ENVIRONMENTAL PRODUCT DECLARATION

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

SURFACE COATED STEEL BEAM

LGL CONSTRUCTION AB

EPD HUB, HUB-0510
Publishing date 16 June 2023, last updated date 4 July 2023, valid until 16 June 2028

Created with One Click LCA

GENERAL INFORMATION

MANUFACTURER

Manufacturer	LGL Construction AB
Address	Skruvgatan 6, 333 33 Smålandsstenar, Sweden
Contact details	fredrik.holmqvist@lgl.se
Website	www.lgl.se

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, and modules C1-C4, D
EPD author	Amanda Norlin, LGL Construction AB
EPD verification	Independent verification of this EPD and data, according to ISO 14025: ☐ Internal certification ☑ External verification
EPD verifier	Lucas Rodríguez 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	Surface coated steel beam
Additional labels	Customized construction components for steel frames
Product reference	--
Place of production	Smålandsstenar, Sweden
Period for data	Calendar year 2022
Averaging in EPD	Multiple products
Variation in GWP-fossil for A1-A3	17 %

ENVIRONMENTAL DATA SUMMARY

Declared unit	1 kg of steel structure
Declared unit mass	1 kg
GWP-fossil, A1-A3 (kgCO2e)	1.05
GWP-total, A1-A3 (kgCO2e)	1.08
Secondary material, inputs (%)	83.3
Secondary material, outputs (%)	94.3
Total energy use, A1-A3 (kWh)	5.77
Total water use, A1-A3 (m3e)	0.0121

PRODUCT AND MANUFACTURER

ABOUT THE MANUFACTURER

LGL Construction AB is a steel construction contractor that creates complete solutions in steel construction. LGL designs, manufactures and assembles frame systems and other steel components for buildings.
More information about the manufacturer can be found at: www.lgl.se

PRODUCT DESCRIPTION

This EPD represents surface coated steel beams and merchant bars produced at LGL Construction AB in Smålandsstenar. The product consists of structural steel frames used for building construction. It includes beams, columns, connections, stairs and similar customized construction components. The steel structures are manufactured according to EN 1090-1, up to EXC 3, and CE marked.

PRODUCT RAW MATERIAL MAIN COMPOSITION

Raw material category	Amount, mass- %	Material origin
Metals	98.9	EU
Minerals	-	-
Fossil materials	0.11	EU
Bio-based materials	-	-

BIOGENIC CARBON CONTENT

Product's biogenic carbon content at the factory gate. It includes wooden pallets used for transport.

Biogenic carbon content in product, kg C	0
Biogenic carbon content in packaging, kg C	0.00647

FUNCTIONAL UNIT AND SERVICE LIFE

Declared unit	1 kg of steel structure
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	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	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.

LGL buy steel beams and merchant bars from different suppliers. The steel materials are blasted using cast iron steel shots, and according to project documentation and requirements, cut to required 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 final products are welded from the different steel components. The welding process consumes welding fillers as well as gases used as shielding. The main method of surface coating in the factory is wet painting. About 10 percent of the annual production is sent away to get a hot-dip galvanized surface at another plant, and is then returned to LGL for packaging and shipping. The manufacturing process requires electricity for the different equipment as well as heating. The steel waste produced at the plant is directed to recycling or stored at LGL to be welded together for re-usage.

The loss of material is not considered.

A wooden pallet is used as a packaging material for transporting the product from the factory gate.

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.

Transportation impacts occurred from final products delivery to construction site. The transportation distance is defined according to the PCR. Average distance of transportation from production plant to building site is assumed as 122.09 km and the transportation method is assumed to be lorry. Vehicle capacity utilization volume factor is assumed in the database. In reality, it may vary but as role of transportation emissions in total results is small, the variety in load is assumed to be negligible. Empty returns are not taken into account as it is assumed that return trip is used by the transportation company to serve the needs of other clients. Transportation does not cause losses as product are packaged properly.

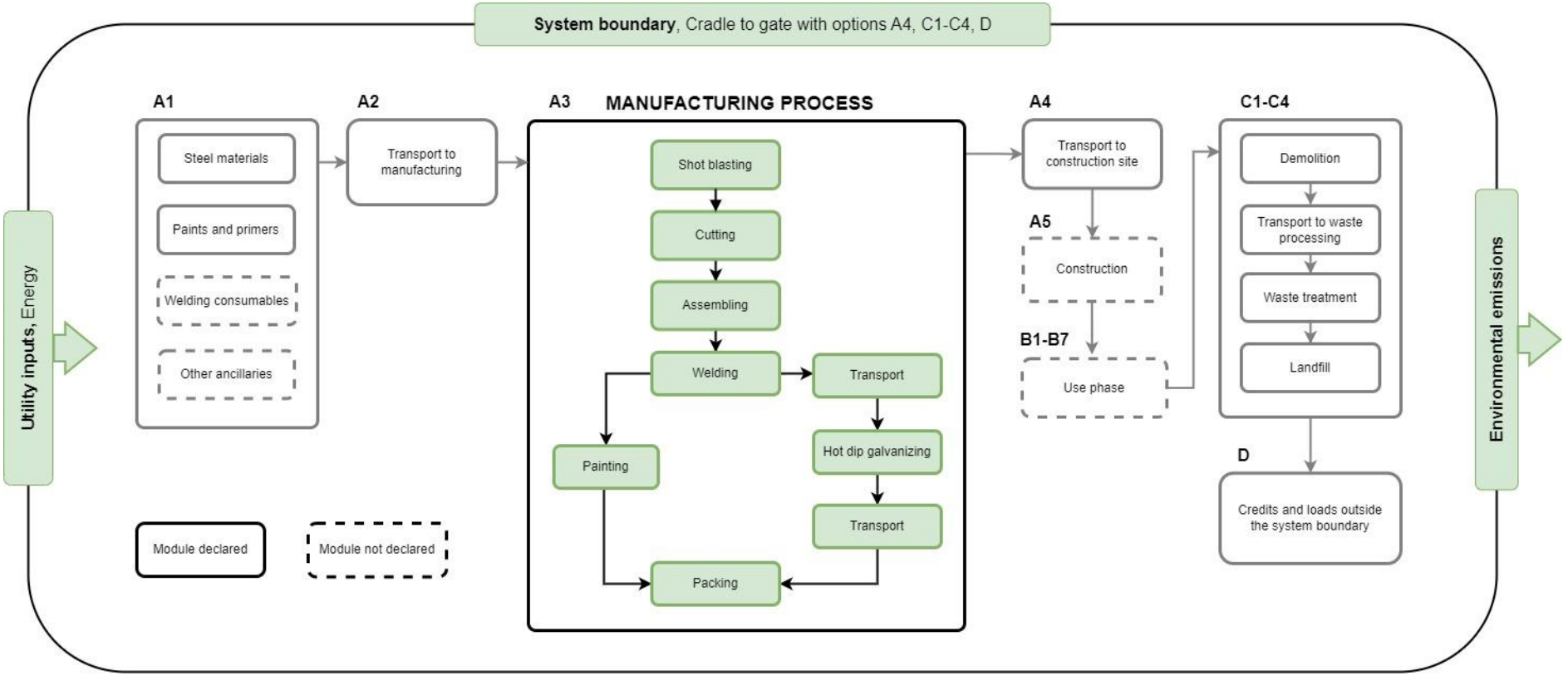
PRODUCT USE AND MAINTENANCE (B1-B7)

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 0.01 kWh/kg of product. The source of energy is diesel fuel used by construction machines (C1). It is assumed that 100% of the waste is collected and transported to the waste treatment center. Transportation distance to treatment is assumed as 50 km and the transportation method is assumed to be lorry (C2). Approximately 95% of steel is assumed to be recycled based on World Steel Association, 2020 (C3). It is assumed that the remaining 5 % 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 for 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	Allocated by mass or volume
Packaging materials	Allocated by mass or volume
Ancillary materials	Not applicable
Manufacturing energy	Allocated by revenue

AVERAGES AND VARIABILITY

Type of average	Multiple products
Averaging method	Averaged by shares of total mass
Variation in GWP-fossil for A1-A3	17 %

Primary data represents the manufacturing of paint- and zinc coated beams and merchant bars. The data was used to calculate average impacts for the products. The variability of the primary data or the emissions between the products did not amount to more than 50% of the relevant data (the highest compared to the lowest). The primary data was averaged by calculating a weighed average of the products consumption of raw materials and energy. The production amount mass shares per each product was used in the weighting.

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 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	9,71E-1	3,92E-2	6,69E-2	1,08E0	1,14E-2	MND	MND	MND	MND	MND	MND	MND	MND	3,33E-2	4,73E-3	3,07E-2	3,28E-2	-7,27E-1
GWP – fossil	kg CO_2e	9,38E-1	3,92E-2	7,37E-2	1,05E0	1,15E-2	MND	MND	MND	MND	MND	MND	MND	MND	3,31E-3	4,72E-3	2,06E-2	3,28E-2	-7,17E-1
GWP – biogenic	kg CO_2e	-1,95E-2	1,52E-5	-7,63E-3	-2,71E-2	4,46E-6	MND	MND	MND	MND	MND	MND	MND	MND	3E-2	1,83E-6	1,01E-2	1,28E-5	-9,36E-3
GWP – LULUC	kg CO_2e	5,21E-2	1,45E-5	8,27E-4	5,29E-2	4,25E-6	MND	MND	MND	MND	MND	MND	MND	MND	3,3E-7	1,74E-6	2,71E-5	6,65E-6	-1,21E-4
Ozone depletion pot.	kg $CFC_{-11}e$	6,77E-8	9,02E-9	9,84E-9	8,66E-8	2,65E-9	MND	MND	MND	MND	MND	MND	MND	MND	7,07E-10	1,09E-9	2,54E-9	4,8E-9	-2,79E-8
Acidification potential	mol H^+e	5,58E-3	1,66E-4	1,2E-4	5,87E-3	4,88E-5	MND	MND	MND	MND	MND	MND	MND	MND	3,44E-5	2E-5	2,61E-4	6,65E-5	-2,93E-3
EP-freshwater[2)]	kg Pe	5,28E-5	3,21E-7	6,69E-7	5,38E-5	9,44E-8	MND	MND	MND	MND	MND	MND	MND	MND	1,1E-8	3,87E-8	1,11E-6	2,05E-7	-2,95E-5
EP-marine	kg Ne	9,43E-4	4,93E-5	3E-5	1,02E-3	1,45E-5	MND	MND	MND	MND	MND	MND	MND	MND	1,52E-5	5,94E-6	5,52E-5	1,17E-5	-6,01E-4
EP-terrestrial	mol Ne	9,18E-3	5,44E-4	3,47E-4	1,01E-2	1,6E-4	MND	MND	MND	MND	MND	MND	MND	MND	1,67E-4	6,56E-5	6,38E-4	1,31E-4	-7,01E-3
POCP ("smog")[3)]	kg NMVOCe	3,55E-3	1,74E-4	1,02E-4	3,83E-3	5,12E-5	MND	MND	MND	MND	MND	MND	MND	MND	4,59E-5	2,1E-5	1,75E-4	3,93E-5	-3,58E-3
ADP-minerals & metals[4)]	kg Sbe	5,22E-6	9,19E-8	2,3E-7	5,55E-6	2,7E-8	MND	MND	MND	MND	MND	MND	MND	MND	1,68E-9	1,11E-8	2,77E-6	1,15E-7	-1,37E-5
ADP-fossil resources	MJ	1,31E1	5,89E-1	2,64E0	1,63E1	1,73E-1	MND	MND	MND	MND	MND	MND	MND	MND	4,45E-2	7,09E-2	2,8E-1	2,47E-1	-6,23E0
Water use[5)]	m^3e depr.	8,65E-1	2,63E-3	6,22E-2	9,3E-1	7,75E-4	MND	MND	MND	MND	MND	MND	MND	MND	1,2E-4	3,17E-4	5,43E-3	3,51E-3	-1,3E-1

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	2,32E0	6,31E-3	7,22E-1	3,05E0	1,95E-3	MND	MND	MND	MND	MND	MND	MND	MND	2,54E-4	7,99E-4	4,96E-2	5,64E-3	-5,29E-1
Renew. PER as material	MJ	1,88E-1	0E0	6,92E-2	2,57E-1	0E0	MND	MND	MND	MND	MND	MND	MND	MND	0E0	0E0	-7E-2	-1,9E-1	0E0
Total use of renew. PER	MJ	2,51E0	6,31E-3	7,91E-1	3,31E0	1,95E-3	MND	MND	MND	MND	MND	MND	MND	MND	2,54E-4	7,99E-4	-2,04E-2	-1,84E-1	-5,29E-1
Non-re. PER as energy	MJ	1,45E1	5,6E-1	2,63E0	1,77E1	1,73E-1	MND	MND	MND	MND	MND	MND	MND	MND	4,45E-2	7,09E-2	2,8E-1	2,47E-1	-6,24E0
Non-re. PER as material	MJ	1,33E-1	0E0	4,57E-3	1,37E-1	0E0	MND	MND	MND	MND	MND	MND	MND	MND	0E0	0E0	0E0	-1,3E-1	0E0
Total use of non-re. PER	MJ	1,47E1	5,6E-1	2,64E0	1,79E1	1,73E-1	MND	MND	MND	MND	MND	MND	MND	MND	4,45E-2	7,09E-2	2,8E-1	1,17E-1	-6,24E0
Secondary materials	kg	8,32E-1	1,55E-4	3,69E-4	8,33E-1	4,81E-5	MND	MND	MND	MND	MND	MND	MND	MND	1,74E-5	1,97E-5	3,1E-4	3,76E-4	4,15E-1
Renew. secondary fuels	MJ	4,43E-3	1,57E-6	1,83E-3	6,26E-3	4,85E-7	MND	MND	MND	MND	MND	MND	MND	MND	5,7E-8	1,99E-7	1,61E-5	5,41E-7	-6,63E-5

Non-ren. secondary fuels	MJ	0E0	0E0	0E0	0E0	0E0	MND	MND	MND	MND	MND	MND	MND	MND	0E0	0E0	0E0	0E0	0E0
Use of net fresh water	m^3	1,05E-2	7,25E-5	1,56E-3	1,21E-2	2,24E-5	MND	MND	MND	MND	MND	MND	MND	MND	2,7E-6	9,19E-6	1,64E-4	9,74E-5	-1,52E-3

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	6,32E-2	7,43E-4	1,48E-3	6,55E-2	2,3E-4	MND	MND	MND	MND	MND	MND	MND	MND	5,96E-5	9,41E-5	1,9E-3	1,3E-2	-2,4E-1
Non-hazardous waste	kg	7,36E-1	1,22E-2	3,35E-2	7,82E-1	3,77E-3	MND	MND	MND	MND	MND	MND	MND	MND	4,19E-4	1,55E-3	6,06E-2	4,9E-2	-1,21E0
Radioactive waste	kg	6,43E-4	3,75E-6	2,5E-5	6,72E-4	1,16E-6	MND	MND	MND	MND	MND	MND	MND	MND	3,13E-7	4,75E-7	1,64E-6	0E0	1,87E-6

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	4,22E-7	0E0	0E0	4,22E-7	0E0	MND	MND	MND	MND	MND	MND	MND	MND	0E0	0E0	0E0	0E0	0E0
Materials for recycling	kg	3,16E-2	0E0	0E0	3,16E-2	0E0	MND	MND	MND	MND	MND	MND	MND	MND	0E0	0E0	9,38E-1	0E0	0E0
Materials for energy rec	kg	2,88E-3	0E0	0E0	2,88E-3	0E0	MND	MND	MND	MND	MND	MND	MND	MND	0E0	0E0	4,72E-3	0E0	0E0
Exported energy	MJ	9,99E-3	0E0	0E0	9,99E-3	0E0	MND	MND	MND	MND	MND	MND	MND	MND	0E0	0E0	0E0	9,8E-2	0E0

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	1,32E0	3,69E-2	7,34E-2	1,43E0	1,14E-2	MND	MND	MND	MND	MND	MND	MND	MND	3,27E-3	4,67E-3	2,03E-2	3,26E-2	-6,79E-1
Ozone depletion Pot.	kg CFC_{-11}e	1,9E-8	6,79E-9	8,64E-9	3,45E-8	2,1E-9	MND	MND	MND	MND	MND	MND	MND	MND	5,6E-10	8,6E-10	2,06E-9	4,07E-9	-3,12E-8
Acidification	kg SO_2e	4,41E-3	1,23E-4	9,36E-5	4,63E-3	3,79E-5	MND	MND	MND	MND	MND	MND	MND	MND	2,45E-5	1,55E-5	2,11E-4	5,51E-5	-2,37E-3
Eutrophication	kg PO_4^3e	9,84E-4	2,79E-5	3,72E-5	1,05E-3	8,64E-6	MND	MND	MND	MND	MND	MND	MND	MND	5,69E-6	3,54E-6	6,98E-5	1,44E-5	-1,22E-3
POCP (“smog”)	kg C_2H_4e	5,25E-4	4,79E-6	6,64E-6	5,36E-4	1,48E-6	MND	MND	MND	MND	MND	MND	MND	MND	5,36E-7	6,06E-7	7,98E-6	2,2E-6	-4,1E-4
ADP-elements	kg Sbe	3,22E-6	8,46E-8	2,31E-7	3,53E-6	2,62E-8	MND	MND	MND	MND	MND	MND	MND	MND	1,65E-9	1,07E-8	2,76E-6	8,71E-8	-1,37E-5
ADP-fossil	MJ	1,29E1	5,6E-1	2,64E0	1,61E1	1,73E-1	MND	MND	MND	MND	MND	MND	MND	MND	4,45E-2	7,09E-2	2,79E-1	2,47E-1	-6,24E0

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.

Lucas Rodríguez, as an authorized verifier acting for EPD Hub Limited
Updated 04.07.2023