indicator	Unit	A1-A3	A4	A5	C1	C2	C4	D
GWP-fossil	kg CO ₂ eq.	1,90E+00	4,46E-02	4,81E-04	1,20E-02	2,97E-02	2,18E-03	-4,82E-01
GWP-biogenic	kg CO ₂ eq.	-2,53E-02	1,45E-05	6,92E-02	1,68E-05	9,63E-06	3,46E-02	1,09E-04
GWP-luluc	kg CO ₂ eq.	3,20E-03	1,09E-06	4,73E-08	1,33E-06	7,22E-07	4,84E-08	-1,42E-03
GWP- total	kg CO ₂ eq.	1,91E+00	4,46E-02	4,26E-02	1,20E-02	2,97E-02	3,68E-02	-4,83E-01
ODP	kg CFC 11 eq.	2,55E-08	9,01E-10	6,81E-12	1,06E-09	6,00E-10	1,72E-11	-2,01E-09
AP	mol H ⁺ eq.	9,90E-03	1,07E-04	5,40E-06	4,71E-05	7,11E-05	5,71E-06	-3,26E-03
EP-freshwater	kg P eq.	5,27E-04	3,19E-07	7,27E-08	3,91E-07	2,12E-07	3,13E-06	-1,41E-04
EP-marine	kg N eq.	1,92E-03	4,05E-05	3,06E-06	6,37E-06	2,69E-05	6,69E-05	-5,36E-04
EP-terrestrial	mol N eq.	2,03E-02	4,43E-04	2,71E-05	6,66E-05	2,95E-04	1,91E-05	-5,54E-03
POCP	kg NMVOC eq.	6,63E-03	1,87E-04	6,67E-06	1,08E-04	1,25E-04	1,63E-05	-1,72E-03
ADP-minerals&metals*	kg Sb eq.	8,24E-05	1,46E-09	9,03E-11	1,80E-09	9,71E-10	2,24E-10	2,36E-06
ADP-fossil*	MJ	2,18E+01	5,84E-01	2,88E-03	6,88E-01	3,88E-01	1,24E-02	-4,58E+00
WDP*	m ³	1,06E+00	2,48E-04	8,18E-05	2,93E-04	1,65E-04	-2,72E-04	-3,19E-02

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
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A) Disclaimer: as the Module C is included in the EPD declaration, for the use of the environmental information it's recommended to account all of the declared modules, from A1-A3 to C.

B) Disclaimer: the estimated impacts are relative results that don't include the full of the impacts, nor thresholds or safety and risks' evaluation.

Additional mandatory and voluntary impact category indicators

Results per functional or declared unit								
Indicator	Unit	A1-A3	A4	A5	C1	C2	C4	D
GWP-GHG ¹	kg CO ₂ eq.	1,91E+00	4,46E-02	4,80E-04	1,20E-02	2,97E-02	2,94E-02	-4,83E-01
Particulate matter	disease inc.	1,17E-07	2,48E-09	4,09E-11	3,99E-10	1,65E-09	8,12E-11	-4,78E-08
Human toxicity, cancer	CTUh	9,30E-09	3,16E-12	1,10E-12	1,71E-12	2,10E-12	9,99E-13	-1,07E-09
Human toxicity, non cancer	CTUh	2,91E-08	2,50E-10	5,38E-11	4,95E-11	1,66E-10	8,91E-11	-2,48E-09

Resource use indicators

Results per functional or declared unit								
Indicator	Unit	A1-A3	A4	A5	C1	C2	C4	D
PERE	MJ	2,05E+00	2,03E-03	1,39E-04	2,40E-03	1,35E-03	1,16E-03	-4,48E-01
PERM	MJ	7,82E-01	2,65E-04	3,36E-05	3,22E-04	1,77E-04	5,79E-05	-5,70E-02
PERT	MJ	2,83E+00	2,29E-03	1,73E-04	2,72E-03	1,52E-03	1,22E-03	-5,05E-01
PENRE	MJ	2,18E+01	-2,00E+00	-1,00E+00	0,00E+00	3,88E-01	1,24E-02	-4,58E+00
PENRM	MJ	2,57E-03	1,48E-06	7,89E-07	1,78E-06	9,86E-07	2,85E-06	1,28E-03
PENRT	MJ	2,18E+01	5,84E-01	2,88E-03	6,88E-01	3,88E-01	1,24E-02	-4,58E+00
SM	kg	8,50E-01	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	1,00E-01
RSF	MJ	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
FW	m ³	1,02E+00	2,44E-04	7,32E-05	2,89E-04	1,62E-04	-1,88E-04	-3,33E-02

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
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¹ 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.

Waste indicators

Results per functional or declared unit								
Indicator	Unit	A1-A3	A4	A5	C1	C2	C4	D
Hazardous waste disposed	kg	5,94E-03	2,80E-05	1,67E-07	3,41E-05	1,86E-05	2,43E-06	4,10E-03
Non-hazardous waste disposed	kg	1,64E-01	2,62E-05	2,80E-02	3,18E-05	1,74E-05	5,09E-02	6,35E-03
Radioactive waste disposed	kg	2,10E-05	5,48E-08	2,52E-09	6,63E-08	3,65E-08	1,44E-08	-1,51E-06

Output flow indicators

Results per functional or declared unit								
Indicator	Unit	A1-A3	A4	A5	C1	C2	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	0,00E+00
Material for recycling	kg	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	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	0,00E+00
Exported energy, electricity	MJ	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
Exported energy, thermal	MJ	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00

Additional environmental information

- A4 Transport: outbound transports from Alutitan S.p.A. are, for the vast majority, done inside the Italian national territory by road freight transport.

Assumption's information	Units
Type of freight carrier and fuel assumption	The average consumption (litres), and the average freight vehicles are extrapolated from the Directive 2007/37/CE
Distances	km
Usage capacity	Downstream transports are made by external organisations. The cargo's usage capacity for Alutitan is near the 100% for the outgoing transports
Apparent density of the material	2,7 kg/dm ³
Usage factor of the volume capacity of freight transports	N.A.

- Reference Service Life:

Information about reference service life	Units
RSL spawn	The RSL of an aluminium profile extend greatly over a century and therefore it can't be quantified. The point is considered not applicable
Declared product properties at the gate of the factory	RSL of aluminium profiles isn't influenced by mechanical properties, and the mechanical strength directly depends by the request of the customer.
Scope of application, including the operative instructions.	It is not possible to define a particular scope of application that could have an impact of the RSL
Expected quality of the finished product when applied as manufacturer' intended	N.A.
Degradation from external environment exposure, as meteoric degradation, UV exposure, pollutants, building exposure to Sun or mean temperatures	Aluminium is corrosion-resistant and durable. A natural thin oxide layer protects the material against corrosion by air, water or certain chemicals. Durability is increased further with additional surface protection
Indoors environment conditions, as temperatures, humidity and chemical agents' exposure	Aluminium is corrosion-resistant and durable.
Application conditions, as usage frequency and mechanical exposure	N.A.
Expected maintenance frequency, type and quality of spare parts	N.A.

- End of life: End of life sc
- enarios must describe processes for which the economic and technical viability has already been proved.

Parameters	Units
Recovery share from demolition activities	95% if dismantle before the demolition activities (e.g. infixes)
Resources usage for recovery	95% (kg) if the material is obtained from demolition's debris, whether the profile had a structural role. The assumption is justified by the economic value of the aluminium scrap

Parameters	Units
Recovery from dismantling or wreckage rummage	Those recovery are usually manually operations
Share of recovery route by bibliography	0 kg/kg for reuse: it is assumed that none of the profile is reused, although technically feasible
	0,95 kg/kg for recycling: via waste smelting
	0 kg/kg to energy recovery: the route is viable only for aluminium foil
Share of disposed waste	0,05 kg/kg for landfill disposal
Energy goods consumption for each module	For C1 module, it can be assumed a fuel consumption of 1,5 dm ³ of diesel for each 100 kilos of profiles recovery
	For C2 module it is assumed that the recovered profile would travel for 50 km by an Euro5 TIR.
	For D module it's assumed a travel route of 100 km for the recovered waste. Data about smelting are included in the calculation of LCIA

Aluminium recovery and recycling are common practices of the metal industries; main recovery route is smelting of the wreckages to produce new billets, without any additional process or treatment. The available bibliography reassures that an evaluation of 95% of recovery share is in line with the real processes of the industry.

The environmental benefits of aluminium recovery are most evident in the avoided emission of A1 module when compared with the extraction and process of primary material (bauxite).

The evaluation of D module has been made by:

$$e_{moduleD1} = \sum_i \left((M_{MRout_i} - M_{MRin_i}) \cdot \left(E_{MRafterEoWout_i} - E_{VMSubout_i} \cdot \frac{Q_{Pout_i}}{Q_{Sub_i}} \right) \right)$$

In which $M_{MRout} - M_{MRin}$ is evaluated at 0,724, for M_{MRout} is 0,95 and M_{MRin} is rounded to 0,225, that is the share of post-consumer scrap already in Alutitan's raw material.

The second term is directly modelled on SimaPro and for $EM_{RafterEoWout}$ the values directly came by the dataset "Aluminium, cast alloy {RER}| treatment of Aluminium scrap, post-consumer, prepared for recycling, at refiner | Cut-off, U", that already include the environmental impacts of aluminium recovery. The term $E_{VMSubout}$ instead, is the dataset for the primary aluminium, for the subtraction of the impact that would have been generated using primary materials.

The approach can be considered cautious, it is indeed applied the full dataset for the aluminium's recovery operations for the inclusion of any viable recycling route, not only smelting.

Information related to Sector EPD

This EPD is not sectorial.

Differences versus previous versions

This document is the first version of EPD.

References

- General Programme Instructions of the International EPD® System. Version 4.0
- International EPD® System PCR 2019:14 Construction products, version 1.3.4
- EN 15804:2012+A2:2019/AC:2021 Sustainability of construction works - Environmental product declarations - Core rules for the product category of construction products
- ISO 14025:2006, Environmental labels and declarations - Type III environmental declarations
- ISO 14040:2006, Environmental management - Life cycle assessment - Principles
- ISO 14044:2006, Environmental management - Life cycle assessment - Requirements

