

Result summary

# Alumet anodizing process epd in square (m2)

## Alumet<sup>®</sup>

Calculation number: EPD-NIBE-20220301-25248

Generation on: 22-12-2022

Issue date: 22-12-2022

Valid until: 22-12-2027

Status: verified

R<THiNK

## 1 General information

### 1.1 PRODUCT

Alument anodizing process epd in square (m2)

### 1.2 VALIDITY

**Issue date** 22-12-2022

**Valid until:** 22-12-2027

### 1.3 OWNER OF THE DECLARATION

# Alument<sup>®</sup>

**Manufacturer:** Alument

**Address:** Mon Plaisir 32, 4879 AN Etten-Leur

**E-mail:** info@alument.nl

**Website:** https://alument.nl

**Production location:** Alument BV

**Address production location:** Mon Plaisir 32, 4879 AN Etten-Leur

### 1.4 VERIFICATION OF THE DECLARATION

CEN standard EN 15804 serves as the core PCR. In compliance with ISO 14040:2006 and 14044:2006.

Independent verification of the declaration according to EN ISO 14025:2011-10.

Internal  External



Lex Roes, Ecochain Technologies B.V.

### 1.5 THIS DECLARATION IS BASED ON THE PRODUCT CATEGORY RULES

NMD Determination method Environmental performance Construction works v1.1 March 2022

### 1.6 FUNCTIONAL / DECLARED UNIT

Declared unit: square meter (m2)

### 1.7 CONVERSION FACTORS

Description	Value	Unit
Declared unit	1	square meter
Weight per declared unit	0.902	kg
Conversion factor to 1 kg	1.108236	square meter

### 1.8 SCOPE OF DECLARATION AND SYSTEM BOUNDARIES

This is a Cradle to gate LCA. The life cycle stages included are as shown below:

(X = included, ND = module not declared)

A1 A2 A3 A4 A5 B1 B2 B3 B4 B5 B6 B7 C1 C2 C3 C4 D

# 1 General information

X X X ND ND ND ND ND ND ND ND ND ND ND ND ND

## 1.9 COMPARABILITY

In principle, a comparison or assessment of the environmental impacts of different products is only possible if they have been prepared in accordance with EN 15804. For the

evaluation of the comparability, the following aspects have to be considered in particular: PCR used, functional or declared unit, geographical reference, the definition of the system boundary, declared modules, data selection (primary or secondary data, background database, data quality), scenarios used for use and disposal phases, and the life cycle inventory (data collection, calculation methods, allocations, validity period). PCRs and general program instructions of different EPDs programs may differ. Comparability needs to be evaluated. For further guidance, see EN 15804+A2 (5.3 Comparability of EPD for construction products) and ISO 14025 (6.7.2 Requirements for comparability).

## 2 Product

### 2.1 PRODUCT DESCRIPTION

Anodizing is an electrochemical process, which converts the metal surface into a decorative, durable, corrosion-resistant, wear-resistant oxide layer. This aluminum oxide layer is not applied like a coating, but is fully integrated with the underlying aluminum. It has an ordered porous structure that allows for additional processes, such as coloring.

Alumat has its own anodising bath. In this, aluminum components are mainly anodized sheet metal. The bath consists largely of chemicals, the main component of which is water. In addition, a set of chemicals is used to, for example, get the desired color and part is used to close the accelerated oxidation process.

Hydrochloric acid is used to clean the process from other chemicals. Many of the chemicals are not listed in Ecoinvent. The environmental map for chemicals was used for this purpose. In total, 0.93 kg of various chemicals are used per square meter. The layer thickness on the aluminum that remains is an average of 25  $\mu$ m.

To accurately reflect the sensitivity of the product, it was decided to link a CSV file to the review report. Displays the numbers from the report in scientific notation. The document linked to this review document is called:

Alumat CSV bestand ter aanvulling Review rapport Alumat 20221214



### 2.2 DESCRIPTION PRODUCTION PROCESS

The pre-process is included in the semi-finished product to arrive at anodizing aluminum products:

- mix of chemicals
- gas consumption
- power consumption
- and spring packing materials in which the semi-finished products become delivered.
- The chemicals are delivered in tankers or barrels. These are then transferred to the tank intended for this purpose and the drums are rinsed and returned as stationary drums. Only the salts are supplied in plastic bags.

The process takes place in a water bath mixed with chemicals. In this case, the water component is an auxiliary material to start the process. 1.18 kg of water is used per m<sup>2</sup> of anodised sheet metal.

Depending on the color to be achieved, a dye is applied. This can be, Flash Matt C, Sanodal Gold 4n, Aditivo Rainbow, Aditivo Moonlight. These are extremely small quantities per m<sup>2</sup> and fall within the 20% rule in which deviations can be made within the system. See sensitivity analysis 8.2

## 2 Product

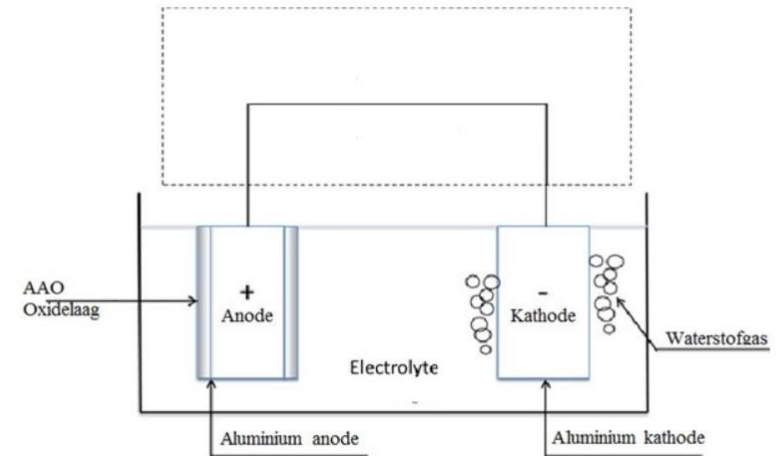
A lot of electricity is needed to be able to anodize. The baths are continuously under a certain voltage. In addition, heat is needed to speed up the process. Gas is used for this.

The baths are kept under electrical tension. This gives an energy consumption of: 5,219 kWh per m<sup>2</sup>

To heat the baths: 0.416 m<sup>3</sup> per m<sup>2</sup> of gas is required.

The process releases a lot of heat as an emission.

During anodising, the chemicals are converted into an oxidation layer. The chemicals are absorbed into the process. What remains is warm water, which returns to the public sewer via a controlled sewer system.



## 3 Results

### 3.1 ENVIRONMENTAL IMPACT INDICATORS PER SQUARE METER

#### CORE ENVIRONMENTAL IMPACT INDICATORS EN15804+A2

Abbreviation	Unit	A1	A2	A3	Total
AP	mol H+ eqv.	7.02E-3	7.01E-5	8.72E-3	1.58E-2
GWP-total	kg CO2 eqv.	7.13E-1	1.21E-2	4.37E+0	5.09E+0
GWP-b	kg CO2 eqv.	1.02E-2	5.58E-6	3.77E-2	4.80E-2
GWP-f	kg CO2 eqv.	7.01E-1	1.21E-2	4.33E+0	5.04E+0
GWP-luluc	kg CO2 eqv.	1.22E-3	4.43E-6	1.04E-3	2.26E-3
EP-m	kg N eqv.	7.08E-4	2.47E-5	1.92E-3	2.65E-3
EP-fw	kg P eqv.	5.76E-5	1.22E-7	1.95E-4	2.53E-4
EP-T	mol N eqv.	8.51E-3	2.72E-4	2.32E-2	3.20E-2
ODP	kg CFC 11 eqv.	4.96E-7	2.67E-9	2.96E-7	7.95E-7
POCP	kg NMVOC eqv.	2.25E-3	7.78E-5	5.98E-3	8.31E-3
ADP-f	MJ	1.21E+1	1.82E-1	5.95E+1	7.18E+1
ADP-mm	kg Sb-eqv.	3.95E-5	3.06E-7	1.40E-5	5.38E-5
WDP	m3 world eqv.	1.11E+0	6.52E-4	3.96E-1	1.50E+0

**AP**=Acidification (AP) | **GWP-total**=Global warming potential (GWP-total) | **GWP-b**=Global warming potential - Biogenic (GWP-b) | **GWP-f**=Global warming potential - Fossil (GWP-f) | **GWP-luluc**=Global warming potential - Land use and land use change (GWP-luluc) | **EP-m**=Eutrophication marine (EP-m) | **EP-fw**=Eutrophication, freshwater (EP-fw) | **EP-T**=Eutrophication, terrestrial (EP-T) | **ODP**=Ozone depletion (ODP) | **POCP**=Photochemical ozone formation - human health (POCP) | **ADP-f**=Resource use, fossils (ADP-f) | **ADP-mm**=Resource use, minerals and metals (ADP-mm) | **WDP**=Water use (WDP)

#### ADDITIONAL ENVIRONMENTAL IMPACT INDICATORS EN15084+A2

Abbreviation	Unit	A1	A2	A3	Total
ETP-fw	CTUe	1.92E+1	1.63E-1	4.63E+1	6.56E+1
PM	disease incidence	3.92E-8	1.09E-9	2.88E-8	6.91E-8
HTP-c	CTUh	7.77E-10	5.27E-12	8.55E-10	1.64E-9
HTP-nc	CTUh	4.96E-8	1.78E-10	2.62E-8	7.60E-8
IR	kBq U235 eqv.	8.06E-2	7.64E-4	9.88E-2	1.80E-1

**ETP-fw**=Ecotoxicity, freshwater (ETP-fw) | **PM**=Particulate Matter (PM) | **HTP-c**=Human toxicity, cancer (HTP-c) | **HTP-nc**=Human toxicity, non-cancer (HTP-nc) | **IR**=Ionising radiation, human health (IR) | **SQP**=Land use (SQP)

### 3 Results

Abbreviation	Unit	A1	A2	A3	Total
SQP	Pt	3.88E+0	1.58E-1	9.40E+0	1.34E+1

**ETP-fw**=Ecotoxicity, freshwater (ETP-fw) | **PM**=Particulate Matter (PM) | **HTP-c**=Human toxicity, cancer (HTP-c) | **HTP-nc**=Human toxicity, non-cancer (HTP-nc) | **IR**=Ionising radiation, human health (IR) | **SQP**=Land use (SQP)

#### CLASSIFICATION OF DISCLAIMERS TO THE DECLARATION OF CORE AND ADDITIONAL ENVIRONMENTAL IMPACT INDICATORS

ILCD classification	Indicator	Disclaimer
ILCD type / level 1	Global warming potential (GWP)	None
	Depletion potential of the stratospheric ozone layer (ODP)	None
	Potential incidence of disease due to PM emissions (PM)	None
ILCD type / level 2	AAcidification potential, Accumulated Exceedance (AP)	None
	Eutrophication potential, Fraction of nutrients reaching freshwater end compartment (EP-freshwater)	None
	Eutrophication potential, Fraction of nutrients reaching marine end compartment (EP-marine)	None
	Eutrophication potential, Accumulated Exceedance (EP-terrestrial)	None
	Formation potential of tropospheric ozone (POCP)	None
ILCD type / level 3	Potential Human exposure efficiency relative to U235 (IRP)	1
	Abiotic depletion potential for non-fossil resources (ADP-minerals&metals)	2
	Abiotic depletion potential for fossil resources (ADP-fossil)	2
	Water (user) deprivation potential, deprivation-weighted water consumption (WDP)	2
	Potential Comparative Toxic Unit for ecosystems (ETP-fw)	2
	Potential Comparative Toxic Unit for humans (HTP-c)	2
	Potential Comparative Toxic Unit for humans (HTP-nc)	2
Potential Soil quality index (SQP)	2	

**Disclaimer 1** – 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.

**Disclaimer 2** – The results of this environmental impact indicator shall be used with care as the uncertainties on these results are high or as there is limited experienced with the indicator.

### 3 Results

#### CORE ENVIRONMENTAL IMPACT INDICATORS EN15804+A1

Abbreviation	Unit	A1	A2	A3	Total
ADPE	Kg Sb	3.95E-5	3.06E-7	1.40E-5	5.38E-5
GWP	Kg CO2 Equiv.	6.91E-1	1.20E-2	4.28E+0	4.98E+0
ODP	Kg CFC-11 Equiv.	5.11E-7	2.13E-9	2.81E-7	7.94E-7
POCP	Kg Ethene Equiv.	3.36E-4	7.23E-6	6.35E-4	9.79E-4
AP	Kg SO2 Equiv.	6.01E-3	5.27E-5	6.90E-3	1.30E-2
EP	Kg PO43- Equiv.	5.15E-4	1.04E-5	1.37E-3	1.90E-3

**ADPE**=Depletion of abiotic resources-elements | **GWP**=Global warming | **ODP**=Ozone layer depletion | **POCP**=Photochemical oxidants creation | **AP**=Acidification of soil and water | **EP**=Eutrophication

#### NATIONAL ANNEX NMD

Abbreviation	Unit	A1	A2	A3	Total
ADPF	Kg Sb	5.09E-3	8.81E-5	3.33E-2	3.85E-2
HTP	kg 1.4 DB	3.35E-1	5.05E-3	4.31E-1	7.71E-1
FAETP	kg 1.4 DB	1.06E-2	1.47E-4	1.09E-2	2.17E-2
MAETP	kg 1.4 DB	3.22E+1	5.30E-1	4.61E+1	7.88E+1
TETP	kg 1.4 DB	8.77E-3	1.78E-5	1.73E-2	2.61E-2

**ADPF**=Depletion of abiotic resources-fossil fuels | **HTP**=Human toxicity | **FAETP**=Ecotoxicity, fresh water | **MAETP**=Ecotoxicity, marine water (MAETP) | **TETP**=Ecotoxicity, terrestrial

### 3.2 INDICATORS DESCRIBING RESOURCE USE AND ENVIRONMENTAL INFORMATION BASED ON LIFE CYCLE INVENTORY (LCI)

#### PARAMETERS DESCRIBING RESOURCE USE

Abbreviation	Unit	A1	A2	A3	Total
PERE	MJ	1.72E+0	2.28E-3	4.86E+0	6.58E+0

**PERE**=renewable primary energy ex. raw materials | **PERM**=renewable primary energy used as raw materials | **PERT**=renewable primary energy total | **PENRE**=non-renewable primary energy ex. raw materials | **PENRM**=non-renewable primary energy used as raw materials | **PENRT**=non-renewable primary energy total | **SM**=use of secondary material | **RSF**=use of renewable secondary fuels | **NRSF**=use of non-renewable secondary fuels | **FW**=use of net fresh water



### 3 Results

Abbreviation	Unit	A1	A2	A3	Total
PERM	MJ	0.00E+0	0.00E+0	0.00E+0	0.00E+0
PERT	MJ	1.72E+0	2.28E-3	4.86E+0	6.58E+0
PENRE	MJ	1.28E+1	1.94E-1	6.43E+1	7.73E+1
PENRM	MJ	0.00E+0	0.00E+0	-7.16E-5	-7.16E-5
PENRT	MJ	1.28E+1	1.94E-1	6.43E+1	7.73E+1
SM	Kg	0.00E+0	0.00E+0	0.00E+0	0.00E+0
RSF	MJ	0.00E+0	0.00E+0	0.00E+0	0.00E+0
NRSF	MJ	0.00E+0	0.00E+0	0.00E+0	0.00E+0
FW	M3	3.09E-2	2.22E-5	2.88E-2	5.97E-2

**PERE**=renewable primary energy ex. raw materials | **PERM**=renewable primary energy used as raw materials | **PERT**=renewable primary energy total | **PENRE**=non-renewable primary energy ex. raw materials | **PENRM**=non-renewable primary energy used as raw materials | **PENRT**=non-renewable primary energy total | **SM**=use of secondary material | **RSF**=use of renewable secondary fuels | **NRSF**=use of non-renewable secondary fuels | **FW**=use of net fresh water

#### OTHER ENVIRONMENTAL INFORMATION DESCRIBING WASTE CATEGORIES

Abbreviation	Unit	A1	A2	A3	Total
HWD	Kg	5.14E-5	4.62E-7	5.33E-5	1.05E-4
NHWD	Kg	1.26E-1	1.16E-2	1.37E-1	2.74E-1
RWD	Kg	6.79E-5	1.20E-6	1.02E-4	1.71E-4

**HWD**=hazardous waste disposed | **NHWD**=non hazardous waste disposed | **RWD**=radioactive waste disposed

#### ENVIRONMENTAL INFORMATION DESCRIBING OUTPUT FLOWS

Abbreviation	Unit	A1	A2	A3	Total
CRU	Kg	0.00E+0	0.00E+0	0.00E+0	0.00E+0
MFR	Kg	0.00E+0	0.00E+0	2.52E-6	2.52E-6
MER	Kg	0.00E+0	0.00E+0	0.00E+0	0.00E+0

**CRU**=Components for re-use | **MFR**=Materials for recycling | **MER**=Materials for energy recovery | **EE**=Exported energy | **EET**=Exported Energy Thermic | **EEE**=Exported Energy Electric

### 3 Results

Abbreviation	Unit	A1	A2	A3	Total
EE	MJ	0.00E+0	0.00E+0	8.90E-4	8.90E-4
EET	MJ	0.00E+0	0.00E+0	5.63E-4	5.63E-4
EEE	MJ	0.00E+0	0.00E+0	3.27E-4	3.27E-4

**CRU**=Components for re-use | **MFR**=Materials for recycling | **MER**=Materials for energy recovery | **EE**=Exported energy | **EET**=Exported Energy Thermic | **EEE**=Exported Energy Electric

## 3 Results

### 3.3 INFORMATION ON BIOGENIC CARBON CONTENT PER SQUARE METER

#### CARBON CONTENT

The following Information describing the biogenic carbon content in (the main parts of) the product at the factory gate per square meter:

### 3 Results

#### 3.4 ENVIRONMENTAL COST INDICATOR NL PER SQUARE METER

results.one\_point\_score\_name.short

Module EN15804	ECI NL	Share in total (%)
A1 Raw Materials Supply	€ 0.10	24,4 %
A2 Transport	€ 0.00	0,4 %
A3 Manufacturing	€ 0.31	75,2 %
<b>ECI NL per functional unit</b>	<b>€ 0.41</b>	

## 4 Contact information

Publisher

Operator

Owner of declaration

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