ENVIRONMENTAL PRODUCT DECLARATION

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

ProClamp
Kruge AS

EPD HUB, HUB-1059
Published on 01.02.2024, last updated on 01.02.2024, valid until 01.02.2029.

GENERAL INFORMATION

MANUFACTURER

Manufacturer	Kruge AS
Address	Industriveien 7, 3431 Spikkestad, Norway
Contact details	post@kruge.no
Website	https://www.kruge.no/

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 1.0, 1 Feb 2022
Sector	Construction product
Category of EPD	Third party verified EPD
Scope of the EPD	Cradle to gate with options, A4-A5, and modules C1-C4, D
EPD author	Mikkel Ostreng - Kruge A.S.
EPD verification	Independent verification of this EPD and data, according to ISO 14025: ☐ Internal certification ☑ 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	ProClamp
Additional labels	ProClamp vent, ProClamp Combi
Product reference	3950059, 3950061, 3950064, 3950066, 3950068, 3950071, 3950073, 3950075, 3950077, 3447002, 3447004, 3447006, 3447008, 3447011, 3447013, 3447015, 3447017, 3447019, 3447024, 3447028, 3447031, 3447033, 3447035, 3447037, 3447039
Place of production	Jiangmen Eurofix Metal & Rubber Products Co., Ltd. No.1 Tangbian Industrial Zone,Chaolian Town,J
Period for data	2022
Averaging in EPD	No averaging
Variation in GWP-fossil for A1-A3	0%

ENVIRONMENTAL DATA SUMMARY

Declared unit	1 kg
Declared unit mass	1 kg
GWP-fossil, A1-A3 (kgCO2e)	3,59E+00
GWP-total, A1-A3 (kgCO2e)	3,56E+00
Secondary material, inputs (%)	2.23
Secondary material, outputs (%)	85.0
Total energy use, A1-A3 (kWh)	11.5
Total water use, A1-A3 (m3e)	2,76E-02

PRODUCT AND MANUFACTURER

ABOUT THE MANUFACTURER

Kruge AS is your competence partner and supplier of sustainable assembly systems.

PRODUCT DESCRIPTION

ProClamp is a series of zink galvanized steel products for mounting ducts and pipes internally in a wide range of buildings and industries. The product range has been developed in Norway, based on 40 years of experience, cooperating with leading manufacturers and entrepreneurs. The ProClamp product range is manufactured in a cooperation with manufacturer in China using Kruge AS tools and completed in Kruges plant in Norway.

Further information can be found at https://www.kruge.no/.

PRODUCT RAW MATERIAL MAIN COMPOSITION

Raw material category	Amount, mass- %	Material origin
Metals	97.5	CHINA
Minerals	2.5	CHINA
Fossil materials	0	-
Bio-based materials	0	-

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	0.0244

FUNCTIONAL UNIT AND SERVICE LIFE

Declared unit	1 kg
Mass per declared unit	1 kg
Functional unit	-
Reference service life	-

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	x	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	Deconstr./demol.	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.

The steel materials are received in our Chinese factory as hot rolled to the required surface conditions using cast iron steel shots. The materials are then cut to specified shapes. Hydraulic oils, cutting emulsions and other lubrication oils are used during the process to reduce the wear of machines and to ensure stable cutting conditions. The materials are punched in Kruge tools to the final shapes of the Proclamp products. The final products are welded with the steel connection nut and 2 screws are installed (Purchased from a subcontractor). The welding process consumes heat and electricity for welding machinery. The manufacturing process requires electricity and fuels for the different equipment as well as heating, unless district heating is used. The steel waste produced at the plant is directed to recycling. The loss of material is considered (5%), as well as wastewater treatments. A wooden pallet and packaging film are used as a packaging material for transporting the product from Kruges's facilities in China to our Norwegian plant. Here the products are repackaged, quality tested and prepared for final shipping to the clients building sites.

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 average transport distance from the production facility to the construction site is calculated to be an average of 72,7 km, and the transport method is assumed to be lorry. The vehicles capacity utilization volume factor is assumed to be 55% which means to compensate for filling ratio stated transport leg is 40/55% = 72,7 In reality it may vary, but as the role of transport emissions in the overall results is small, the variation in load is assumed to be negligible. To be conservative, empty returns are included in this study as implemented through an average load factor in Ecoinvents transport data points. Transport does not cause loss as the product is properly packed.

PRODUCT USE AND MAINTENANCE (B1-B7)

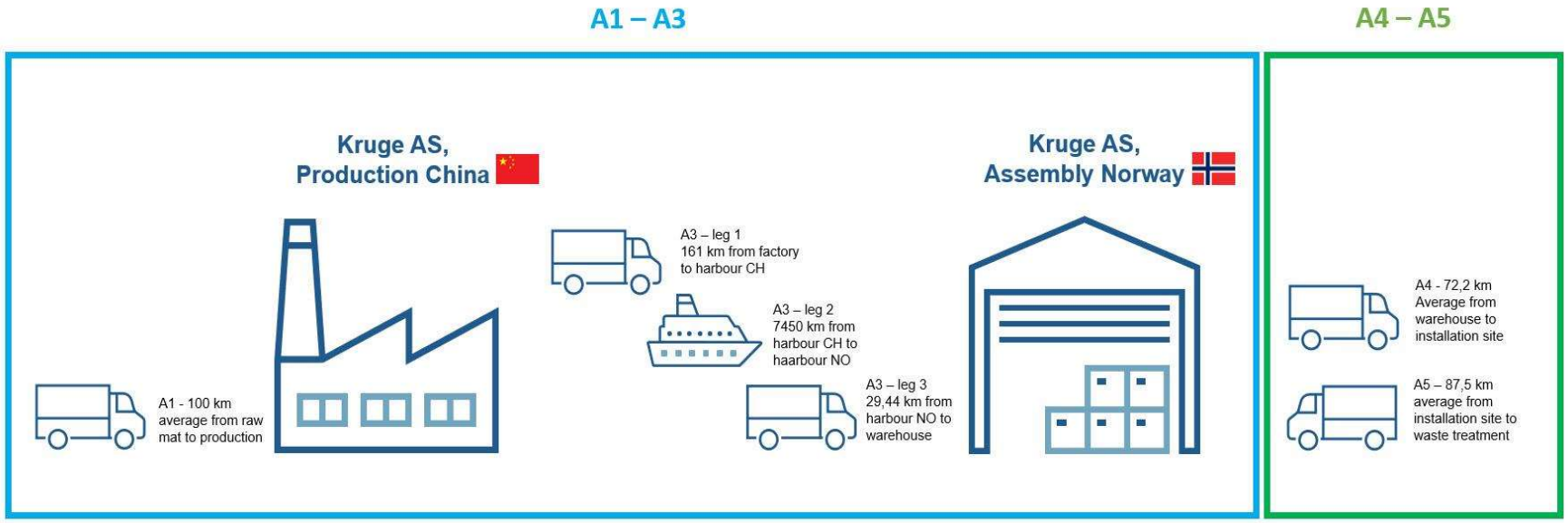
This EPD does not cover the use phase.
Air, soil, and water impacts during the use phase have not been studied.

PRODUCT END OF LIFE (C1-c4, D)

Demolition is assumed to consume an neglectable amount of energy as it will be dismantled by hand. It is assumed that 100% of the waste is collected and transported to the waste treatment center. Transportation

distance to treatment is calculated to be 87.5 km (72,5 km average distance to building site + 15 km to waste treatment site in Drammen, Norway) and the transportation method is assumed to be lorry (C2). Kruge has taken as its starting point that everything to be recycled is taken back to Kruge before it is transported to recycling. This is to make a worst case scenario. Approximately 85% of steel is assumed to be recycled based on World Steel Association, 2020 (C3). It is assumed that the remaining 15% of steel is taken to landfill for final disposal (C4). Due to the recycling process, the end-of-life product is converted into recycled steel, while the wooden pallet is incinerated with energy recovery (D)

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 materials	No allocation
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%

All data is collected for 1 kg of finished product, all other data follows as average values. This is representative as all products are similar in size and design, for all life-cycle stages will be representet correctly as kg product.

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. Ecoinvent v3.8 and One Click LCA databases were used 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	3,26E+00	9,59E-02	2,04E-01	3,56E+00	1,45E-01	4,29E-02	MND	MND	MND	MND	MND	MND	MND	MNR	8,21E-03	1,86E-02	7,91E-04	-1,38E+00
GWP – fossil	kg CO_2e	3,26E+00	9,58E-02	2,33E-01	3,59E+00	1,45E-01	1,27E-02	MND	MND	MND	MND	MND	MND	MND	MNR	8,21E-03	1,86E-02	7,90E-04	-1,38E+00
GWP – biogenic	kg CO_2e	3,07E-05	0,00E+00	-3,02E-02	-3,02E-02	0,00E+00	3,02E-02	MND	MND	MND	MND	MND	MND	MND	MNR	0,00E+00	0,00E+00	0,00E+00	0,00E+00
GWP – LULUC	kg CO_2e	1,03E-03	6,43E-05	5,15E-04	1,61E-03	9,71E-05	1,19E-06	MND	MND	MND	MND	MND	MND	MND	MNR	3,03E-06	2,44E-05	7,46E-07	-2,20E-04
Ozone depletion pot.	kg CFC_{-11}e	3,44E-08	1,93E-08	8,80E-09	6,24E-08	2,83E-08	2,73E-10	MND	MND	MND	MND	MND	MND	MND	MNR	1,89E-09	2,30E-09	3,20E-10	-5,48E-08
Acidification potential	mol H^+e	8,60E-03	2,47E-03	1,12E-03	1,22E-02	8,05E-04	1,08E-05	MND	MND	MND	MND	MND	MND	MND	MNR	3,48E-05	2,36E-04	7,43E-06	-5,60E-03
EP-freshwater[2)]	kg Pe	2,27E-05	5,01E-07	1,16E-05	3,48E-05	2,02E-06	2,97E-08	MND	MND	MND	MND	MND	MND	MND	MNR	6,72E-08	9,98E-07	8,28E-09	-5,63E-05
EP-marine	kg Ne	1,83E-03	6,16E-04	2,25E-04	2,67E-03	2,39E-04	6,17E-06	MND	MND	MND	MND	MND	MND	MND	MNR	1,03E-05	4,99E-05	2,57E-06	-1,15E-03
EP-terrestrial	mol Ne	1,87E-02	6,84E-03	2,24E-03	2,78E-02	2,66E-03	3,76E-05	MND	MND	MND	MND	MND	MND	MND	MNR	1,14E-04	5,77E-04	2,83E-05	-1,34E-02
POCP ("smog")[3)]	kg NMVOCe	6,22E-03	1,79E-03	6,27E-04	8,64E-03	8,60E-04	1,21E-05	MND	MND	MND	MND	MND	MND	MND	MNR	3,65E-05	1,59E-04	8,23E-06	-6,84E-03
ADP-minerals & metals[4)]	kg Sbe	1,77E-05	1,66E-07	1,18E-06	1,90E-05	2,12E-06	2,17E-08	MND	MND	MND	MND	MND	MND	MND	MNR	1,92E-08	2,51E-06	1,82E-09	-2,61E-05
ADP-fossil resources	MJ	3,50E+01	1,25E+00	3,23E+00	3,95E+01	2,04E+00	2,20E-02	MND	MND	MND	MND	MND	MND	MND	MNR	1,23E-01	2,52E-01	2,17E-02	-1,20E+01
Water use[5)]	m^3e depr.	1,11E+00	4,59E-03	7,72E-02	1,19E+00	1,45E-02	7,82E-04	MND	MND	MND	MND	MND	MND	MND	MNR	5,52E-04	4,89E-03	6,87E-05	-2,60E-01

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.

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	1,62E+00	1,19E-02	5,25E-01	2,15E+00	5,00E-02	7,25E-04	MND	MND	MND	MND	MND	MND	MND	MNR	1,39E-03	4,47E-02	1,88E-04	-1,04E+00
Renew. PER as material	MJ	0,00E+00	0,00E+00	2,61E-01	2,61E-01	0,00E+00	-2,61E-01	MND	MND	MND	MND	MND	MND	MND	MNR	0,00E+00	0,00E+00	0,00E+00	0,00E+00
Total use of renew. PER	MJ	1,62E+00	1,19E-02	7,86E-01	2,42E+00	5,00E-02	-2,60E-01	MND	MND	MND	MND	MND	MND	MND	MNR	1,39E-03	4,47E-02	1,88E-04	-1,04E+00
Non-re. PER as energy	MJ	3,49E+01	1,25E+00	2,92E+00	3,91E+01	2,04E+00	2,20E-02	MND	MND	MND	MND	MND	MND	MND	MNR	1,23E-01	2,52E-01	2,17E-02	-1,21E+01
Non-re. PER as material	MJ	0,00E+00	0,00E+00	1,59E-01	1,59E-01	0,00E+00	-1,59E-01	MND	MND	MND	MND	MND	MND	MND	MNR	0,00E+00	0,00E+00	0,00E+00	0,00E+00

Total use of non-re. PER	MJ	3,49E+01	1,25E+00	3,08E+00	3,93E+01	2,04E+00	-1,37E-01	MND	MND	MND	MND	MND	MND	MND	MNR	1,23E-01	2,52E-01	2,17E-02	-1,21E+01
Secondary materials	kg	2,23E-02	5,82E-04	1,81E-02	4,11E-02	1,09E-03	1,93E-05	MND	MND	MND	MND	MND	MND	MND	MNR	3,42E-05	2,81E-04	4,55E-06	7,91E-01
Renew. secondary fuels	MJ	2,35E-04	2,24E-06	2,33E-03	2,56E-03	1,04E-05	1,38E-07	MND	MND	MND	MND	MND	MND	MND	MNR	3,46E-07	1,46E-05	1,19E-07	-1,26E-04
Non-ren. secondary fuels	MJ	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	MND	MND	MND	MND	MND	MND	MND	MNR	0,00E+00	0,00E+00	0,00E+00	0,00E+00
Use of net fresh water	m^3	2,55E-02	1,09E-04	2,05E-03	2,76E-02	3,68E-04	7,53E-06	MND	MND	MND	MND	MND	MND	MND	MNR	1,60E-05	1,48E-04	2,37E-05	-3,17E-03

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	7,81E-02	1,99E-03	1,75E-02	9,76E-02	5,15E-03	7,67E-05	MND	MND	MND	MND	MND	MND	MND	MNR	1,64E-04	1,71E-03	0,00E+00	-4,57E-01
Non-hazardous waste	kg	9,22E-01	1,99E-02	4,69E-01	1,41E+00	9,15E-02	1,06E-02	MND	MND	MND	MND	MND	MND	MND	MNR	2,69E-03	5,47E-02	1,50E-01	-2,24E+00
Radioactive waste	kg	2,23E-05	8,60E-06	8,62E-06	3,95E-05	1,30E-05	1,16E-07	MND	MND	MND	MND	MND	MND	MND	MNR	8,25E-07	1,48E-06	0,00E+00	3,80E-06

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	0,00E+00	MND	MND	MND	MND	MND	MND	MND	MNR	0,00E+00	0,00E+00	0,00E+00	0,00E+00
Materials for recycling	kg	0,00E+00	0,00E+00	3,74E-02	3,74E-02	0,00E+00	0,00E+00	MND	MND	MND	MND	MND	MND	MND	MNR	0,00E+00	8,50E-01	0,00E+00	0,00E+00
Materials for energy rec	kg	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	MND	MND	MND	MND	MND	MND	MND	MNR	0,00E+00	0,00E+00	0,00E+00	0,00E+00
Exported energy	MJ	0,00E+00	0,00E+00	1,13E-01	1,13E-01	0,00E+00	1,38E-01	MND	MND	MND	MND	MND	MND	MND	MNR	0,00E+00	0,00E+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	3,18E+00	9,50E-02	2,29E-01	3,51E+00	1,42E-01	1,54E-02	MND	MND	MND	MND	MND	MND	MND	MNR	8,13E-03	1,83E-02	7,74E-04	-1,31E+00
Ozone depletion Pot.	kg CFC_{11}e	2,97E-08	1,53E-08	7,39E-09	5,24E-08	2,25E-08	2,19E-10	MND	MND	MND	MND	MND	MND	MND	MNR	1,50E-09	1,86E-09	2,53E-10	-6,09E-08
Acidification	kg SO_2e	7,13E-03	1,97E-03	9,25E-04	1,00E-02	6,24E-04	8,26E-06	MND	MND	MND	MND	MND	MND	MND	MNR	2,70E-05	1,91E-04	5,61E-06	-4,53E-03
Eutrophication	kg PO_4^3e	1,46E-03	2,31E-04	4,21E-04	2,11E-03	1,61E-04	1,10E-05	MND	MND	MND	MND	MND	MND	MND	MNR	6,15E-06	6,30E-05	1,21E-06	-2,33E-03
POCP (“smog”)	kg C_2H_4e	1,05E-03	5,18E-05	4,63E-05	1,15E-03	5,29E-05	1,24E-06	MND	MND	MND	MND	MND	MND	MND	MNR	1,05E-06	7,22E-06	2,35E-07	-7,81E-04
ADP-elements	kg Sbe	1,76E-05	1,63E-07	1,16E-06	1,89E-05	2,10E-06	2,14E-08	MND	MND	MND	MND	MND	MND	MND	MNR	1,86E-08	2,50E-06	1,79E-09	-2,61E-05
ADP-fossil	MJ	3,50E+01	1,25E+00	3,23E+00	3,95E+01	2,04E+00	2,20E-02	MND	MND	MND	MND	MND	MND	MND	MNR	1,23E-01	2,52E-01	2,17E-02	-1,21E+01

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

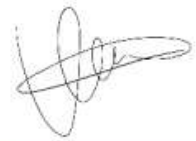
I hereby confirm that, following detailed examination, I have not established any relevant deviations by the studied Environmental Product Declaration (EPD), its LCA and project report, in terms of the data collected and used in the LCA calculations, the way the LCA-based calculations have been carried 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
01.02.2024



VERIFIED ISO 14025