ENVIRONMENTAL PRODUCT DECLARATION

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

Fine-ground Aluminium Trihydrate (ATH)

LKAB Minerals BV

EPD HUB, HUB-2424
Published on 25.01.2025, last updated on 17.02.2025, valid until 24.01.2030

Created with One Click LCA

GENERAL INFORMATION

MANUFACTURER

Manufacturer	LKAB Minerals BV
Address	Vlasweg 19, Harbour M164 NL-4782PW Moerdijk, The Netherlands
Contact details	sales.nl@lkab.com
Website	https://www.lkabminerals.com

EPD STANDARDS, SCOPE AND VERIFICATION

Program operator	EPD Hub, hub@epdhub.com
Reference standard	EN 15804+A2:2019 and 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 options, A1-A3, A4
EPD author	Marcus Eriksson
EPD verification	Independent verification of this EPD and data, according to ISO 14025: ☐ Internal verification ☑ External verification
EPD verifier	Haiha Nguyen, 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	Fine-ground Aluminium Trihydrate (ATH)
Product reference	Included grades (inc. S&D grades): M6B, M8B, M10B, M15B, M20B, M25B, B302
Place of production	Moerdijk, The Netherlands
Period for data	2023 (calendar year)
Averaging in EPD	Multiple products
Variation in GWP-fossil for A1-A3	34 %

ENVIRONMENTAL DATA SUMMARY

Declared unit	1 metric tonne
Declared unit mass	1000 kg
GWP-fossil, A1-A3 ($kgCO_2e$)	704
GWP-total, A1-A3 ($kgCO_2e$)	691
Secondary material, inputs (%)	0.08
Total energy use, A1-A3 (kWh)	3130
Net freshwater use, A1-A3 (m^3)	3.55
Additional info	This EPD reflects an average of ATH delivered by bulk and by bag, and the results are thus valid for both

PRODUCT AND MANUFACTURER

ABOUT THE MANUFACTURER

LKAB Minerals BV is part of the LKAB Group - an international mining and minerals group that offers sustainable iron ore, minerals and special products. LKAB Minerals supplies raw materials into diverse markets, from agriculture to industrial coatings and construction.

LKAB Minerals have deposits, processing facilities, and offices in 12 countries. LKAB Minerals BV is strategically located in Moerdijk, close to the main ports of Rotterdam (The Netherlands), and Antwerp (Belgium). LKAB Minerals BV has storage, milling, drying, screening and packaging facilities available on-site.

PRODUCT DESCRIPTION

LKAB Minerals offers fine-ground Aluminium Trihydrate (ATH) in various grades, which is used as a raw material in a variety of end-products, for example: 1) solid surfacing, 2) fire retardancy in coatings and 3) flame retardancy in polymers.

In all applications, ATH is used as an intermediary product which improves the qualities of the end product. ATH offers exceptional whiteness, good translucency, resistance to chemicals and weathering, and impact resistance. The softness of the mineral contributes to making materials machinable, with loading levels between 40% and 70% becoming possible and providing the best properties.

Further information can be found at
https://www.lkabminerals.com/products/ath/.

PRODUCT RAW MATERIAL MAIN COMPOSITION

Raw material category	Amount, mass %	Material origin
Minerals	100	Germany, Bosnia

BIOGENIC CARBON CONTENT

The milled ATH does not contain any biogenic carbon. However, the packaging used in the ATH delivered by bulk contains biogenic carbon.

Biogenic carbon content in product, kg C	0
Biogenic carbon content in packaging, kg C	5.22

FUNCTIONAL UNIT AND SERVICE LIFE

Declared unit	1 metric tonne
Mass per declared unit	1000 kg
Reference service life	N/A – depends on end product

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	x	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND		
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 and other ancillary materials. Further, energy use and handling of waste formed in the production processes are included in this stage. The study also considers the material losses occurring during the manufacturing processes as well as losses during electricity transmission.

The raw material is coarse, dry ATH, delivered from two suppliers by truck to Moerdijk. The ATH is derived from Bauxite ore, which is refined to a fine white powder via the Bayer process, washed and dried before delivery.

At the site, the ATH is milled to custom grades and transported to European customers by truck. The energy input for the ATH production process is electricity, which powers the mill and electric loaders on site.

Approximately half of the ATH was sold in 25 kg paper bags during the reference year, and the other half was delivered by bulk. The packaging scenario in this EPD reflects the average and the EPD is thus representative for the full year production, including both delivery by bag and bulk.

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. The transport to customer is done by truck (25mt), at an assumed average distance of 500 km. Emissions from installation is not relevant.

PRODUCT USE AND MAINTENANCE (B1-B7)

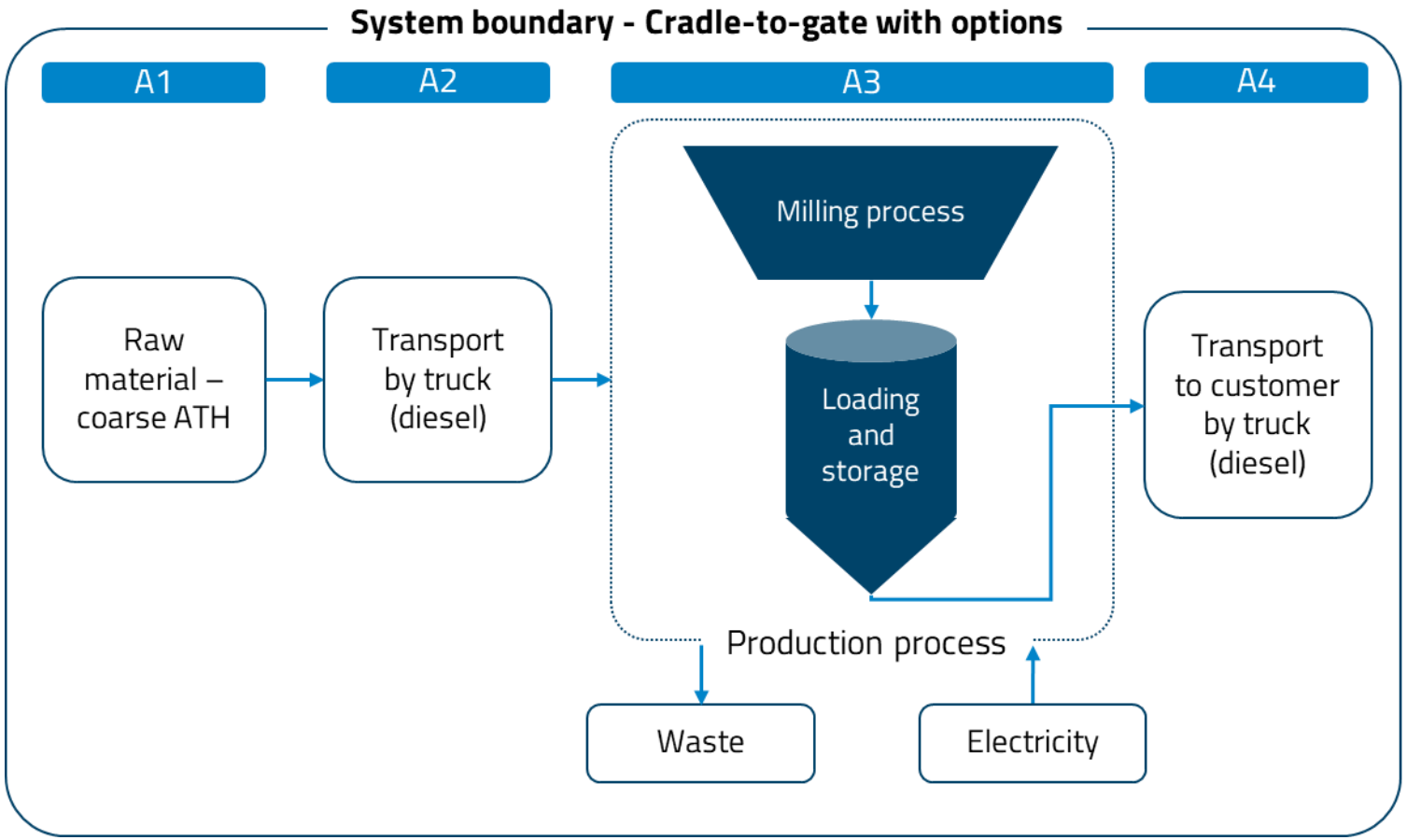
The product use and maintenance stages are not relevant for this product.

PRODUCT END OF LIFE (C1-C4, D)

The product fulfils the criteria specified in the relevant PCR (EN 15804:2012+A2:2019) for excluding the end-of-life stage, and this stage is therefore not included in this EPD.

1) The product is physically integrated with the end product during installation so they cannot be physically separated at end of life;
2) The product is no longer identifiable at end of life as a result of a physical or chemical transformation process
3) The product does not contain any biogenic carbon

MANUFACTURING PROCESS



Life cycle stages A5, B, C and D are outside of system boundaries

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.

In this study, no allocation has been necessary.

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

AVERAGES AND VARIABILITY

Type of average	Multiple products
Averaging method	Averaged by shares of total mass
Variation in GWP-fossil for A1-A3	34 %

This EPD covers seven grades of ATH, which vary in the electricity needed for milling. The electricity use underlying this EPD is the average from the included grades weighted by their production share (metric tons). All grades are produced at the same site and the raw material comes from the same suppliers.

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	5,17E+02	1,33E+02	4,07E+01	6,91E+02	8,15E+01	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND
GWP – fossil	kg CO_2e	5,17E+02	1,33E+02	5,37E+01	7,04E+02	8,14E+01	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND
GWP – biogenic	kg CO_2e	3,82E-01	5,40E-02	-1,30E+01	-1,26E+01	3,30E-02	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND
GWP – LULUC	kg CO_2e	1,83E-01	5,33E-02	1,67E-02	2,53E-01	3,26E-02	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND
Ozone depletion pot.	kg CFC-$_{11}$e	9,66E-05	3,09E-05	3,33E-06	1,31E-04	1,89E-05	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND
Acidification potential	mol H^+e	1,93E+00	3,79E-01	3,44E-01	2,65E+00	2,31E-01	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND
EP-freshwater[2)]	kg Pe	4,94E-03	9,52E-04	4,38E-04	6,33E-03	5,81E-04	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND
EP-marine	kg Ne	4,53E-01	7,55E-02	5,89E-02	5,88E-01	4,62E-02	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND
EP-terrestrial	mol Ne	5,21E+00	8,39E-01	6,49E-01	6,70E+00	5,13E-01	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND
POCP ("smog")[3)]	kg NMVOCe	1,42E+00	3,22E-01	1,82E-01	1,92E+00	1,97E-01	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND
ADP-minerals & metals[4)]	kg Sbe	1,41E-03	4,82E-04	2,80E-04	2,18E-03	2,95E-04	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND
ADP-fossil resources	MJ	8,23E+03	1,98E+03	6,55E+02	1,09E+04	1,21E+03	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND
Water use[5)]	m^3e depr.	1,38E+02	9,29E+00	3,63E+01	1,83E+02	5,67E+00	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND

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	1,55E-05	1,07E-05	9,60E-07	2,72E-05	6,56E-06	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND
Ionizing radiation[6)]	kBq U235e	2,44E+01	1,04E+01	6,19E-01	3,55E+01	6,36E+00	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND
Ecotoxicity (freshwater)	CTUe	2,00E+04	1,66E+03	4,88E+02	2,21E+04	1,01E+03	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND
Human toxicity, cancer	CTUh	3,26E-06	5,09E-08	2,22E-08	3,33E-06	3,11E-08	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND
Human tox. non-cancer	CTUh	5,97E-05	1,62E-06	3,25E-07	6,16E-05	9,90E-07	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND
SQP[7)]	-	1,18E+03	1,41E+03	1,09E+03	3,68E+03	8,61E+02	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND

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	1,68E+02	2,89E+01	1,92E+02	3,89E+02	1,76E+01	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND
Renew. PER as material	MJ	0,00E+00	0,00E+00	1,59E+02	1,59E+02	0,00E+00	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND
Total use of renew. PER	MJ	1,68E+02	2,89E+01	3,51E+02	5,48E+02	1,76E+01	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND
Non-re. PER as energy	MJ	8,23E+03	1,98E+03	6,53E+02	1,09E+04	1,21E+03	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND
Non-re. PER as material	MJ	0,00E+00	0,00E+00	4,08E+01	4,08E+01	0,00E+00	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND
Total use of non-re. PER	MJ	8,23E+03	1,98E+03	6,93E+02	1,09E+04	1,21E+03	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND
Secondary materials	kg	7,92E-01	6,75E-01	4,24E-01	1,89E+00	4,13E-01	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND
Renew. secondary fuels	MJ	2,07E-02	7,43E-03	3,82E+00	3,85E+00	4,54E-03	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND
Non-ren. secondary fuels	MJ	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND
Use of net fresh water	m^3	3,13E+00	2,53E-01	1,61E-01	3,55E+00	1,55E-01	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND

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	5,62E+02	2,26E+00	1,58E+00	5,66E+02	1,38E+00	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND
Non-hazardous waste	kg	1,97E+02	4,01E+01	6,87E+01	3,06E+02	2,45E+01	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND
Radioactive waste	kg	1,42E-02	1,37E-02	3,53E-04	2,82E-02	8,34E-03	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND

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	0,00E+00	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND
Materials for recycling	kg	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND
Materials for energy rec	kg	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND
Exported energy	MJ	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND

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	5,08E+02	1,32E+02	5,27E+01	6,93E+02	8,07E+01	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND
Ozone depletion Pot.	kg CFC_{-11}e	8,70E-05	2,45E-05	2,68E-06	1,14E-04	1,50E-05	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND
Acidification	kg SO_2e	1,53E+00	3,11E-01	2,88E-01	2,13E+00	1,90E-01	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND
Eutrophication	kg PO_4^3e	1,03E+00	6,70E-02	6,98E-02	1,16E+00	4,10E-02	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND
POCP (“smog”)	kg C_2H_4e	6,60E-02	1,57E-02	1,14E-02	9,31E-02	9,59E-03	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND
ADP-elements	kg Sbe	9,88E-04	4,71E-04	2,80E-04	1,74E-03	2,88E-04	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND
ADP-fossil	MJ	8,23E+03	1,98E+03	6,58E+02	1,09E+04	1,21E+03	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND

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

Why does verification transparency matter? Read more online
This EPD has been generated by One Click LCA EPD generator, which has been verified and approved by the EPD Hub.

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.

HaiHa Nguyen, as an authorized verifier acting for EPD Hub Limited
23.01.2025

VERIFIED ISO 14025