ENVIRONMENTAL PRODUCT DECLARATION

as per *ISO 14025* and *EN 15804+A2*

Owner of the Declaration	European Association for Panels and Profiles e. V. (PPA-Europe)
Publisher	Institut Bauen und Umwelt e.V. (IBU)
Programme holder	Institut Bauen und Umwelt e.V. (IBU)
Declaration number	EPD-PPA-20240130-CBG1-EN
Issue date	19.07.2024
Valid to	18.07.2029

Profiled sheets made of aluminium for roof, wall and ceiling constructions

PPA-Europe

Institut Bauen und Umwelt e.V.

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European Association for Panels and Profiles

General Information

PPA-Europe

Programme holder

IBU – Institut Bauen und Umwelt e.V.
Hegelplatz 1
10117 Berlin
Germany

Declaration number

EPD-PPA-20240130-CBG1-EN

This declaration is based on the product category rules:

Thin walled profiles and profiled panels of metal, 01.08.2021
(PCR checked and approved by the SVR)

Issue date

19.07.2024

Valid to

18.07.2029

Dipl.-Ing. Hans Peters
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Profiled sheets made of aluminium for roof, wall and ceiling constructions

Owner of the declaration

European Association for Panels and Profiles e. V. (PPA-Europe)
Europark Fichtenhain A 13a
47807 Krefeld
Germany

Declared product / declared unit

1m² industrially produced aluminium profiled sheets

Scope:

This document is an association EPD for 1 m² aluminium trapezoidal 35/207 profile and it represents an average EPD, based on vertical averaging of the specific producer datasets under consideration of the yearly production amounts. Its applicability is limited to aluminium profiled sheets, which are manufactured by member companies of the European Association for Panels and Profiles.

The following member companies of the European Association for Panels and Profiles have provided data for the year 2022:

1. Hans Laukien
2. Isolpack
3. Maas Profilzentrum
4. Montana Bausysteme
5. Wurzer Profiliertechnik
6. Zambelli RIB-ROOF

These companies are representative for the European production of aluminium profiled sheets.

Additionally, the EPD includes a public annex. This annex applies to:

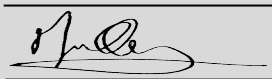
- 1 m² aluminium sinusoidal profile 18/76
- 1 kg aluminium profile.

The owner of the declaration shall be liable for the underlying information and evidence; the IBU shall not be liable with respect to manufacturer information, life cycle assessment data and evidences.

The EPD was created according to the specifications of EN 15804+A2. In the following, the standard will be simplified as *EN 15804*.

Verification

The standard EN 15804 serves as the core PCR
Independent verification of the declaration and data according to ISO 14025:2011
☐ internally ☒ externally



Mr Olivier Muller,
(Independent verifier)

Product

Product description/Product definition

The EPD is valid for prefabricated thin-walled profiled sheets made of aluminium for loadbearing, self-supporting and non-supporting applications in single- and multi-layer roof, wall and ceiling structures.

The profiled sheets are made of a core of aluminium with organic coatings. For the placing of the product on the market in the European Union / European Free Trade Association (EU/EFTA) (with the exception of Switzerland), *CPR* applies. The product needs a Declaration of Performance taking into consideration *EN 14782* or *EN 1090* and the CE-marking. The data listed in the respective Declaration of Performance apply.

For the application and use, the respective national provisions apply.

Application

The products are used as covering components in single- and multi-layer roof and wall structures, as well as supporting trays in single- and multi-layer roof and ceiling structures for mainly static loads.

The profiled sheets are used in interior and exterior applications.

Technical Data

Technical specifications for profiled sheets are:

- *EN 14782*
- *EN 508*
- *EN 1090*

Constructional data

1 m² Aluminium trapezoidal profile 35/207

Name	Value	Unit
Thickness of the sheet, according EN 485-4	0.7	mm
Surface weight	2.3	kg/m²
Height of the profile, according EN 508 or EN 1090	35	mm

Performance data of the product in accordance with the declaration of performance with respect to its essential characteristics according to *EN 14782* or *EN 1090*.

Base materials/Ancillary materials

Aluminium according to *EN 485-2* or *EN 573-3*

Organic coating according to *EN 12944-1*:
Polyester (SP), coil coating, 25 µm on the application side and max. 12 µm on the backside.

The product does not contain any SVHCs (Substances of Very High Concern) *REACH*.

Reference service life

The term of protection depends on the location, weather conditions and the quality of the coating, if applicable.

Thin-walled profiled sheets made of aluminium exhibit an estimated service life of > 50 years. This declaration depends on Life Cycle Assessment and relies on the use conditions, according to the *BBSR table*.

LCA: Calculation rules

Declared Unit

The declared unit is 1 m^2 of aluminium profile. The averaging is done weighted based on the production volume (in m²) per company.

Declared unit

Name	Value	Unit
Declared unit	1	m^2
Surface weight	2.3	kg/m²
Conversion factor to 1 kg	0.44	-

System boundary

Type of the EPD: cradle to gate - with options, modules C1-C4 and module D (A1-A3, C, D and additional modules A4 and A5)

Production stage (modules A1-A3) includes processes that provide materials and energy input for the system, manufacturing and transport processes up to the factory gate, as well as waste processing.
Module A4: Delivery to the construction site- fixed transport distance of 100 km.
Module A5: Disposal of transport packaging at the construction site and installation by the use of construction machineries - electricity and diesel driven.

Module C1: Dismantling by the use of machineries- electricity and diesel driven.
Module C2: Transport to the site of end-of-life treatment- fixed transport distance of 50 km.
Module C3: Metal recycling of the aluminium profiles.
Module C4: Deposition/landfill (No environmental impact).

Module D: Potential credits for substitution processes or recycling materials from A5 and C3. For the end of life, it is assumed that the aluminium is recycled with credit for the recycling potential declared in module D.
For the end of life, a collection rate of 100 % is assumed.

Geographic Representativeness

Land or region, in which the declared product system is manufactured, used or handled at the end of the product´s lifespan: Europe

Comparability

Basically, a comparison or an evaluation of EPD data is only possible if all the data sets to be compared were created according to *EN 15804* and the building context, respectively the product-specific characteristics of performance, are taken into account. The background datasets are obtained from *LCA FE* (fka *GaBi*) Database *CUP 2023.1*.

LCA: Scenarios and additional technical information

Characteristic product properties of biogenic carbon

Information on describing the biogenic Carbon Content at factory gate

Name	Value	Unit
Biogenic carbon content in product	-	kg C
Biogenic carbon content in accompanying packaging	0.036	kg C

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

The following technical information is a basis for the declared modules.

Transport to the building site (A4)

Name	Value	Unit
Transport distance	100	km
Capacity utilisation (including empty runs)	61	%

Installation into the building (A5)

Packaging materials:
PE film 0.06 kg/m² profile
Wooden pallets 0.09 kg/m² profile

A5 covers the waste treatment of packaging material at the point of installation.

Name	Value	Unit
Output substances following waste treatment on site	0.152	kg
Machine- Diesel driven for installation per kg	0.004	L
Machine- electricity driven for installation per kg	1.89	Wh

End of life (C1-C4)

Name	Value	Unit
Machine- Diesel driven for installation per kg	0.005	L
Machine- Electricity driven for installation per kg	0.63	Wh
Collected separately waste type waste type	2.3	kg
Recycling	2.3	kg
Landfilling	-	kg

Reuse, recovery or recycling potential (D)

The avoided production of primary aluminium sheet is considered. Resulting potential benefits and loads for the metal recycling are declared in module D.

LCA: Results

DESCRIPTION OF THE SYSTEM BOUNDARY (X = INCLUDED IN LCA; MND = MODULE OR INDICATOR NOT DECLARED; MNR = MODULE NOT RELEVANT)

Product stage			Construction process stage		Use stage							End of life stage				Benefits and loads beyond the system boundaries
Raw material supply	Transport	Manufacturing	Transport from the gate to the site	Assembly	Use	Maintenance	Repair	Replacement	Refurbishment	Operational energy use	Operational water use	De-construction demolition	Transport	Waste processing	Disposal	Reuse-Recovery-Recycling-potential
A1	A2	A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
X	X	X	X	X	MND	MND	MNR	MNR	MNR	MND	MND	X	X	X	X	X

RESULTS OF THE LCA - ENVIRONMENTAL IMPACT according to EN 15804+A2: 1 m² Aluminium trapezoidal profile 35/207 (2.3kg/m²)

Parameter	Unit	A1-A3	A4	A5	C1	C2	C3	C4	D
GWP-total	kg CO_2 eq	2.11E+01	1.67E-02	3.69E-01	1.07E-01	8.35E-03	0	0	-1.96E+01
GWP-fossil	kg CO_2 eq	2.12E+01	1.65E-02	2.36E-01	1.05E-01	8.25E-03	0	0	-1.95E+01
GWP-biogenic	kg CO_2 eq	-1.32E-01	4.87E-05	1.32E-01	4.18E-04	2.44E-05	0	0	-3.85E-02
GWP-luluc	kg CO_2 eq	5.74E-03	1.53E-04	8.21E-04	9.69E-04	7.64E-05	0	0	-1.77E-03
ODP	kg CFC11 eq	2.28E-11	2.15E-15	1.37E-10	2.12E-14	1.07E-15	0	0	-1.62E-11
AP	mol H^+ eq	9.75E-02	2.12E-05	5.79E-04	6.15E-04	1.06E-05	0	0	-6.8E-02
EP-freshwater	kg P eq	1.24E-05	6.04E-08	3.33E-07	3.84E-07	3.02E-08	0	0	-6.54E-06
EP-marine	kg N eq	1.45E-02	7.18E-06	2.73E-04	3E-04	3.59E-06	0	0	-1.16E-02
EP-terrestrial	mol N eq	1.58E-01	8.64E-05	3.07E-03	3.32E-03	4.32E-05	0	0	-1.26E-01
POCP	kg NMVOC eq	4.43E-02	1.83E-05	7.25E-04	7.98E-04	9.13E-06	0	0	-3.43E-02
ADPE	kg Sb eq	1.1E-06	1.09E-09	6.15E-09	6.96E-09	5.44E-10	0	0	-6.81E-07
ADPF	MJ	2.85E+02	2.25E-01	1.3E+00	1.43E+00	1.12E-01	0	0	-2.63E+02
WDP	m^3 world eq deprived	3.1E+00	1.99E-04	3.09E-02	1.36E-03	9.97E-05	0	0	-1.2E+00

GWP = Global warming potential; ODP = Depletion potential of the stratospheric ozone layer; AP = Acidification potential of land and water; EP = Eutrophication potential; POCP = Formation potential of tropospheric ozone photochemical oxidants; ADPE = Abiotic depletion potential for non-fossil resources; ADPF = Abiotic depletion potential for fossil resources; WDP = Water (user) deprivation potential)

RESULTS OF THE LCA - INDICATORS TO DESCRIBE RESOURCE USE according to EN 15804+A2: 1 m² Aluminium trapezoidal profile 35/207 (2.3kg/m²)

Parameter	Unit	A1-A3	A4	A5	C1	C2	C3	C4	D
PERE	MJ	1.22E+02	1.64E-02	1.7E+00	1.09E-01	8.18E-03	0	0	-8.64E+01
PERM	MJ	1.58E+00	0	-1.58E+00	0	0	0	0	0
PERT	MJ	1.24E+02	1.64E-02	1.1E-01	1.09E-01	8.18E-03	0	0	-8.64E+01
PENRE	MJ	2.83E+02	2.26E-01	4.13E+00	1.44E+00	1.13E-01	0	0	-2.64E+02
PENRM	MJ	2.83E+00	0	-2.83E+00	0	0	0	0	0
PENRT	MJ	2.85E+02	2.26E-01	1.31E+00	1.44E+00	1.13E-01	0	0	-2.64E+02
SM	kg	0	0	0	0	0	0	0	0
RSF	MJ	2.65E-22	0	0	0	0	0	0	0
NRSF	MJ	3.11E-21	0	0	0	0	0	0	0
FW	m^3	2.95E-01	1.79E-05	8.01E-04	1.18E-04	8.96E-06	0	0	-1.8E-01

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

RESULTS OF THE LCA – WASTE CATEGORIES AND OUTPUT FLOWS according to EN 15804+A2: 1 m² Aluminium trapezoidal profile 35/207 (2.3kg/m²)

Parameter	Unit	A1-A3	A4	A5	C1	C2	C3	C4	D
HWD	kg	1.91E-08	6.99E-13	2.47E-12	3.75E-12	3.49E-13	0	0	2.89E-08
NHWD	kg	5.9E+00	3.44E-05	2.84E-03	2.25E-04	1.72E-05	0	0	-4.48E+00
RWD	kg	1.65E-02	4.22E-07	1.03E-05	4.06E-06	2.11E-07	0	0	-2.03E-02
CRU	kg	0	0	0	0	0	0	0	0
MFR	kg	7.62E-02	0	0	0	0	2.3E+00	0	0
MER	kg	0	0	0	0	0	0	0	0
EEE	MJ	0	0	4.15E-01	0	0	0	0	0
EET	MJ	0	0	1.07E+00	0	0	0	0	0

HWD = Hazardous waste disposed; NHWD = Non-hazardous waste disposed; RWD = Radioactive waste disposed; CRU = Components for re-use; MFR = Materials for recycling; MER = Materials for energy recovery; EEE = Exported electrical energy; EET = Exported thermal energy

RESULTS OF THE LCA – additional impact categories according to EN 15804+A2-optional:
1 m² Aluminium trapezoidal profile 35/207 (2.3kg/m²)

Parameter	Unit	A1-A3	A4	A5	C1	C2	C3	C4	D
PM	Disease incidence	1.1E-06	1.55E-10	1.06E-08	1.22E-08	7.75E-11	0	0	-7.24E-07
IR	kBq U235 eq	3.34E+00	6.3E-05	1.36E-03	6.29E-04	3.15E-05	0	0	-4.49E+00
ETP-fw	CTUe	9.75E+01	1.6E-01	9.18E-01	1.02E+00	7.99E-02	0	0	-9.54E+01
HTP-c	CTUh	1.19E-08	3.27E-12	2.02E-11	2.08E-11	1.63E-12	0	0	-8.14E-09
HTP-nc	CTUh	2.48E-07	1.74E-10	1.32E-09	1.37E-09	8.7E-11	0	0	-1.92E-07
SQP	SQP	4.18E+01	9.4E-02	5.25E-01	5.99E-01	4.7E-02	0	0	-7.26E+00

PM = Potential incidence of disease due to PM emissions; IR = Potential Human exposure efficiency relative to U235; ETP-fw = Potential comparative Toxic Unit for ecosystems; HTP-c = Potential comparative Toxic Unit for humans (cancerogenic); HTP-nc = Potential comparative Toxic Unit for humans (not cancerogenic); SQP = Potential soil quality index

Disclaimer 1 – concerning Potential Human exposure efficiency relative to U235 (IRP) - 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 or radioactive waste disposal in underground facilities. Potential ionizing radiation from the soil, radon and from some construction materials is also not measured by this indicator.
Disclaimer 2 – concerning (ADP-minerals & metals, ADP-fossil, WDP, ETP-fwm HTP-c, HTP-nc, SQP) - The results of this environmental impact indicator shall be used with care as the uncertainties on these results are high as there is limited experience with the indicator.

References

EN 485-2
Aluminium and aluminium alloys - Sheet, strip and plate - Part 2: Mechanical properties

EN 508-2
Roofing products from metal sheet - Specification for self-supporting products of steel, aluminium or stainless steel sheet - Part 2: Aluminium

EN 573-3
Aluminium and aluminium alloys - Chemical composition and form of wrought products - Part 3: Chemical composition and form of products

EN 1090-1
Execution of steel structures and aluminium structures - Part 1: Requirements for conformity assessment of structural components

EN 1090-5
Execution of steel structures and aluminium structures - Part 5: Technical requirements for cold-formed structural aluminium elements and cold-formed structures for roof, ceiling, floor and wall applications

EN ISO 12944-1
Paints and varnishes - Corrosion protection of steel structures by protective coating systems - Part 1: General introduction

EN 14782
Self-supporting metal sheet for roofing, external cladding and internal lining - Product specification and requirements

EN 15804+ A2: 2019
Sustainability of construction works -Environmental Product Declarations - Core rules for the product category of construction products

BBSR table
BBSR table (german):
'Nutzungsdauern von Bauteilen zur Lebenszyklusanalyse nach BNB', Federal Institute for Research on Building, Urban Affairs and Spatial Development, Referat II Nachhaltiges Bauen; online available under
http://www.nachhaltigesbauen.de/baustoff-und-gebaeudedaten/nutzungsdauern-von-bauteilen.html

CPR
REGULATION (EU) No 305/2011 OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL of 9 March 2011 laying down harmonised conditions for the marketing of construction products and repealing Council Directive 89/106/EEC

IBU PCR Part A
PCR - Part A: Calculation rules for the Life Cycle Assessment and Requirements on the Background Report, version 1.3, Institut Bauen und Umwelt e.V., www.bau-umwelt.com, August 2021

IBU PCR Part B
PCR – Part B: Requirements of the EPD for Thin walled profiles and profiled panels of metal, v8, Institut Bauen und Umwelt e.V., www.bau-umwelt.com, 2023-10

LCA FE Software and Database
LCA FE software-system and CUP 2023.1 databases, University of Stuttgart and Sphera Solutions GmbH, LeinfeldenEchterdingen, 2023 (https://sphera.com/product-sustainabilitygabi-data-search/)

European Association for Panels and Profiles

MAAS PROFILE

WURZER Profiliertechnik für Dach und Fassade

MONTANA A Tata Steel Enterprise

zAmbelli EINFACH MACHEN. AUS METALL.

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Annex for profiled sheets made of aluminium for roof, wall and ceiling constructions

- **Aluminium sinusoidal profile18/76**
- **1kg aluminium profile**

to the

ENVIRONMENTAL PRODUCT DECLARATION
as per /ISO 14025/ and /EN 15804+A2/

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General Information

This document applies to aluminium profile- sinusoidal, 1kg aluminium profile as a public annex to the EPD-EPD-PPA-20240130-CBG1-EN document. The declared unit is 1 m^2 and 1 kg. The LCA data were based on production data from the year 2022.

European Association for Panels and Profiles

General Information on Products

This annex contains the LCA results of:

- Aluminium sinusoidal profile 18/76
- 1kg aluminium profile

Technical Data for Aluminium profile Sinusoidal

Technical specifications for profiled sheets are:

- *EN 14782*
- *EN 508*
- *EN 1090*

Constructional Data

Name	Value	Unit
Thickness of the sheet, according *EN 485-4*	0.7	mm
Surface weight	2.25	kg/m²
Height of the profile	18	mm

Technical Data for 1kg aluminium sheet

Base materials/Ancillary materials:
Aluminium according *EN 485-2* or *EN 573-3* with organic coating according *EN 12944-1*

1. LCA: Calculation rules

Declared unit

Product name	Name	Value	Unit
Aluminium sinusoidal profile 18/76	Declared unit	1	m^2
	Surface weight of the profile (total value)	2.25	kg/m²
1 kg Aluminium profile	Declared unit	1	kg

The annex includes the individual calculation for aluminium profiles, according to the declared unit mentioned above. The last declaration, for 1kg aluminium profile, is calculated including all the modules. The individual calculation for the aluminium profile can further be utilized to estimate the LCA results for the products with different weight. The results for 1kg aluminium profile shall be scaled by the mass of the desired profile.

2. LCA: Scenarios and additional technical information

Characteristic product properties of biogenic carbon

Information on describing the biogenic Carbon Content at factory gate

Product name	Name	Value	Unit
Aluminium sinusoidal profile 18/76	Biogenic carbon content in accompanying packaging	0,034	kg C / m²
1 kg Aluminium profile	Biogenic carbon content in accompanying packaging	0,014	kg C / kg

The following technical information is a basis for the declared modules.

Transport to the building site (A4)

The transport to building site A4 is standardized and can be scaled up to building level. Hence, it is considered to be 100km.

Name	Value	Unit
Transport distance	100	km
Capacity utilisation (including empty runs)	61	%

Installation (A5)

The following packaging material is considered in A1- A3: polyethylene foil and wooden pallets.
A5 covers the waste treatment of packaging material at the point of installation. A5 covers the waste treatment of packaging material at the point of installation. Disposal of transport packaging at the construction site and installation by construction machineries- diesel and electricity driven.

Energy benefits resulting from the waste treatment of the packaging material is quantified in module D.

Installation into the building (A5)

Product name	Name	Value	Unit
Aluminium sinusoidal profile 18/76	Output substances following waste treatment on site	0.222	kg
1kg Aluminium profile	Output substances following waste treatment on site	0.071	kg

End of life (C1-C4)

Product name	Name	Value	Unit
Aluminium sinusoidal profile 18/76	Collected separately waste type waste type	2.25	kg
	Recycling	2.25	kg
	Energy recovery	-	kg
	Landfilling	-	kg
1kg Aluminium profile	Collected separately waste type waste type	1	kg
	Recycling	1	kg
	Energy recovery	-	kg
	Landfilling	-	kg

Reuse. recovery or recycling potential (D)

Resulting potential benefits and loads for the metal recycling are declared in module D.

3. LCA: Results

DESCRIPTION OF THE SYSTEM BOUNDARY (X = INCLUDED IN LCA; ND = MODULE OR INDICATOR NOT DECLARED; MNR = MODULE NOT RELEVANT)

PRODUCT STAGE			CONSTRUCTION PROCESS STAGE		USE STAGE							END OF LIFE STAGE				BENEFITS AND LOADS BEYOND THE SYSTEM BOUNDARIES
Raw material supply	Transport	Manufacturing	Transport from the gate to the site	Assembly	Use	Maintenance	Repair	Replacement	Refurbishment	Operational energy use	Operational water use	De-construction demolition	Transport	Waste processing	Disposal	Reuse- Recovery- Recycling- potential
A1	**A2**	**A3**	**A4**	**A5**	**B1**	**B2**	**B3**	**B4**	**B5**	**B6**	**B7**	**C1**	**C2**	**C3**	**C4**	**D**
X	X	X	X	X	MND	MND	MND	MND	MND	MND	MND	X	X	X	X	X

RESULTS OF THE LCA - ENVIRONMENTAL IMPACT according to EN 15804+A2: 1m² Aluminium sinusoidal profile 18/76

Core Indicator	Unit	A1-A3	A4	A5	C1	C2	C3	C4	D
GWP-total	[kg CO_2-Eq.]	2,04E+01	1,63E-02	3,91E-01	1,04E-01	8,15E-03	0,00E+00	0,00E+00	-1,89E+01
GWP-fossil	[kg CO_2-Eq.]	2,06E+01	1,61E-02	2,67E-01	1,03E-01	8,05E-03	0,00E+00	0,00E+00	-1,89E+01
GWP-biogenic	[kg CO_2-Eq.]	-1,21E-01	4,76E-05	1,23E-01	4,08E-04	2,38E-05	0,00E+00	0,00E+00	-3,73E-02
GWP-luluc	[kg CO_2-Eq.]	5,42E-03	1,49E-04	8,01E-04	9,46E-04	7,46E-05	0,00E+00	0,00E+00	-1,72E-03
ODP	[kg CFC11-Eq.]	2,73E-11	2,10E-15	1,68E-10	2,07E-14	1,05E-15	0,00E+00	0,00E+00	-1,57E-11
AP	[mol H^+-Eq.]	9,29E-02	2,07E-05	5,73E-04	6,00E-04	1,03E-05	0,00E+00	0,00E+00	-6,58E-02
EP-freshwater	[kg P-Eq.]	1,14E-05	5,89E-08	3,25E-07	3,75E-07	2,95E-08	0,00E+00	0,00E+00	-6,34E-06
EP-marine	[kg N-Eq.]	1,39E-02	7,01E-06	2,69E-04	2,93E-04	3,51E-06	0,00E+00	0,00E+00	-1,12E-02
EP-terrestrial	[mol N-Eq.]	1,52E-01	8,43E-05	3,04E-03	3,24E-03	4,22E-05	0,00E+00	0,00E+00	-1,22E-01
POCP	[kg NMVOC-Eq.]	4,23E-02	1,78E-05	7,15E-04	7,79E-04	8,91E-06	0,00E+00	0,00E+00	-3,33E-02
ADPE	[kg Sb-Eq.]	1,03E-06	1,06E-09	6,00E-09	6,79E-09	5,31E-10	0,00E+00	0,00E+00	-6,60E-07
ADPF	[MJ]	2,80E+02	2,20E-01	1,28E+00	1,40E+00	1,10E-01	0,00E+00	0,00E+00	-2,55E+02
WDP	[m^3 world-Eq deprived]	2,97E+00	1,95E-04	3,33E-02	1,32E-03	9,74E-05	0,00E+00	0,00E+00	-1,16E+00

Caption	GWP = Global warming potential; ODP = Depletion potential of the stratospheric ozone layer; AP = Acidification potential of land and water; EP = Eutrophication potential; POCP = Formation potential of tropospheric ozone photochemical oxidants; ADPE = Abiotic depletion potential for non-fossil resources; ADPF = Abiotic depletion potential for fossil resources; WDP = Water (user) deprivation potential

RESULTS OF THE LCA - INDICATORS TO DESCRIBE RESOURCE USE according to EN 15804+A2: 1m² Aluminium sinusoidal profile 18/76

Indicator	Unit	A1-A3	A4	A5	C1	C2	C3	C4	D
PERE	[MJ]	1,17E+02	1,60E-02	1,58E+00	1,06E-01	7,99E-03	0,00E+00	0,00E+00	-8,36E+01
PERM	[MJ]	1,48E+00	0,00E+00	-1,48E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
PERT	[MJ]	1,19E+02	1,60E-02	1,07E-01	1,06E-01	7,99E-03	0,00E+00	0,00E+00	-8,36E+01
PENRE	[MJ]	2,77E+02	2,20E-01	4,84E+00	1,41E+00	1,10E-01	0,00E+00	0,00E+00	-2,56E+02
PENRM	[MJ]	3,56E+00	0,00E+00	-3,56E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
PENRT	[MJ]	2,80E+02	2,20E-01	1,28E+00	1,41E+00	1,10E-01	0,00E+00	0,00E+00	-2,56E+02
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
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
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
FW	[m^3]	2,82E-01	1,75E-05	8,55E-04	1,15E-04	8,75E-06	0,00E+00	0,00E+00	-1,74E-01

Caption	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 resources; SM = Use of secondary material; RSF = Use of renewable secondary fuels; NRSF = Use of non-renewable secondary fuels; FW = Use of net fresh water

RESULTS OF THE LCA – WASTE CATEGORIES AND OUTPUT FLOWS according to EN 15804+A2: 1m² Aluminium sinusoidal profile 18/76

Indicator	Unit	A1-A3	A4	A5	C1	C2	C3	C4	D
HWD	[kg]	1,53E-08	6,82E-13	2,38E-12	3,66E-12	3,41E-13	0,00E+00	0,00E+00	2,79E-08
NHWD	[kg]	5,58E+00	3,36E-05	2,66E-03	2,19E-04	1,68E-05	0,00E+00	0,00E+00	-4,34E+00
RWD	[kg]	1,75E-02	4,12E-07	1,05E-05	3,96E-06	2,06E-07	0,00E+00	0,00E+00	-1,96E-02
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
MFR	[kg]	5,48E-02	0,00E+00	0,00E+00	0,00E+00	0,00E+00	2,25E+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
EEE	[MJ]	0,00E+00	0,00E+00	4,55E-01	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
EET	[MJ]	0,00E+00	0,00E+00	1,22E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00

Caption	HWD = Hazardous waste disposed; NHWD = Non-hazardous waste disposed; RWD = Radioactive waste disposed; CRU = Components for re-use; MFR = Materials for recycling; MER = Materials for energy recovery; EEE = Exported electrical energy; EET = Exported thermal energy

RESULTS OF THE LCA – additional impact categories according to EN 15804+A2-optional:

1m² Aluminium sinusoidal profile 18/76

Indicator	Unit	A1-A3	A4	A5	C1	C2	C3	C4	D
PM	[Disease Incidence]	1,05E-06	1,51E-10	1,04E-08	1,20E-08	7,57E-11	0,00E+00	0,00E+00	-7,01E-07
IRP	[kBq U235-Eq.]	3,45E+00	6,15E-05	1,33E-03	6,14E-04	3,07E-05	0,00E+00	0,00E+00	-4,35E+00
ETP-fw	[CTUe]	9,45E+01	1,56E-01	9,04E-01	9,92E-01	7,80E-02	0,00E+00	0,00E+00	-9,24E+01
HTP-c	[CTUh]	1,12E-08	3,19E-12	1,99E-11	2,03E-11	1,60E-12	0,00E+00	0,00E+00	-7,88E-09
HTP-nc	[CTUh]	2,37E-07	1,70E-10	1,29E-09	1,33E-09	8,49E-11	0,00E+00	0,00E+00	-1,86E-07
SQP	[-]	4,06E+01	9,17E-02	5,12E-01	5,85E-01	4,59E-02	0,00E+00	0,00E+00	-7,05E+00

Caption	PM = Potential incidence of disease due to PM emissions; IR = Potential Human exposure efficiency relative to U235; ETP-fw = Potential comparative Toxic Unit for ecosystems; HTP-c = Potential comparative Toxic Unit for humans (cancerogenic); HTP-nc = Potential comparative Toxic Unit for humans (not cancerogenic); SQP = Potential soil quality index

RESULTS OF THE LCA - ENVIRONMENTAL IMPACT according to EN 15804+A2 1 kg Aluminium profile with production processes

Core Indicator	Unit	A1-A3	A4	A5	C1	C2	C3	C4	D
GWP-total	[kg CO_2-Eq.]	9,09E+00	7,25E-03	2,72E-01	4,63E-02	3,62E-03	0,00E+00	0,00E+00	-8,28E+00
GWP-fossil	[kg CO_2-Eq.]	9,14E+00	7,16E-03	2,17E-01	4,57E-02	3,58E-03	0,00E+00	0,00E+00	-8,26E+00
GWP-biogenic	[kg CO_2-Eq.]	-5,39E-02	2,12E-05	5,45E-02	1,81E-04	1,06E-05	0,00E+00	0,00E+00	-1,63E-02
GWP-luluc	[kg CO_2-Eq.]	2,41E-03	6,64E-05	3,56E-04	4,21E-04	3,32E-05	0,00E+00	0,00E+00	-7,48E-04
ODP	[kg CFC11-Eq.]	1,22E-11	9,32E-16	1,68E-10	9,22E-15	4,66E-16	0,00E+00	0,00E+00	-7,00E-12
AP	[mol H^+-Eq.]	4,13E-02	9,20E-06	2,78E-04	2,67E-04	4,60E-06	0,00E+00	0,00E+00	-2,86E-02
EP-freshwater	[kg P-Eq.]	5,08E-06	2,62E-08	1,45E-07	1,67E-07	1,31E-08	0,00E+00	0,00E+00	-2,77E-06
EP-marine	[kg N-Eq.]	6,19E-03	3,12E-06	1,28E-04	1,30E-04	1,56E-06	0,00E+00	0,00E+00	-4,88E-03
EP-terrestrial	[mol N-Eq.]	6,74E-02	3,75E-05	1,47E-03	1,44E-03	1,88E-05	0,00E+00	0,00E+00	-5,31E-02
POCP	[kg NMVOC-Eq.]	1,88E-02	7,93E-06	3,40E-04	3,46E-04	3,96E-06	0,00E+00	0,00E+00	-1,45E-02
ADPE	[kg Sb-Eq.]	4,58E-07	4,72E-10	2,67E-09	3,02E-09	2,36E-10	0,00E+00	0,00E+00	-2,88E-07
ADPF	[MJ]	1,24E+02	9,76E-02	5,95E-01	6,23E-01	4,88E-02	0,00E+00	0,00E+00	-1,12E+02
WDP	[m^3 world-Eq deprived]	1,32E+00	8,66E-05	2,49E-02	5,89E-04	4,33E-05	0,00E+00	0,00E+00	-5,07E-01

Caption	GWP = Global warming potential; ODP = Depletion potential of the stratospheric ozone layer; AP = Acidification potential of land and water; EP = Eutrophication potential; POCP = Formation potential of tropospheric ozone photochemical oxidants; ADPE = Abiotic depletion potential for non-fossil resources; ADPF = Abiotic depletion potential for fossil resources; WDP = Water (user) deprivation potential

RESULTS OF THE LCA - INDICATORS TO DESCRIBE RESOURCE USE according to EN 15804+A2: 1 kg Aluminium profile with production processes

Indicator	Unit	A1-A3	A4	A5	C1	C2	C3	C4	D
PERE	[MJ]	5,22E+01	7,10E-03	7,04E-01	4,73E-02	3,55E-03	0,00E+00	0,00E+00	-3,64E+01
PERM	[MJ]	6,57E-01	0,00E+00	-6,57E-01	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
PERT	[MJ]	5,29E+01	7,10E-03	4,65E-02	4,73E-02	3,55E-03	0,00E+00	0,00E+00	-3,64E+01
PENRE	[MJ]	1,23E+02	9,80E-02	2,18E+00	6,25E-01	4,90E-02	0,00E+00	0,00E+00	-1,12E+02
PENRM	[MJ]	1,58E+00	0,00E+00	-1,58E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
PENRT	[MJ]	1,25E+02	9,80E-02	5,97E-01	6,25E-01	4,90E-02	0,00E+00	0,00E+00	-1,12E+02
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
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
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
FW	[m^3]	1,25E-01	7,78E-06	6,16E-04	5,12E-05	3,89E-06	0,00E+00	0,00E+00	-7,56E-02

Caption	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 resources; SM = Use of secondary material; RSF = Use of renewable secondary fuels; NRSF = Use of non-renewable secondary fuels; FW = Use of net fresh water

RESULTS OF THE LCA – WASTE CATEGORIES AND OUTPUT FLOWS according to EN 15804+A2: 1 kg Aluminium profile with production processes

Indicator	Unit	A1-A3	A4	A5	C1	C2	C3	C4	D
HWD	[kg]	6,80E-09	3,03E-13	1,06E-12	1,63E-12	1,52E-13	0,00E+00	0,00E+00	1,20E-08
NHWD	[kg]	2,48E+00	1,49E-05	1,18E-03	9,75E-05	7,47E-06	0,00E+00	0,00E+00	-1,88E+00
RWD	[kg]	7,77E-03	1,83E-07	6,03E-06	1,76E-06	9,17E-08	0,00E+00	0,00E+00	-8,59E-03
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
MFR	[kg]	2,63E-04	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
EEE	[MJ]	0,00E+00	0,00E+00	3,58E-01	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
EET	[MJ]	0,00E+00	0,00E+00	1,05E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00

Caption	HWD = Hazardous waste disposed; NHWD = Non-hazardous waste disposed; RWD = Radioactive waste disposed; CRU = Components for re-use; MFR = Materials for recycling; MER = Materials for energy recovery; EEE = Exported electrical energy; EET = Exported thermal energy

RESULTS OF THE LCA – additional impact categories according to EN 15804+A2-optional: 1 kg Aluminium profile with production processes

Indicator	Unit	A1-A3	A4	A5	C1	C2	C3	C4	D
PM	[Disease Incidence]	4,66E-07	6,73E-11	4,70E-09	5,32E-09	3,36E-11	0,00E+00	0,00E+00	-3,05E-07
IRP	[kBq U235-Eq.]	1,53E+00	2,73E-05	6,11E-04	2,73E-04	1,37E-05	0,00E+00	0,00E+00	-1,90E+00
ETP-fw	[CTUe]	4,20E+01	6,93E-02	4,25E-01	4,41E-01	3,47E-02	0,00E+00	0,00E+00	-4,03E+01
HTP-c	[CTUh]	4,96E-09	1,42E-12	9,47E-12	9,05E-12	7,09E-13	0,00E+00	0,00E+00	-3,43E-09
HTP-nc	[CTUh]	1,05E-07	7,55E-11	6,15E-10	5,93E-10	3,78E-11	0,00E+00	0,00E+00	-8,12E-08
SQP	[-]	1,81E+01	4,08E-02	2,28E-01	2,60E-01	2,04E-02	0,00E+00	0,00E+00	-3,12E+00

Caption	PM = Potential incidence of disease due to PM emissions; IR = Potential Human exposure efficiency relative to U235; ETP-fw = Potential comparative Toxic Unit for ecosystems; HTP-c = Potential comparative Toxic Unit for humans (cancerogenic); HTP-nc = Potential comparative Toxic Unit for humans (not cancerogenic); SQP = Potential soil quality index

Disclaimer 1 – for the indicator “Potential Human exposure efficiency relative to U235”.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 or radioactive waste disposal in underground facilities. Potential ionizing radiation from the soil. radon and from some construction materials is also not measured by this indicator.

Disclaimer 2 – for the indicators “abiotic depletion potential for non-fossil resources”. “abiotic depletion potential for fossil resources”. “water (user) deprivation potential. deprivation-weighted water consumption”. “potential comparative toxic unit for ecosystems”. “potential comparative toxic unit for humans – cancerogenic”. “Potential comparative toxic unit for humans - not cancerogenic”. “potential soil quality index”.
The results of this environmental impact indicator shall be used with care as the uncertainties on these results are high as there is limited experience with the indicator.