ENVIRONMENTAL PRODUCT DECLARATION

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

Owner of the Declaration	Hilti Aktiengesellschaft
Publisher	Institut Bauen und Umwelt e.V. (IBU)
Programme holder	Institut Bauen und Umwelt e.V. (IBU)
Declaration number	EPD-HIL-20240323-IBA1-EN
Issue date	05.06.2024
Valid to	04.06.2029

Aluminium profiles

Hilti Aktiengesellschaft

Institut Bauen und Umwelt e.V.

ECO PLATFORM EPD VERIFIED

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1. General Information

Hilti Aktiengesellschaft

Programme holder

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

Declaration number

EPD-HIL-20240323-IBA1-EN

This declaration is based on the product category rules:

Products of aluminium and aluminium alloys, 01.08.2021
(PCR checked and approved by the SVR)

Issue date

05.06.2024

Valid to

04.06.2029

Dipl.-Ing. Hans Peters
(Chairman of Institut Bauen und Umwelt e.V.)

Florian Pronold
(Managing Director Institut Bauen und Umwelt e.V.)

Aluminium profiles

Owner of the declaration

Hilti Aktiengesellschaft
Feldkircher Strasse 100
9494 Schaan
Liechtenstein

Declared product / declared unit

The declared product is 1 kg of aluminium profiles.

Scope:

This product declaration refers to a declared unit of 1 kg of aluminium profiles produced in one production facility in Romania. 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.
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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

Dr. Eva Schmincke,
(Independent verifier)

2. Product

2.1 Product description/Product definition

This EPD refers to 1 kilogram of aluminium profiles, represented by profiles of different shapes coming from the extrusion process. The final products are identical in terms of chemical composition and production process; the only difference between the products is the shape. The aluminium profiles are uncoated and non-insulated.
For the use and application of the product, the respective national provisions at the place of use apply.

2.2 Application

The final aluminium product (aluminium profiles) is used for creating different aluminium products for the Building & construction sector.

2.3 Technical Data

The final product has the technical characteristics described in the table below

Constructional data

Name	Value	Unit
Gross density	2.7	kg/m^3
Melting point	655	°C
Electrical conductivity at 20°C	34	$m/\Omega mm^2$
Thermal conductivity	220	W/(mK)
Coefficient of thermal expansion	23.4	$10^{-6}K^{-1}$
Modulus of elasticity	69.5	N/mm^2
Shear modulus	26.1	N/mm^2
Specific heat capacity	898	kJ/kgK
Hardness	90	HB
Yield strength Rp 0,2 min.	225	N/mm^2
Tensile strength Rm min.	270	N/mm^2
Tensile stress at break	25	%

Note that for the Electrical conductivity at 20 °C, Thermal conductivity, Hardness, Yield strength Rp 0,2 min., Tensile strength Rm min. and Tensile stress at break, the values represent the maximum values.

Performance data of the product with respect to its characteristics in accordance with the relevant technical provision (no CE-marking).

2.4 Delivery status

The aluminium profiles are delivered on the desired length and shape. The profiles are secured during transport by being tied together using plastic bands and placed on rectangular wooden bars.

2.5 Base materials/Ancillary materials

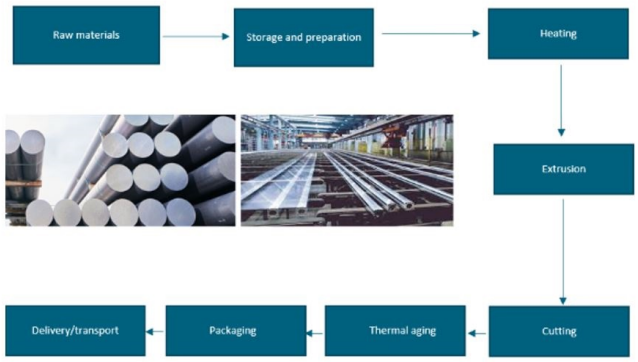
The main constituent of the aluminium profiles, is aluminium. The share of virgin and recycled aluminium in the billets depend on the recipe of different manufacturers. Based on the information provided by the suppliers of billets, around 60 % of the aluminium in the profiles is primary aluminium and 40 % of the aluminium is recycled.
The product does not contain substances on the *ECHA* list of Substances of Very High Concern (SVHC) above 0.1 mass %.

The product does not contain other carcinogenic, mutagenic, reprotoxic (CMR) substances of category 1A or 1B not on the candidate list above 0.1 mass % in at least one sub-product.

No biocidal products have been added to the present construction product or it has been treated with biocidal products (it is thus a treated product within the meaning of the *Biocidal Products Regulation (EU) No 528/2012*).

2.6 Manufacture

The main technological flow is the extrusion of aluminium bars and transforming them into uncoated aluminium profiles. The extrusion activity is carried out in several stages, as follows:



There are several production lines with interchangeable moulds which will define the aluminium profile shape. The aluminium billets are fed to the extrusion equipment with a conveyor, heated to a temperature at which Aluminium becomes easier to be formed and then extruded into the final shape. The profiles are then transferred to a curing oven which uses natural gas to heat the aluminium profiles and where the profiles are kept in order to be cured. The industrial products made are intended for the Business-to-business market segment.
These stages use mainly electricity and natural gas, as well as a small quantity of chemicals and industrial gases. Diesel is consumed for internal transport activities. The sodium hydroxide solution is used in the moulds cleaning process, through which residual aluminium is removed from the moulds. The company has implemented a certified quality management system, *ISO 9001*, which monitors the entire manufacturing process.

2.7 Environment and health during manufacturing

The production facility has an environmental management system in accordance with *ISO 14001* and an occupational health and safety management system in accordance with *ISO 45001* in order to ensure environmental protection and occupational health and safety in the production process.

2.8 Product processing/Installation

The final aluminium product (aluminium profiles) is used for creating different aluminium products for: the building & construction sector.

2.9 Packaging

The profiles are tied together using plastic straps, at a length based on clients' specifications, packed in cardboard for being

secured during transportation and placed on wooden bars. The wooden bars, the plastic straps and the cardboard can be recycled by the customer.

2.10 Condition of use

There are no special features of the material composition for the period of use.

2.11 Environment and health during use

If the aluminium profiles are used as intended, no hazards to air, water and soil as well as to human health can arise.

No harmful substances are incorporated in the product.

The environmental impact during the use phase depends on the design of the end product since aluminium profiles are not final products.

2.12 Reference service life

The aluminium profiles are not a final product and they are used for different industries as input material where it can have multiple applications, therefore no reference service life (RSL) is declared for aluminium profiles.

Each industry might treat the aluminium profiles based on the properties of the environment where the finished products will stand. The treatment will influence the ageing of the final product.

2.13 Extraordinary effects

Fire

Aluminium profiles meet the requirements of building material class A "non-combustible" according to *DIN 4102-4*. The melting point of aluminium is approx. 650° C.

The toxicity of fire gases is not applicable.

Fire protection

Name	Value
Building material class	A1
Burning droplets	not applicable
Smoke gas development	not applicable

Water

The exposure of the aluminium profiles to water does not alter the product and has no negative impact on the environment (water).

Mechanical destruction

Unforeseen mechanical destruction of the aluminium profiles is not relevant.

2.14 Re-use phase

The aluminium profiles are 100 % recyclable. The material does not suffer any loss of quality and can be recycled forever. The aluminium scrap from demolition can be separated, collected and recycled by the recycling industry.

2.15 Disposal

According to the *European Waste Catalog (EWC)*, the disposal code depends on the end product.
Given its high value, the aluminium scrap it's not disposed but used as a raw material in the recycling industry.

2.16 Further information

For more information, visit: https://www.hilti.com/

3. LCA: Calculation rules

3.1 Declared Unit

The declared unit refers to 1 kilogram of aluminium profiles, represented by profiles of different shapes coming from the extrusion process. Final products are identical in terms of chemical composition and production process; the only difference between the products is the shape. Products manufacturing is located at one plant in Romania refers to the same technology. The product consists of aluminium profiles using raw materials (aluminium billets) from several suppliers. The share of virgin aluminium in the aluminium bars is assumed to be 60 % while the rest of 40 % is assumed to be recycled aluminium, as reported by the suppliers.
Data used in calculations represent site-specific production volumes for 2022 of the main product line. There are no by-products formed from the production line subject to this study.

Declared unit and mass reference

Name	Value	Unit
Declared unit	1	kg

3.2 System boundary

The LCA for aluminium profiles is a cradle-to-gate assessment of the environmental impacts with options.
The following life cycle phases are considered in the analysis:

Module A1-A3 | Product stage

The following processes were considered:

- The purchase of the raw materials and the ancillary materials such as primary aluminium, recycled aluminium as well as ancillary materials such as alloying metals and packaging.
- The transport of the raw and ancillary materials was calculated based on the actual distances of the suppliers.
- The energy consists of diesel used in the manufacturing process and natural gas which is supplied from the national grid.
- The electricity is 100 % green electricity based on the contract concluded between the production facilitiy and the electricity supplier.

Module C2 | Transport to waste processing

Module C2 declares the environmental impacts resulting from transporting the waste aluminium to a waste processing facility at an assumed distance of 50 km.

Module C3 | Waste processing

Module C3 declares the environmental impacts resulting from the treatment of aluminium scrap by collecting, sorting, cleaning and pressing (90 % of the product).

Module C4 | Disposal

Module C4 declares the environmental impacts resulting from landfilling (10 % of the product).

Module D | Credits and loads outside the system boundary

In Module D, the net substitution potential of primary aluminium through a recycling scenario (90 % of the product) is presented.

3.3 Estimates and assumptions

This study analysis is based mainly on-site specific data related to products manufacturing. Study results are valid for the technological process specified, geographical area and time period mentioned.

Furthermore, the following estimates have been made:

- PP and PET were assumed to be used in a share of 25 % PP and 75 % PET from the total amount of plastic packaging materials.
- It was assumed that soft sawnwood with a density of 540 kg/m^3 is used for wood packaging.
- waste outputs such as mixed plastic, wood, and cardboard, are accounted for by selecting data sets representative for the market, where transport is already included in the final assessment of the impacts.
- It is assumed that the water needed for the sodium hydroxide solution was the difference between the sodium hydroxide as an input and the waste solution. Water use is declared as water from a well. In the calculations, the total amount of water is classified as tap water - underground water without treatment since characterisation factors in *Ecoinvent 3.9.1* suitable for water from a well are not available.
- Aluminium bars produced from the main supplier are accounted for in the modelling process with product-specific environmental burden, while for the aluminium sourced from other suppliers a 20 %, 60 % and 100 % virgin material is assumed, depending on the supplier.
- Starting with 2021, the production facility purchases only green electricity. The electricity mix of 62.41 % hydro-power and 37.59 % wind power used in this study is for the year 2021. The share of renewable electricity for the year 2022 will be published by the electricity supplier after the completion of this study.
- The input of PVC was excluded, as this life cycle assessment study is performed for uncoated aluminium profiles and the total production was assumed to be without PVC.
- For wood, the only available input was in pieces. It was assumed a 10x10x10 cm cube, 0.0001 m^3 per piece.
- For cardboard, the only available input was in pieces. A weight of 0.01 kg/ piece was assumed.

Assumptions applied for transport are summarized below:

- the use of Euro 5 and 6 trucks is assumed for the transport of aluminium bars, due to the prevalence of this type of Euro trucks in the fleet transporting materials.
- all inputs, except aluminium bars retreived from the main supplier, sodium hydroxide, are accounted for by selecting data sets representative for the market, where transport is already included in the final assessment of the impacts.
- The average distance for the packaging waste, was assumed 250 km.

3.4 Cut-off criteria

All inputs and outputs from background system to foreground system processes, with significant potential impact, are included in the calculation. Company specific-data is available for all foreground processes. Cut-off criteria are set to be not more than 1 % of renewable and non-renewable primary energy usage and not more than 1 % of the total mass flow for a single flow and 99 % of all flows should be considered.

3.5 Background data

Calculations were performed using *Simapro 9.5*, where inputs and outputs are listed. The LCA impacts were calculated using characterization factors from *Ecoinvent 3.9.1* database, applying the *EN 15804 + A2* Method V1.03/EF 3.1 normalization and weighting set.

3.6 Data quality

Data reliability is ensured by the manufacturer's data management systems and expert knowledge of plant engineers. Additional questions regarding reported values (e.g., type of material, materials use, waste management techniques, transportation distances, etc.) were answered and clarified by plant engineers.

3.7 Period under review

Site-specific data is collected for all flows according to the set cut-off criteria. Data collected is representative of the same technology for the period between the 1st of January 2022 to the 31st of December 2022. All collected data is based on the actual quantities used and produced during this period.

3.8 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

3.9 Allocation

In this study, there are no by-products and thus no relevant allocation is considered necessary since all inputs are converted to the main product described above and waste outflows.
The total environmental burden is associated with the products delivered to the customers.

3.10 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. Calculations were performed using *Simapro 9.5*, where inputs and outputs are listed. The LCA impacts were calculated using characterization factors from Ecoinvent 3.9.1 database. No biogenic carbon is contained in the declared product.
End of life (C1-C4)
For the end-of-life scenario used in this study the following assumptions are made: 90 % of the aluminium is recycled and 10 % of the aluminium is landfilled at the end of life and thus follows the most recent data on aluminium recycling published by the European Aluminium Association.

4. LCA: Scenarios and additional technical information

Characteristic product properties of biogenic carbon
Biogenic carbon is present only in the wooden packaging.

Information on describing the biogenic carbon content at factury gate
The biogenic carbon was calculated only from the sum of packaging.

Name	Value	Unit
Biogenic carbon content in product	-	kg C
Biogenic carbon content in accompanying packaging	8.39E-09	kg C

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

End of life (C1-C4)

For the end-of-life scenario used in this study the following assumptions are made: 90 % of the aluminium is recycled and 10 % of the aluminium is landfilled at the end of life and thus follows the most recent data on aluminium recycling published by the European Aluminium Association.

Name	Value	Unit
Recycling	0.9	kg
Landfilling	0.1	kg

Reuse, recovery and/or recycling potentials (D), relevant scenario information

Name	Value	Unit
Recycling	90	%

5. LCA: Results

The following table shows the LCA results for the declared unit of 1 kg of aluminium profiles.

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	MND	MND	MND	MND	MNR	MNR	MNR	MND	MND	MND	X	X	X	X

RESULTS OF THE LCA - ENVIRONMENTAL IMPACT according to EN 15804+A2: 1 kg aluminium profiles

Parameter	Unit	A1-A3	C2	C3	C4	D
Global Warming Potential total (GWP-total)	kg CO_2 eq	6.49E+00	1.2E-02	2.94E-01	5.91E-03	-6.27E+00
Global Warming Potential fossil fuels (GWP-fossil)	kg CO_2 eq	6.29E+00	1.2E-02	2.92E-01	5.86E-03	-6.14E+00
Global Warming Potential biogenic (GWP-biogenic)	kg CO_2 eq	4.12E-02	1.02E-05	1.9E-03	4.81E-05	-2.01E-02
Global Warming Potential luluc (GWP-luluc)	kg CO_2 eq	1.66E-01	5.41E-06	2.59E-04	5.02E-06	-1.14E-01
Depletion potential of the stratospheric ozone layer (ODP)	kg CFC11 eq	2.95E-07	2.55E-10	3.58E-09	7.89E-11	-1.32E-07
Acidification potential of land and water (AP)	mol H^+ eq	4.09E-02	2.41E-05	1.19E-03	3.23E-05	-4.47E-02
Eutrophication potential aquatic freshwater (EP-freshwater)	kg P eq	1.8E-03	8.08E-07	6.99E-05	1.3E-06	-2.67E-03
Eutrophication potential aquatic marine (EP-marine)	kg N eq	7.62E-03	6E-06	2.34E-04	9.19E-06	-6.01E-03
Eutrophication potential terrestrial (EP-terrestrial)	mol N eq	6.38E-02	6.07E-05	2.55E-03	9.79E-05	-5.93E-02
Formation potential of tropospheric ozone photochemical oxidants (POCP)	kg NMVOC eq	2.49E-02	3.77E-05	8.52E-04	3.35E-05	-2.25E-02
Abiotic depletion potential for non fossil resources (ADPE)	kg Sb eq	1.46E-05	3.74E-08	6.05E-06	1.19E-08	4.73E-05
Abiotic depletion potential for fossil resources (ADPF)	MJ	7.83E+01	1.65E-01	2.28E+00	7.98E-02	-7.49E+01
Water use (WDP)	m^3 world eq deprived	7.38E-01	6.33E-04	1.38E-02	1.56E-03	-9.78E-01

RESULTS OF THE LCA - INDICATORS TO DESCRIBE RESOURCE USE according to EN 15804+A2: 1 kg aluminium profiles

Parameter	Unit	A1-A3	C2	C3	C4	D
Renewable primary energy as energy carrier (PERE)	MJ	4.75E+01	2.88E-03	2.32E-01	4.25E-03	-2.79E+01
Renewable primary energy resources as material utilization (PERM)	MJ	5.57E-06	0	0	0	0
Total use of renewable primary energy resources (PERT)	MJ	4.75E+01	2.88E-03	2.32E-01	4.25E-03	-2.79E+01
Non renewable primary energy as energy carrier (PENRE)	MJ	7.83E+01	1.65E-01	2.28E+00	7.98E-02	-7.49E+01
Non renewable primary energy as material utilization (PENRM)	MJ	0	0	0	0	0
Total use of non renewable primary energy resources (PENRT)	MJ	7.83E+01	1.65E-01	2.28E+00	7.98E-02	-7.49E+01
Use of secondary material (SM)	kg	5.37E-01	0	0	0	0
Use of renewable secondary fuels (RSF)	MJ	0	0	0	0	0
Use of non renewable secondary fuels (NRSF)	MJ	0	0	0	0	0
Use of net fresh water (FW)	m^3	5.39E-04	0	0	0	0

RESULTS OF THE LCA – WASTE CATEGORIES AND OUTPUT FLOWS according to EN 15804+A2: 1 kg aluminium profiles

Parameter	Unit	A1-A3	C2	C3	C4	D
Hazardous waste disposed (HWD)	kg	3.24E-04	1.05E-06	5.95E-03	3.33E-07	6.81E-04
Non hazardous waste disposed (NHWD)	kg	2.76E+00	6.8E-03	9.26E-01	2.06E-01	-1.61E+00
Radioactive waste disposed (RWD)	kg	4.99E-04	6.53E-08	4.18E-06	7.03E-08	-1.94E-04
Components for re-use (CRU)	kg	0	0	0	0	0
Materials for recycling (MFR)	kg	3.59E-01	0	0	0	0
Materials for energy recovery (MER)	kg	1.95E-02	0	0	0	0
Exported electrical energy (EEE)	MJ	0	0	0	0	0
Exported thermal energy (EET)	MJ	0	0	0	0	0

RESULTS OF THE LCA – additional impact categories according to EN 15804+A2-optional: 1 kg aluminium profiles

Parameter	Unit	A1-A3	C2	C3	C4	D
Incidence of disease due to PM emissions (PM)	Disease incidence	5.66E-07	7.32E-10	2.1E-08	5.87E-10	-4.77E-07
Human exposure efficiency relative to U235 (IR)	kBq U235 eq	1.89E+00	2.66E-04	1.65E-02	2.88E-04	-7.49E-01
Comparative toxic unit for ecosystems (ETP-fw)	CTUe	2.62E+01	8.84E-02	2.67E+00	1.76E-01	-3.24E+00
Comparative toxic unit for humans (carcinogenic) (HTP-c)	CTUh	2.43E-08	4.84E-12	1.91E-10	4.18E-12	-7.61E-09
Comparative toxic unit for humans (noncarcinogenic) (HTP-nc)	CTUh	3.23E-07	1.4E-10	8E-09	1.21E-10	-2.21E-07

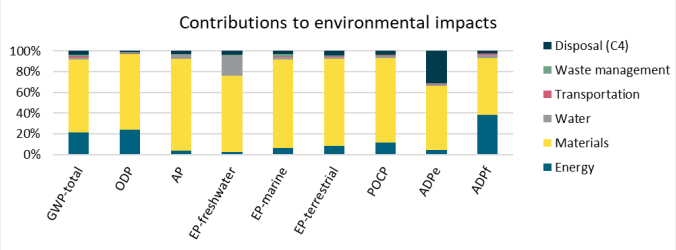
Soil quality index (SQP)	SQP	1.6E+01	8.45E-02	2.15E+00	9.56E-02	-3.99E+00

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.

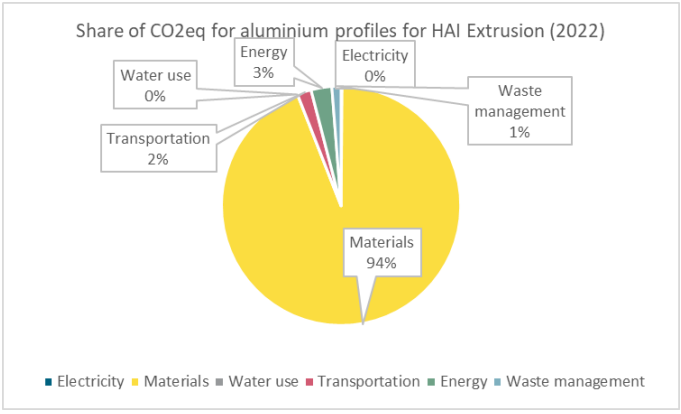
Disclaimer 2 – for the indicators “abiotic depletion potential for non-fossil resources”, “abiotic depletion potential for fossil resources”, “water (user) deprivation potential, deprivation-weighted water consumption”, “potential comparative toxic unit for ecosystems”, “potential comparative toxic unit 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.

6. LCA: Interpretation

The LCA results are presented for 1 kg of aluminium profiles. The charts below provide information on the impacts per main processes of the upstream and manufacturing life cycle stages.



Based on the results it can be concluded that the dominant material category appears to be materials responsible for 90 % for the climate change category. The second biggest contributor to the overall impact is disposal with 5 % for the climate change category followed by the footprint of energy with a share of 3 % for the climate change category.
In the figure below it can be seen that by excluding the final disposal materials still represent the dominant category and are responsible for 94 % of the total climate change impact category.



7. Requisite evidence

The product is not a finished product (end product) and it is used as raw material for other industries. The processing and the design of the end product will vary, depending on the application of the final product.

8. References

DIN EN 573-3:2019-10
Aluminium and aluminium alloys - Chemical composition and form of wrought products - Part 3: Chemical composition and form of products

DIN 4102-4
Fire behaviour of building materials and building components - Part 4: Synopsis and application of classified building materials, components and special components

ISO 9001
ISO 9001:2015 Quality management systems

ISO 14001
ISO 14001:2015 Environmental management systems

ISO 14025
EN ISO 14025:2011, Environmental labels and declarations — Type III environmental declarations — Principles and procedures.

ISO 14040
ISO 14040:2006, Environmental management — Life cycle assessment — Principles and framework

ISO 14044
ISO 14044:2006, Environmental management — Life cycle assessment — Requirements and guidelines

EN 15804
EN 15804:2012+A2:2019+AC:2021, Sustainability of construction works — Environmental Product Declarations — Core rules for the product category of construction products.

ISO 45001
ISO 45001:2018 Occupational health and safety management systems

Further References

BPR Regulation
Biocidal Products Regulation EU 528/2012

European Aluminium Association
A strategy for achieving aluminium's full potential for circular economy by 2030
https://european-aluminium.eu/wpcontent/uploads/2022/08/european-aluminium-circularaluminium-action-plan.pdf

ECHA list
List of substances of very high concern (SVHC) for authorisation (ECHA Candidate List), 14.01.2020, published under Article 59(10) of REACH. Helsinki: European Chemicals Agency. http://echa.europa.eu/

European Waste Catalogue (EWC)
Ordinance on the European Waste List (Waste List Ordinance AVV)

IBU
Institut Bauen und Umwelt e.V.: General Instructions for the EPD programme of Institut Bauen und Umwelt e.V., Version 2.0, Berlin: Institut Bauen und Umwelt e.V., 2021, www.ibuepd.com

PCR Part A: Calculation Rules for the Life Cycle Assessment and Requirements on the Project Report according to EN15804+A2:2019, v. 1.3

PCR Part B: Requirements on the EPD for Products of aluminium and aluminium alloys, v. 1.6

Software and database
SimaPro
LCA and reporting softwareapps.simapro.com

ecoinvent Version 3
Wernet, G., Bauer, C., Steubing, B., Reinhard, J., Moreno-Ruiz, E., and Weidema, B., 2016. The ecoinvent database version 3 (part I): overview and methodology. The International Journal of Life Cycle Assessment, [online] 21(9), pp.1218–1230.
The literature referred to in the Environmental Product Declaration must be listed in full.Standards already fully quoted in the EPD do not need to be listed here again.
The current version of PCR Part A and PCR Part B of the PCR document on which they are based must be referenced.

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