

ENVIRONMENTAL PRODUCT DECLARATION

as per ISO 14025 and EN 15804+A2

Owner of the Declaration	Kalzip GmbH
Publisher	Institut Bauen und Umwelt e.V. (IBU)
Programme holder	Institut Bauen und Umwelt e.V. (IBU)
Declaration number	EPD-KAL-20230027-IBC1-EN
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Valid to	11.04.2028

Aluminium Standing Seam Roofing and Wall Cladding System - Kalzip® Kalzip GmbH

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1. General Information

Kalzip GmbH

Programme holder

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

Declaration number

EPD-KAL-20230027-IBC1-EN

This declaration is based on the product category rules:

Aluminium roofing and cladding systems, 01.07.2014
(PCR checked and approved by the SVR)

Issue date

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Aluminium Standing Seam Roofing and Wall Cladding System - Kalzip®

Owner of the declaration

Kalzip GmbH
August-Horch-Str. 20-22
56070 Koblenz
Germany

Declared product / declared unit

Standing seam roofing and wall cladding system made of polyvinylidene fluoride (PVDF)-coated aluminium. The EPD refers to 1 m² system consisting of 1 mm standing seam aluminium sheet, 200 mm rock wool insulation, 1.75 E-180 clips made of plastic-coated steel, a vapour barrier SKBitumen and 3.5 fasteners made of stainless steel, including packaging.

Scope:

This EPD relates to the manufacture, transport, installation and disposal of a representative product with the highest environmental impact (worst case) for a range of products (standing seam roofing and wall cladding system) from Kalzip. The technical properties are presented in chapter 2.3. The production site of the product is Koblenz, Germany, from where the products are delivered directly to the customer's construction sites. 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	
<input type="checkbox"/>	internally
<input checked="" type="checkbox"/>	externally



Angela Schindler,
(Independent verifier)

2. Product

2.1 Product description/Product definition

The aluminium standing seam system is a roofing and wall cladding system made of profiled thin sheet metal that can be fabricated either in the factory or by mobile roll forming at the project site. Several profiled sheet panel widths and heights are available to meet different design specifications and load bearing requirements. Furthermore, various material finishes and surface treatments are available. The panels can be supplied in straight, convex- or concave-rounded, free-form, conical or conical-rounded shapes as well as in combinations of the above.

The system described (aluminium sheet with PVDF-coated surface) represents the system with the highest environmental impact in order to also cover the range of possible variants that Kalzip manufactures with this EPD. Regulation (EU) No. 305/2011 (CPR) applies to the marketing of the product on the market in the EU/EFTA (with the exception of Switzerland). The product requires a declaration of performance taking into account *DIN EN 14782:2006-03*, Self-supporting metal sheet for roofing, external cladding and internal lining - Product specification and requirements or *DIN EN 14783* Fully supported metal sheet and strip for roofing, external cladding and internal lining - Product specification and requirements. The respective national regulations apply to the use.

2.2 Application

The aluminium profiled roof panels are profiled panels that are joined together by mechanically flanging the lateral edge ribs of adjacent roof elements to form a standing seam and are used as an outer shell for roofing and wall cladding. The profiled panels are suitable as warm and cold roof versions for all roof shapes and roof pitches from 1.5 degrees and for all substructures and supporting structures. They can be used for both new construction and renovation projects. The structural design depends on the respective application and can be adapted exactly to the required U-values and sound insulation values of the building by selecting the appropriate insulation thickness. Industrially manufactured profiled panels are used in a wide range of applications in the building industry. Typical applications include building envelopes and interior cladding.

2.3 Technical Data

Construction data

Name	Value	Unit
Alloys mainly used for the profiled panels	EN AW 3004, 3005, 3105, 6025	
Thickness	265	mm
Minimum pitch	1.5	°
Water vapor diffusion equivalent air layer thickness	1500	m
Airborne sound reduction	53	dB

Performance values of the product according to the declaration of performance in relation to its essential characteristics according to *DIN EN 14782:2006-03* Self-supporting metal sheet for roofing, external cladding and internal lining - Product specification and requirements or *DIN EN 14783* Fully supported metal sheet and strip for roofing, external cladding and internal lining - Product specification and requirements.

2.4 Delivery status

The declared standing seam profiled panel is supplied as a long sheet in project-related dimensions in lengths even over 30 m, widths up to 600 mm and usually with a thickness of 1

mm.

2.5 Base materials/Ancillary materials

Average mass fractions of Kalzip worst case aluminium roof and wall cladding.

Product component	Mass per cent
Rock wool	59.5%
Aluminium	27.7%
Bitumen	8.7%
(Stainless) Steel	1.9%
Plastics	2.1%

The product/at least part of the product contains substances on the ECHA list of Substances of Very High Concern (SVHC) (date 20.06.2022) above 0.1% by mass: **no**.

The product/at least one sub-product contains other CMR substances of category 1A or 1B not on the candidate list above 0.1% by 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 therefore a treated product within the meaning of the Biocidal Products Regulation (EU) No 528/2012): **no**.

2.6 Manufacture

The aluminium sheets are profiled in-house at the production facility in Germany (electronically controlled process). Profiling 1m² consumes 0.122 MJ of electricity and 0.015 kg of lubricant. The standing seam profile panel is finished with PVDF. The insulation and other building materials are purchased externally and assembled on site.

2.7 Environment and health during manufacturing

The company is certified according to *ISO 9001* and *ISO 14001* and *ISO 45001*.

2.8 Product processing/Installation

The standing seam profile panels are installed by a network of trained installation companies in accordance with the procedures of the installation guideline. The standing seam profile panels are connected to each other with a flanging machine.

2.9 Packaging

The Kalzip aluminium profiled panels are packed with plastic film and simple wooden strapping as well as plastic strapping, loaded onto trucks and transported.

2.10 Condition of use

No changes during the use phase compared to the manufacturing state.

2.11 Environment and health during use

No changes during the use phase compared to the state of manufacture.

2.12 Reference service life

The roof system has an assumed service life of 50 years. No reference service life (RSL) could be determined taking *ISO 15686* into account, so a service life from the *BBSR* table 'Service lives of building components for life cycle analysis according to BNB' was used.

2.13 Extraordinary effects



Fire

The Kalzip aluminium standing seam roofing and wall cladding system is not flammable.

Fire resistance class: according to *EN 13501-1* = A1

L 235/19: Profiled sheets made of aluminium or aluminium alloys are classified by the European Commission as products that meet the requirements "external fire performance" without further testing.

Water

Water has no negative effects on the product system.

Mechanical destruction

Due to its lightweight construction, there is no danger in the event of an earthquake. In addition, the system has been thoroughly tested and calculated for projects in hurricane-prone areas.

2.14 Re-use phase

With regard to the material composition, the following possibilities arise:

Material recycling

The product system can be partially recycled. The materials suitable for recycling are the aluminium of the profiled panels and the steel part of the fasteners: clips and screws.

Energy recovery

The materials suitable for energy recovery consist mainly of the plastic and wood materials in the packaging and the bitumen.

Landfill

The rock wool is landfilled.

2.15 Disposal

In the following, the waste code numbers according to the European Waste Catalogue in accordance with the Waste Catalogue Ordinance AVV are listed for the individual product components.

Packaging waste

The following packaging waste, which is generated during installation in the building, is sent for energy recovery:

15 01 02 Packaging made of plastic

15 01 03 Packaging made of wood.

Product waste

All materials are recycled for energy or metallurgical purposes:

17 02 03 Plastics

17 04 02 Aluminium

19 10 01 Iron and steel waste

17 03 Bitumen mixtures, coal tar and tar-containing products 17

06 Insulating material and building materials containing asbestos.

2.16 Further information

Contact details can be found on the back of this declaration. Further product information is available online: www.kalzip.de

3. LCA: Calculation rules

3.1 Declared Unit

This EPD refers to 1 m² aluminium standing seam roofing and wall cladding system incl. packaging.

Indication of the declared unit

Name	Value	Unit
Declared unit	1	m ²
Heat transfer coefficient (U-value)	0.19	W/m ² K
Weight unpacked	13.77	kg
Packaging	0.2	kg
Total weight	13.97	kg
Conversion factor to 1 kg	0.07	-

3.2 System boundary

Type of EPD: Cradle to factory gate - with options (module A1–A3, A5, C1–4 and D).

Modules A1–A3

The product stage contains the production of the necessary raw materials including all upstream chains as well as the necessary procurement transports. For the production of the declared unit, the necessary auxiliary and operating materials and their upstream chains were also considered. For the product, this means that the environmental impacts of the PVDF-coated aluminium, the screws and clips, the bitumen and rock wool are included in the declared product. Also included is the production of packaging material (wood and plastic), electricity and lubricants for production at the plant.

Module A5

The environmental impacts of the incineration of the packaging materials plastic and wood are shown and the installation on the construction site is taken into account.

Module C1

In this module, the disassembly of the product is considered. The same expenditures that are required for the installation have been taken into account.

Module C2

The module includes transports for waste treatment or disposal.

Module C3

The module includes the environmental impacts due to the waste treatment (preparation for recycling of metals and energy recovery of plastics and bitumen) of the product in the end of life.

Module C4

The module includes the environmental impacts of landfilling the rock wool contained in the product.

Module D

The module includes the effort of recycling and the avoided environmental burdens for aluminium and (stainless) steel contained in the product. In addition, the avoided burdens of energy production resulting from the generation of energy from the combustible materials are shown.

3.3 Estimates and assumptions

The expenditure for coating the aluminium was covered by modelling an energy expenditure and added to the environmental impact of the required amount of PVDF. The PVDF of the coating as well as the plastic parts in the clips are not recovered, but are melted down together with the aluminium or steel recycling and are not recovered.

From the generic data set used for the bitumen roofing membrane, it is not apparent whether it is a self-adhesive

product. It can be assumed that this is not the case, which is why this process is also a simplification due to the absence of adhesive. The data from the manufacturers was used to calculate the secondary proportion of aluminium used. Multiplied by the quantities purchased, this results in secondary proportions for aluminium in the roof and wall system of 83 %.

3.4 Cut-off criteria

According to operational data collection, no flows were omitted and, in connection with the use of generic background data, the cut-off criteria according to *EN 15804* were met.

3.5 Background data

The primary data were provided by Kalzip. The background data comes from the *GaBi* database *GaBi* 10.6.

3.6 Data quality

Operating data for all products manufactured by Kalzip were used as far as possible. For other components, average country-specific background data sets are used. The data were collected under consistent methodological conditions and boundary conditions. The data set quality is very good to good. The background data sets from the *GaBi* databases used for

the calculation are not older than 10 years.

3.7 Period under review

The data refer to the manufacturing processes of the year 2020.

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: Germany

3.9 Allocation

Coated aluminium offcuts are produced in module A1–A3. This was modelled using the closed-loop method. This reduces the use of secondary aluminium.

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. The database used is the *GaBi* database in version 10.6.

4. LCA: Scenarios and additional technical information

Characteristic product properties biogenic carbon

The biogenic carbon content was calculated based on the product components. Biogenic carbon is only found in the packaging (wood).

Information describing the biogenic carbon content at the factory gate

Name	Value	Unit
Biogenic carbon content in product	-	kg C
Biogenic carbon content in accompanying packaging	0.08	kg C

Procurement transports (A2)

The procurement transports are carried out by truck (40 t total weight, 27 t max. payload; EURO 0 -6 mix) and a load factor of 85 % including empty runs. All suppliers were included proportionately in the calculation of the transport distance. The transport performance amounts to 8233 kgkm.

Installation in the building (A5)

The fasteners are already included in the scope of delivery.

Name	Value	Unit
Electricity consumption	0.003	kWh

Reference service life

Name	Value	Unit
Life Span (according to BBSR)	50	a

End of life (C1-C4)

The transports for waste treatment (C2) are carried out by truck (20-26 t total weight / 17.3 t payload; EURO 5) and a load factor of 50% including empty runs. The transport distance to the disposal company is 75 km.

Name	Value	Unit
Recycling	4.16	kg
Energy recovery	1.2	kg
Landfilling	8.2	kg

Reuse, recovery and recycling potential (D), relevant scenario information

Module D includes the expenditure for recycling the aluminium and (stainless) steel as well as avoided environmental burdens for the production of primary aluminium and primary (stainless) steel. In addition, there are avoided burdens from the generation of electricity and heat in the amount of energy generated in module A5 from packaging waste and from the combustion of bitumen in C3.

5. 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	MND	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 Standing Seam Roofing and Wall Cladding System incl. packaging

Parameter	Unit	A1-A3	A5	C1	C2	C3	C4	D
GWP-total	kg CO ₂ eq	2.45E+01	3.77E-01	1.1E-03	8.96E-02	3.27E+00	1.23E-01	-5.35E+00
GWP-fossil	kg CO ₂ eq	2.48E+01	8.97E-02	1.1E-03	8.9E-02	3.27E+00	1.22E-01	-5.35E+00
GWP-biogenic	kg CO ₂ eq	-2.87E-01	2.87E-01	0	0	0	0	0
GWP-luluc	kg CO ₂ eq	7.75E-03	1.17E-05	7.16E-08	6.01E-04	1.41E-05	2.26E-04	-1.16E-03
ODP	kg CFC11 eq	3.79E-07	3.83E-14	1.09E-14	8.76E-15	8.37E-13	2.87E-13	4.75E-11
AP	mol H ⁺ eq	1.36E-01	6E-05	1.62E-06	3.16E-04	1.21E-03	8.68E-04	-2.46E-02
EP-freshwater	kg P eq	2.26E-05	1.28E-08	4.95E-10	3.19E-07	1.78E-07	2.07E-07	-3.11E-06
EP-marine	kg N eq	1.7E-02	1.94E-05	4.43E-07	1.46E-04	5.31E-04	2.22E-04	-3.25E-03
EP-terrestrial	mol N eq	3.48E-01	2.84E-04	4.74E-06	1.63E-03	6.3E-03	2.44E-03	-3.53E-02
POCP	kg NMVOC eq	5.34E-02	5.11E-05	1.25E-06	2.85E-04	1.38E-03	6.74E-04	-9.96E-03
ADPE	kg Sb eq	1.25E-04	9.58E-10	1.31E-10	8.99E-09	1.71E-08	1.25E-08	2.27E-05
ADPF	MJ	3.59E+02	1.2E-01	2.34E-02	1.17E+00	1.44E+00	1.6E+00	-7.08E+01
WDP	m ³ world eq deprived	2.92E+00	4.02E-02	8.24E-05	9.95E-04	3.05E-01	1.34E-02	-7.39E-01

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 Standing Seam Roofing and Wall Cladding System incl. packaging

Parameter	Unit	A1-A3	A5	C1	C2	C3	C4	D
PERE	MJ	7.28E+01	3.15E+00	3.38E-03	8.11E-02	5.63E-01	2.4E-01	-3.29E+01
PERM	MJ	3.12E+00	-3.12E+00	0	0	0	0	0
PERT	MJ	7.59E+01	2.23E-02	3.38E-03	8.11E-02	5.63E-01	2.4E-01	-3.29E+01
PENRE	MJ	3.23E+02	1.23E+00	2.34E-02	1.18E+00	3.62E+01	1.6E+00	-7.09E+01
PENRM	MJ	3.58E+01	-1.11E+00	0	0	-3.47E+01	0	0
PENRT	MJ	3.59E+02	1.2E-01	2.34E-02	1.18E+00	1.44E+00	1.6E+00	-7.09E+01
SM	kg	3.08E+00	0	0	0	0	0	6.95E-01
RSF	MJ	0	0	0	0	0	0	0
NRSF	MJ	0	0	0	0	0	0	0
FW	m ³	1.47E-01	9.49E-04	5.12E-06	9.37E-05	7.35E-03	4.06E-04	-7.72E-02

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 Standing Seam Roofing and Wall Cladding System incl. packaging

Parameter	Unit	A1-A3	A5	C1	C2	C3	C4	D
HWD	kg	6.77E-08	9E-12	1.67E-12	6.22E-12	1.49E-10	8.24E-11	-4.02E-06
NHWD	kg	5.75E+00	2.6E-03	4.98E-06	1.91E-04	1.6E-02	8.21E+00	-1.46E+00
RWD	kg	1.32E-02	8.38E-06	3.89E-06	2.18E-06	1.57E-04	1.78E-05	-4.83E-03
CRU	kg	0	0	0	0	0	0	0
MFR	kg	0	0	0	0	4.16E+00	0	0
MER	kg	0	0	0	0	0	0	0
EEE	MJ	0	6.25E-01	0	0	3.94E+00	0	0

EET	MJ	0	1.12E+00	0	0	7.07E+00	0	0
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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 Standing Seam Roofing and Wall Cladding System incl. packaging

Parameter	Unit	A1-A3	A5	C1	C2	C3	C4	D
PM	Disease incidence	1.51E-06	3.14E-10	1.45E-11	1.83E-09	4.23E-09	1.07E-08	-1.8E-07
IR	kBq U235 eq	2.17E+00	1.3E-03	5.7E-04	3.29E-04	2.63E-02	1.98E-03	-9.75E-01
ETP-fw	CTUe	1.35E+02	5.56E-02	7.17E-03	8.3E-01	5.93E-01	8.98E-01	-2.48E+01
HTP-c	CTUh	6.6E-08	2.92E-12	1.32E-13	1.71E-11	2.87E-11	1.37E-10	-3.56E-09
HTP-nc	CTUh	4.3E-07	1.11E-10	6.71E-12	1.07E-09	1.03E-09	1.52E-08	-6.46E-08
SQP	SQP	1.27E+02	3.35E-02	2.15E-03	4.96E-01	4.43E-01	3.33E-01	-4.99E+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

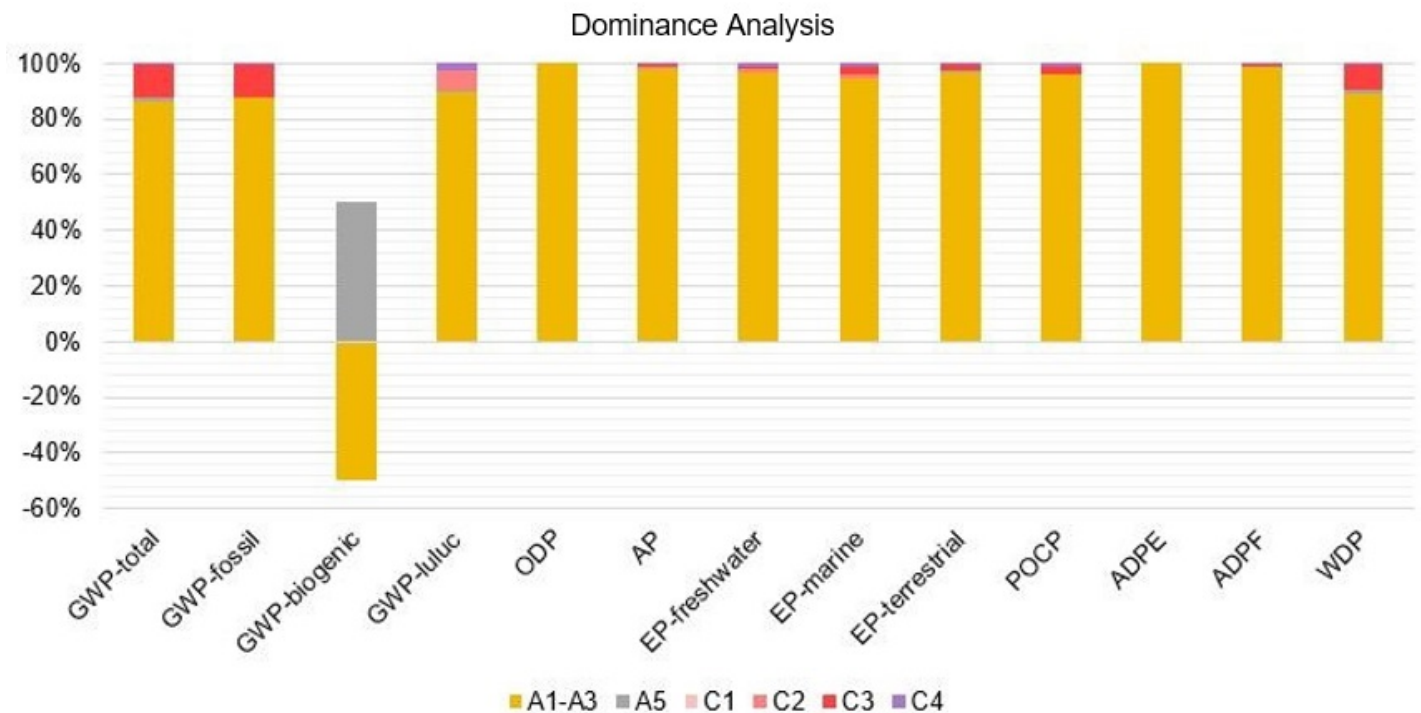
In module D, ODP has a positive value, which is due to the process of aluminium recycling.

Disclaimer 1 - applies to the indicator "Potential human exposure efficiency relative to U235". This impact category mainly addresses the potential effect of low dose ionising radiation on human health in the nuclear fuel cycle. It does not consider effects due to possible nuclear accidents and occupational exposure, nor does it consider effects due to the disposal of radioactive waste in underground facilities. Potential ionising radiation from soil, radon and some building materials is also not measured by this indicator.

Disclaimer 2 - applies to the indicators: 'Abiotic depletion potential for non-fossil resources', "Abiotic depletion potential for fossil resources", "Water (user) deprivation potential", "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 must be used with caution, as the uncertainties in these results are high or as there is limited experience with the indicator.

The impact assessment results are only relative statements that do not make any statements about endpoints of the impact categories, exceedances of threshold values, safety margins or about risks. For all indicators mentioned, the characterisation factors of EK-JRC were applied.

6. LCA: Interpretation



Module A1–A3 has a dominant influence for all environmental indicators considered. In the following, the environmental impacts are analysed using the example of the Global Warming Potential (GWP-total) to identify the responsible sources along the life cycle.

The production phase (module A1–A3) implies a contribution to

the total global warming potential of 86 %. Here, the provided rock wool (35 %), primary aluminium sheet (23 %) and secondary aluminium sheet (23 %) of the manufactured roofing and wall cladding dominate the total emissions of the module. All other materials contribute less than 6 % each to the manufacturing phase. Both transport to the company (A2) and disposal transport (C2) have no major relevance in terms of

GWP, at 1.7 % and 0.3 % respectively. Product installation at the construction site (A5) has a contribution of 1.3 %. The negative contribution to the GWP-biogenic in A1–A3 and the positive contribution in A5 can be explained by the use of wooden packaging, in which biogenic carbon is bound.

Waste treatment at the end of life of the product accounts for 12

% of the total GWP. This is mainly caused by the energy recovery of the bitumen sheeting (84 %). Since this is a worst-case consideration, the values of the specific products, all of which are covered by the EPD, are usually better than the calculated example system. It can be assumed that the environmental impacts are reduced for other possible configurations.

7. Requisite evidence

No further evidence is relevant for this product.

8. References

Standards

EN 13501

DIN EN 13501-1:2010-01, Fire classification of construction products and building elements - Part 1: Classification using data from reaction to fire tests.

EN 14782

DIN EN 14782:2006-03, Self-supporting metal sheet for roofing, external cladding and internal lining - Product specification and requirements.

EN 14783

DIN EN 14783, Fully supported metal sheet and strip for roofing, external cladding and internal lining - Product specification and requirements.

EN 15804

DIN EN 15804:2022-03, Sustainability of construction works - Environmental product declarations - Core rules for the product category of construction products.

EN AW-3004

EN AW-3004:2011-07, Aluminium Material Data Sheet EN AW-3004, EN AW-AI Mn1Mg1.

EN AW-3005

EN AW-3005:2011-07, Aluminium Material Data Sheet EN AW-3005, EN AW-AI Mn1Mg0,5.

EN AW-3105

EN AW-3105:2011-07, Aluminium Material Data Sheet EN AW-3105, EN AW-AI Mn0,5Mg0,5.

EN AW-6025

EN AW-6025, Aluminium Material Data Sheet EN AW-6025, EN AW-AIMg2,5SiMnCu.

ISO 9001

ISO 9001:2015-09, Quality management systems- Requirements.

ISO 14001

ISO 14001:2015-09, Environmental management systems - Requirements with guidance for use.

ISO 14025

DIN EN ISO 14025:2009-11, Environmental labels and declarations - Type III environmental declarations - Principles and procedures.

ISO 14040

DIN EN ISO 14040:2009-11, Environmental management - Life

cycle assessment - Principles and framework.

ISO 14044

DIN EN ISO 14044:2006-10, Environmental management - Life cycle assessment - Requirements and guidelines.

ISO 15686

ISO 15686:2011-05, Buildings and constructed assets - Service life planning - Part 1,2,7,8.

ISO 45001

ISO 45001:2018, Occupational health and safety management systems - Requirements with guidance for use.

Further literature

AVV

Waste Catalogue Ordinance (AVV) of 10 December 2001 (BGBl. I p. 3379), last amended by Article 1 of the Ordinance of 30 June 2020 (BGBl. I p. 1533).

BBSR

Bundesinstitut für Bau-, Stadt- und Raumforschung: Nutzungsdauern von Bauteilen zur Lebenszyklusanalyse nach BNB, 2017.

GaBi

GaBi 10.6: Software and Database for Life Cycle Engineering, Sphera Solutions GmbH, Leinfelden-Echterdingen, 2022.

IBU 2021

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L 235/19

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