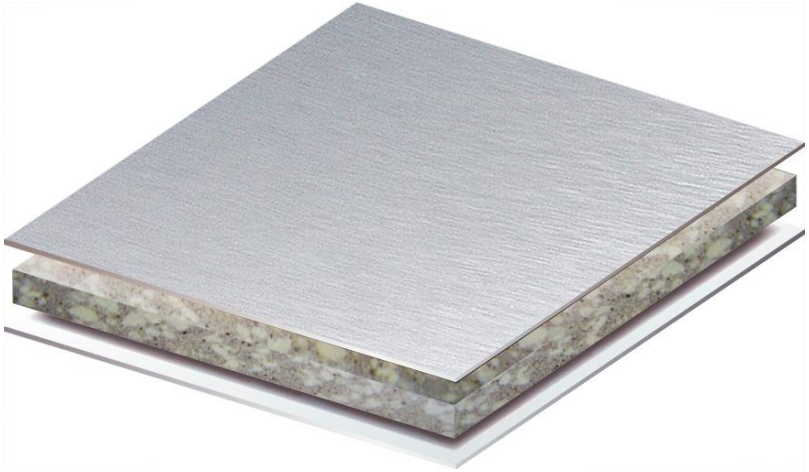
Office building The View, France, BREEAM & HQE certified | material: ALUCOBOND® PLUS naturAL Line | architect: Baumschlager Eberle Architekten, Paris | Photo: Baumschlager Eberle Architekten + Ooshot

ENVIRONMENTAL PRODUCT DECLARATION

IN ACCORDANCE WITH EN 15804+A2 & ISO 14025 / ISO 21930

ALUCOBOND A2

3A Composites GmbH



EPD HUB, HUB-2025

Published on 20.09.2024, last updated on 20.09.2024, valid until 20.09.2029.

GENERAL INFORMATION

MANUFACTURER

Manufacturer	3A Composites GmbH
Address	Alusingenplatz 1 78224 Singen Germany
Contact details	info@alucobond.com
Website	https://www.alucobond.com/en/

EPD STANDARDS, SCOPE AND VERIFICATION

Program operator	EPD Hub, hub@epdhub.com
Reference standard	EN 15804+A2:2019 und ISO 14025
PCR	EPD Hub Core PCR Version 1.1, 5 Dec 2023
Sector	Construction product
Category of EPD	Third party verified EPD
Scope of the EPD	Cradle to gate with modules C1-C4, D
EPD author	Martin Oddershede, JJW Architects
EPD verification	Independent verification of this EPD and data, according to ISO 14025: ☐ Internal verification ☑ External verification
EPD verifier	Lucas Pedro Berman, as an authorized verifier acting for EPD Hub Limited

The manufacturer has the sole ownership, liability, and responsibility for the EPD. EPDs within the same product category but from different programs may not be comparable. EPDs of construction products may not be comparable if they do not comply with EN 15804 and if they are not compared in a building context.

PRODUCT

Product name	ALUCOBOND A2
Place of production	Germany
Period for data	2022
Averaging in EPD	No averaging
Variation in GWP-fossil for A1-A3	0 %

ENVIRONMENTAL DATA SUMMARY

Declared unit	1 square meter with a total panel thickness of 4 mm
Declared unit mass	7.6 kg
GWP-fossil, A1-A3 ($kgCO_2e$)	2,02E+01
GWP-total, A1-A3 ($kgCO_2e$)	1,90E+01
Secondary material, inputs (%)	17.8
Secondary material, outputs (%)	9.63
Total energy use, A1-A3 (kWh)	99.8
Net freshwater use, A1-A3 (m^3)	0.12

PRODUCT AND MANUFACTURER

ABOUT THE MANUFACTURER

3A Composites Europe, the manufacturer behind ALUCOBOND®, is a leading provider of aluminium composite materials. They have been at the forefront of metal facades for over 50 years, offering products known for their flatness, formability, durability, and ease of fabrication. ALUCOBOND® materials are utilized in both exterior and interior architectural applications, known for their design flexibility and aesthetic appeal. The company operates with a commitment to sustainability and innovation, providing a wide range of colors and finishes to inspire and realize architectural visions. ALUCOBOND® for the European market is 100% produced in Germany.

The company's integrated management system provides an important framework for implementing sustainability aspects in their business activities. This is reflected in their externally certified health, safety, energy, environmental and quality management systems (ISO 45001, ISO 50001, ISO 14001, ISO 9001).

PRODUCT DESCRIPTION

ALUCOBOND® A2 is a composite panel featuring two aluminium cover sheets with a non-combustible, mineral-filled polymer core which stand for sustainable building quality and the highest design standards. It meets all relevant standards worldwide. The façade material is characterised by its precise flatness, surface and colour variety as well as excellent formability. ALUCOBOND® A2 is easy to process, break-proof, impact-resistant, weather-resistant, and, most notably, non-combustible.

Aluminium is an excellent lightweight construction material which requires a high degree of primary energy during initial production, but is suitable for very long usage periods in the industry, transport and construction areas because of its optimum recycling properties (100 % infinitely recyclable).

The ALUCOBOND® core material mainly consists of mineral components which use a small amount of primary energy and can still be 100 % recycled and returned to the reusable material cycle. The flameproofing of the core material is exclusively realised using mineral additives. The use of halogen compounds in the core material is avoided.

Further information can be found at https://www.alucobond.com/en/.

PRODUCT RAW MATERIAL MAIN COMPOSITION

Raw material category	Amount, mass %	Material origin
Metals	36.2	EU
Minerals	47.9	EU
Fossil materials	7.5	EU
Bio-based materials	<1	EU

BIOGENIC CARBON CONTENT

Product's biogenic carbon content at the factory gate

Biogenic carbon content in product, kg C	0
Biogenic carbon content in packaging, kg C	0.46

FUNCTIONAL UNIT AND SERVICE LIFE

Declared unit	1 square meter with a total panel thickness of 4 mm
Mass per declared unit	7.6 kg
Reference service life	60

SUBSTANCES, REACH - VERY HIGH CONCERN

The product does not contain any REACH SVHC substances in amounts greater than 0,1 % (1000 ppm).

PRODUCT LIFE-CYCLE

SYSTEM BOUNDARY

This EPD covers the life-cycle modules listed in the following table.

Product stage			Assembly stage		Use stage							End of life stage				Beyond the system boundaries		
A1	A2	A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D		
x	x	x	MND	MND	MND	MND	MND	MND	MND	MND	MND	x	x	x	x	x		
Raw materials	Transport	Manufacturing	Transport	Assembly	Use	Maintenance	Repair	Replacement	Refurbishment	Operational energy use	Operational water use	Deconstruction/ demolition	Transport	Waste processing	Disposal	Reuse	Recovery	Recycling

Modules not declared = MND. Modules not relevant = MNR

MANUFACTURING AND PACKAGING (A1-A3)

The environmental impacts considered for the product stage cover the manufacturing of raw materials used in the production as well as packaging materials and other ancillary materials. Also, fuels used by machines, and handling of waste formed in the production processes at the manufacturing facilities are included in this stage. The study also considers the material losses occurring during the manufacturing processes as well as losses during electricity transmission.

Generally, rolled ingots are cast from application-specific aluminium alloys using the continuous casting method. These rolled ingots are then passed between two rotating steel rollers that are spaced slightly closer together than the thickness of the ingots. The friction from the rollers picks up the ingots, compressing them to the distance between the rollers. This process primarily elongates the material longitudinally. Multiple rolling sequences are typically required to achieve the final thickness. As needed, thermal treatments are applied to obtain the desired material properties, such as workability and rigidity. The aluminium strips are coated to their final width through a continuous varnish application process (coil coating). Solvents used during this process are collected and thermally recycled for curing the varnish. In the next step, the coated strips are laminated and cut to length with a continuously produced core (e.g., extrusion).

TRANSPORT AND INSTALLATION (A4-A5)

Transportation impacts occurred from final products delivery to construction site (A4) cover fuel direct exhaust emissions, environmental impacts of fuel production, as well as related infrastructure emissions.

Please note that while this module has not been included within the system boundaries, the packaging (in module A3) and the waste produced (in modules C3-C4) have been considered.

PRODUCT USE AND MAINTENANCE (B1-B7)

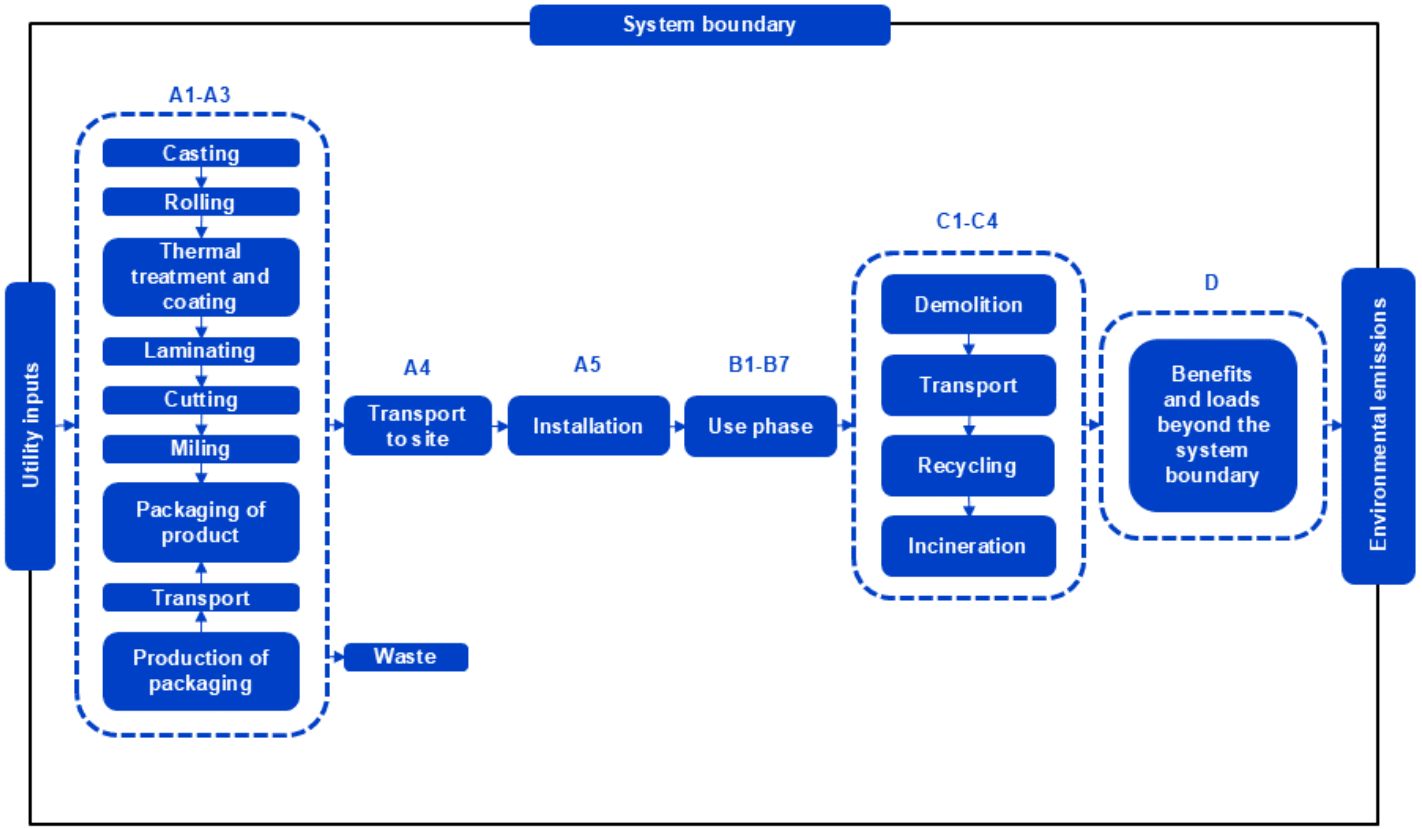
This EPD does not cover the use phase.

Air, soil, and water impacts during the use phase have not been studied.

PRODUCT END OF LIFE (C1-C4, D)

Façade elements and flat panels can often be removed non-destructively, depending on the mounting system. This can be done by unscrewing them or drilling out the rivets. However, non-destructive dismantling is generally not possible for panels that have been glued in place. Dismantled products, if undamaged, can be reused according to their original designated purpose. When sorted correctly, these elements can be shredded to separate the aluminium and the core material, both of which can then be recycled. The core material also supports the smelting process if recycling only the aluminium. Aluminium composite panels are accepted by scrap dealers among other recycling options.

MANUFACTURING PROCESS



LIFE-CYCLE ASSESSMENT

CUT-OFF CRITERIA

The study does not exclude any modules or processes which are stated mandatory in the reference standard and the applied PCR. The study does not exclude any hazardous materials or substances. The study includes all major raw material and energy consumption. All inputs and outputs of the unit processes, for which data is available for, are included in the calculation. There is no neglected unit process more than 1% of total mass or energy flows. The module specific total neglected input and output flows also do not exceed 5% of energy usage or mass.

ALLOCATION, ESTIMATES AND ASSUMPTIONS

Allocation is required if some material, energy, and waste data cannot be measured separately for the product under investigation. All allocations are done as per the reference standards and the applied PCR. In this study, allocation has been done in the following ways:

Data type	Allocation
Raw materials	No allocation
Packaging material	Allocated by mass or volume
Ancillary materials	Allocated by mass or volume
Manufacturing energy and waste	Allocated by mass or volume

AVERAGES AND VARIABILITY

Type of average	No averaging
Averaging method	Not applicable
Variation in GWP-fossil for A1-A3	0 %

This EPD is product and factory specific and does not contain average calculations.

LCA SOFTWARE AND BIBLIOGRAPHY

This EPD has been created using One Click LCA EPD Generator. The LCA and EPD have been prepared according to the reference standards and ISO 14040/14044. The EPD Generator uses Ecoinvent v3.8, Plastics Europe, Federal LCA Commons and One Click LCA databases as sources of environmental data.

ENVIRONMENTAL IMPACT DATA

CORE ENVIRONMENTAL IMPACT INDICATORS – EN 15804+A2, PEF

Impact category	Unit	A1	A2	A3	A1-A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
GWP – total[1)]	kg CO_2e	1,68E+01	3,76E-01	1,82E+00	1,90E+01	MND	MND	MND	MND	MND	MND	MND	MND	MND	2,52E-02	4,07E-02	2,33E+00	7,07E-01	-1,82E+01
GWP – fossil	kg CO_2e	1,66E+01	3,76E-01	3,25E+00	2,02E+01	MND	MND	MND	MND	MND	MND	MND	MND	MND	2,52E-02	4,07E-02	1,28E+00	6,56E-02	-1,76E+01
GWP – biogenic	kg CO_2e	0,00E+00	0,00E+00	-1,43E+00	-1,43E+00	MND	MND	MND	MND	MND	MND	MND	MND	MND	0,00E+00	0,00E+00	1,05E+00	6,41E-01	-1,16E-01
GWP – LULUC	kg CO_2e	2,80E-01	1,43E-04	1,66E-03	2,82E-01	MND	MND	MND	MND	MND	MND	MND	MND	MND	2,50E-06	1,51E-05	4,48E-04	2,38E-05	-4,41E-01
Ozone depletion pot.	kg $CFC\text{-}_{11}$e	1,21E-06	8,62E-08	2,59E-07	1,55E-06	MND	MND	MND	MND	MND	MND	MND	MND	MND	5,38E-09	9,39E-09	3,99E-07	1,79E-08	-2,23E-06
Acidification potential	mol H^+e	1,31E-01	1,61E-03	1,94E-02	1,52E-01	MND	MND	MND	MND	MND	MND	MND	MND	MND	2,61E-04	1,67E-04	4,19E-03	5,12E-04	-1,17E-01
EP-freshwater[2)]	kg Pe	5,32E-04	3,20E-06	2,35E-05	5,59E-04	MND	MND	MND	MND	MND	MND	MND	MND	MND	8,33E-08	3,35E-07	4,43E-05	7,66E-07	-7,72E-06
EP-marine	kg Ne	1,55E-02	4,79E-04	2,99E-03	1,89E-02	MND	MND	MND	MND	MND	MND	MND	MND	MND	1,16E-04	4,83E-05	9,26E-04	2,03E-04	-1,26E-02
EP-terrestrial	mol Ne	1,78E-01	5,29E-03	3,88E-02	2,22E-01	MND	MND	MND	MND	MND	MND	MND	MND	MND	1,27E-03	5,34E-04	1,03E-02	2,13E-03	-1,40E-01
POCP ("smog")[3)]	kg NMVOCe	5,80E-02	1,69E-03	9,85E-03	6,96E-02	MND	MND	MND	MND	MND	MND	MND	MND	MND	3,49E-04	1,74E-04	4,84E-03	6,14E-04	-5,29E-02
ADP-minerals & metals4)	kg Sbe	1,89E-06	8,91E-07	2,46E-06	5,24E-06	MND	MND	MND	MND	MND	MND	MND	MND	MND	1,27E-08	9,59E-08	5,14E-05	3,52E-07	-7,68E-05
ADP-fossil resources	MJ	2,54E+01	5,65E+00	5,17E+00	3,62E+01	MND	MND	MND	MND	MND	MND	MND	MND	MND	3,38E-01	6,14E-01	4,34E+00	1,46E+00	-2,68E+02
Water use[5)]	m^3e depr.	7,38E+00	2,59E-02	1,42E+00	8,83E+00	MND	MND	MND	MND	MND	MND	MND	MND	MND	9,09E-04	2,75E-03	1,26E+00	3,84E-02	-1,25E+00

1) GWP = Global Warming Potential; 2) EP = Eutrophication potential. Required characterisation method and data are in kg P-eq. Multiply by 3,07 to get PO4e; 3) POCP = Photochemical ozone formation; 4) ADP = Abiotic depletion potential; 5) EN 15804+A2 disclaimer for Abiotic depletion and Water use and optional indicators except Particulate matter and Ionizing radiation, human health. The results of these environmental impact indicators shall be used with care as the uncertainties on these results are high or as there is limited experience with the indicator.

ADDITIONAL (OPTIONAL) ENVIRONMENTAL IMPACT INDICATORS – EN 15804+A2, PEF

Impact category	Unit	A1	A2	A3	A1-A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
Particulate matter	Incidence	1,46E-06	4,33E-08	6,89E-08	1,58E-06	MND	MND	MND	MND	MND	MND	MND	MND	MND	7,00E-09	4,68E-09	3,81E-08	1,05E-08	-1,14E-06
Ionizing radiation[6)]	kBq U235e	1,10E+00	2,73E-02	4,37E-01	1,57E+00	MND	MND	MND	MND	MND	MND	MND	MND	MND	1,56E-03	2,93E-03	7,46E-01	1,68E-02	-1,87E+00
Ecotoxicity (freshwater)	CTUe	4,20E+02	5,09E+00	2,78E+01	4,53E+02	MND	MND	MND	MND	MND	MND	MND	MND	MND	2,03E-01	5,52E-01	3,26E+01	2,75E+03	-3,23E+02
Human toxicity, cancer	CTUh	3,77E-08	1,28E-10	2,39E-09	4,02E-08	MND	MND	MND	MND	MND	MND	MND	MND	MND	7,80E-12	1,36E-11	1,16E-08	1,32E-10	-3,49E-08
Human tox. non-cancer	CTUh	6,28E-07	5,04E-09	1,97E-08	6,52E-07	MND	MND	MND	MND	MND	MND	MND	MND	MND	1,47E-10	5,44E-10	2,20E-08	2,48E-09	5,12E-09
SQP[7)]	-	1,97E+01	6,49E+00	1,38E+02	1,64E+02	MND	MND	MND	MND	MND	MND	MND	MND	MND	4,40E-02	7,08E-01	2,28E+00	3,11E+00	-1,80E+01

6) EN 15804+A2 disclaimer for Ionizing radiation, human health. 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; 7) SQP = Land use related impacts/soil quality.

USE OF NATURAL RESOURCES

Impact category	Unit	A1	A2	A3	A1-A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
Renew. PER as energy[8)]	MJ	1,05E+02	6,76E-02	1,55E+01	1,20E+02	MND	MND	MND	MND	MND	MND	MND	MND	MND	1,93E-03	6,92E-03	1,08E+00	2,56E-01	-1,16E+02
Renew. PER as material	MJ	1,43E-01	0,00E+00	1,48E+01	1,49E+01	MND	MND	MND	MND	MND	MND	MND	MND	MND	0,00E+00	0,00E+00	-9,16E+00	-5,61E+00	1,81E-03
Total use of renew. PER	MJ	1,05E+02	6,76E-02	3,02E+01	1,35E+02	MND	MND	MND	MND	MND	MND	MND	MND	MND	1,93E-03	6,92E-03	-8,08E+00	-5,36E+00	-1,16E+02
Non-re. PER as energy	MJ	1,82E+02	5,65E+00	5,10E+01	2,39E+02	MND	MND	MND	MND	MND	MND	MND	MND	MND	3,38E-01	6,15E-01	1,63E+01	1,46E+00	-2,68E+02
Non-re. PER as material	MJ	1,30E+01	0,00E+00	4,20E+00	1,72E+01	MND	MND	MND	MND	MND	MND	MND	MND	MND	0,00E+00	0,00E+00	-6,05E-01	-3,71E-01	7,60E-04
Total use of non-re. PER	MJ	1,95E+02	5,65E+00	5,52E+01	2,56E+02	MND	MND	MND	MND	MND	MND	MND	MND	MND	3,38E-01	6,15E-01	1,57E+01	1,08E+00	-2,68E+02
Secondary materials	kg	1,35E+00	1,62E-03	5,51E-02	1,41E+00	MND	MND	MND	MND	MND	MND	MND	MND	MND	1,32E-04	1,71E-04	5,92E-01	2,41E-03	2,32E+00
Renew. secondary fuels	MJ	3,15E-03	1,59E-05	4,98E-01	5,01E-01	MND	MND	MND	MND	MND	MND	MND	MND	MND	4,33E-07	1,72E-06	3,05E-05	2,09E-05	-9,35E-07
Non-ren. secondary fuels	MJ	0,00E+00	0,00E+00	0,00E+00	0,00E+00	MND	MND	MND	MND	MND	MND	MND	MND	MND	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
Use of net fresh water	m^3	9,75E-02	7,50E-04	2,27E-02	1,21E-01	MND	MND	MND	MND	MND	MND	MND	MND	MND	2,06E-05	7,96E-05	2,49E+01	2,10E-03	-1,10E-01

8) PER = Primary energy resources.

END OF LIFE – WASTE

Impact category	Unit	A1	A2	A3	A1-A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
Hazardous waste	kg	5,00E+00	7,69E-03	1,09E-01	5,12E+00	MND	MND	MND	MND	MND	MND	MND	MND	MND	4,53E-04	8,14E-04	3,94E-02	0,00E+00	-4,50E+00
Non-hazardous waste	kg	2,32E+01	1,28E-01	4,00E+00	2,74E+01	MND	MND	MND	MND	MND	MND	MND	MND	MND	3,18E-03	1,34E-02	9,23E-01	4,88E+00	-4,39E+01
Radioactive waste	kg	1,14E-03	3,78E-05	1,87E-04	1,37E-03	MND	MND	MND	MND	MND	MND	MND	MND	MND	2,38E-06	4,12E-06	1,35E-05	0,00E+00	-1,58E-03

END OF LIFE – OUTPUT FLOWS

Impact category	Unit	A1	A2	A3	A1-A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
Components for re-use	kg	0,00E+00	0,00E+00	0,00E+00	0,00E+00	MND	MND	MND	MND	MND	MND	MND	MND	MND	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
Materials for recycling	kg	0,00E+00	0,00E+00	0,00E+00	0,00E+00	MND	MND	MND	MND	MND	MND	MND	MND	MND	0,00E+00	0,00E+00	3,63E-01	0,00E+00	0,00E+00
Materials for energy rec	kg	0,00E+00	0,00E+00	0,00E+00	0,00E+00	MND	MND	MND	MND	MND	MND	MND	MND	MND	0,00E+00	0,00E+00	3,69E-01	0,00E+00	0,00E+00
Exported energy	MJ	0,00E+00	0,00E+00	0,00E+00	0,00E+00	MND	MND	MND	MND	MND	MND	MND	MND	MND	0,00E+00	0,00E+00	4,40E+00	0,00E+00	0,00E+00

ENVIRONMENTAL IMPACTS – EN 15804+A1, CML / ISO 21930

Impact category	Unit	A1	A2	A3	A1-A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
Global Warming Pot.	kg CO_2e	1,54E+01	3,72E-01	3,24E+00	1,90E+01	MND	MND	MND	MND	MND	MND	MND	MND	MND	2,49E-02	4,03E-02	1,26E+00	9,12E-02	-1,77E+01
Ozone depletion Pot.	kg CFC_{-11}e	1,19E-06	6,83E-08	2,01E-07	1,46E-06	MND	MND	MND	MND	MND	MND	MND	MND	MND	4,26E-09	7,43E-09	3,95E-07	1,43E-08	-2,23E-06
Acidification	kg SO_2e	1,07E-01	1,25E-03	1,60E-02	1,24E-01	MND	MND	MND	MND	MND	MND	MND	MND	MND	1,86E-04	1,30E-04	3,40E-03	3,78E-04	-1,01E-01
Eutrophication	kg PO_4^3e	2,52E-02	2,87E-04	4,26E-03	2,97E-02	MND	MND	MND	MND	MND	MND	MND	MND	MND	4,32E-05	2,96E-05	1,36E-03	1,41E-03	-3,79E-02
POCP (“smog”)	kg C_2H_4e	8,10E-03	4,87E-05	7,43E-04	8,90E-03	MND	MND	MND	MND	MND	MND	MND	MND	MND	4,08E-06	5,19E-06	6,64E-04	2,24E-05	-1,03E-02
ADP-elements	kg Sbe	7,02E-05	8,63E-07	1,01E-05	8,12E-05	MND	MND	MND	MND	MND	MND	MND	MND	MND	1,26E-08	9,29E-08	5,14E-05	3,26E-07	-7,68E-05
ADP-fossil	MJ	1,76E+02	5,65E+00	5,52E+01	2,37E+02	MND	MND	MND	MND	MND	MND	MND	MND	MND	3,38E-01	6,14E-01	3,78E+01	1,46E+00	-2,68E+02

VERIFICATION STATEMENT

VERIFICATION PROCESS FOR THIS EPD

This EPD has been verified in accordance with ISO 14025 by an independent, third-party verifier by reviewing results, documents and compliancy with reference standard, ISO 14025 and ISO 14040/14044, following the process and checklists of the program operator for:

- This Environmental Product Declaration
- The Life-Cycle Assessment used in this EPD
- The digital background data for this EPD

THIRD-PARTY VERIFICATION STATEMENT

I hereby confirm that, following detailed examination, I have not established any relevant deviations by the studied Environmental Product Declaration (EPD), its LCA and project report, in terms of the data collected and used in the LCA calculations, the way the LCA-based calculations have been carried out, the presentation of environmental data in the EPD, and other additional environmental information, as present with respect to the procedural and methodological requirements in ISO 14025:2010 and reference standard.

I confirm that the company-specific data has been examined as regards plausibility and consistency; the declaration owner is responsible for its factual integrity and legal compliance.

I confirm that I have sufficient knowledge and experience of construction products, this specific product category, the construction industry, relevant standards, and the geographical area of the EPD to carry out this verification.

I confirm my independence in my role as verifier; I have not been involved in the execution of the LCA or in the development of the declaration and have no conflicts of interest regarding this verification.

Lucas Pedro Berman, as an authorized verifier acting for EPD Hub Limited
20.09.2024