NORSTAL green steel structures EPD Hub

ENVIRONMENTAL PRODUCT DECLARATION

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

Norstal green - I, H, U, L, T profiles

Norstal Steel Structure S.R.L.

EPD HUB, HUB-0646

Publishing date 25 August 2023, last updated date 25 August 2023, valid until 25 August 2028

greengineers One Click LCA

GENERAL INFORMATION

MANUFACTURER

Manufacturer	Norstal Steel Structure S.R.L.
Address	236-238 Libertatii str., Apahida, Cluj County, Romania
Contact details	office.norstal@gmail.com
Website	www.norstal.ro

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
Scope of the EPD	Cradle to gate with options, A4-A5, and modules C1-C4, D
EPD author	eng. Tudor Iuga, greengineers (MINIMIT SRL)
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	Norstal green - I, H, U, L, T profiles
Place of production	Apahida, Cluj County, Romania
Period for data	2022
Averaging in EPD	No averaging
Variation in GWP-fossil for A1-A3	Not Relevant %

ENVIRONMENTAL DATA SUMMARY

Declared unit	1 kg of steel structures
Declared unit mass	1 kg
GWP-fossil, A1-A3 (kgCO2e)	9,26E-1
GWP-total, A1-A3 (kgCO2e)	9,06E-1
Secondary material, inputs (%)	127.0
Secondary material, outputs (%)	93.1
Total energy use, A1-A3 (kWh)	5.19
Total water use, A1-A3 (m3e)	1,43E-2

PRODUCT AND MANUFACTURER

ABOUT THE MANUFACTURER

We are a steel structure producer that runs high quality custom projects for clients. The main areas of activities include steel structures production, steel design and logistics. Norway, Finland and Sweden are the main export markets where we are delivering our products.

Norstal produces a broad range of steel structures for: residential and office buildings, shopping centres, industrial buildings, sport halls, hangars, fish farms and many others.

PRODUCT DESCRIPTION

Green steel structures for the construction of buildings executed from profiles I, H, U, L, T, etc. and plates, starting from 100% recycled hot-rolled steel raw products processed through cutting, welding (with various technologies) and painting-primering.

Further information can be found at www.norstal.ro.

PRODUCT RAW MATERIAL MAIN COMPOSITION

Raw material category	Amount, mass- %	Material origin
Metals	100	Europe

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	

FUNCTIONAL UNIT AND SERVICE LIFE

Declared unit	1 kg of steel structures
Mass per declared unit	1 kg
Reference service life	100

SUBSTANCES, REACH - VERY HIGH CONCERN

The product does not contain any REACH SVHC substances.

SUBSTANCES, VOC

The product does not contain any VOC substances.

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 raw materials go through a cutting process (band saw or plasma cutting) according to the project and then are blasted to wanted surface conditions using steel shots. The components are assembled and then, the final components are welded and cleaned. The welding process consumes welding wires and gases. All products are primed. The manufacturing process also requires natural gas, electricity, and water. All steel waste produced at the plant is directed to recycling. The loss of material is considered. During transportation, to protect the product from the factory gate to the construction site, wood spacers are used.

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 transportation distance is defined according to the PCR, and was calculated based on the weighted average distances for the 2022 deliveries, from production plant to the construction sites as 2016.67 km with lorries as transportation method. Vehicle capacity utilization volume factor is 100% which means full load (in reality, it may vary but as role of transportation emissions in total results is small, the variety in load is negligible). Transportation does not cause losses as products are protected properly. Installation does not cause losses as well, due to the tailor-made structures and thorough factory quality checks.

Density of the product is 7850 kg/m3, however bulk density varies depending on product type and thickness. Therefore, the average loss due to the openings both in the product itself and between the nested products is assumed as 10%; accordingly, bulk density is calculated as an approximate 7000 kg/m3.

Installation consumes 10 kWh of energy for assembling 1 tone of product. This means that 0.01 kWh is required to assemble 1 kilogram of steel beam. Further, steel bolts and fasteners are also included in the modelling.
Wood used in transport has been conservatively assumed to be incinerated for energy.

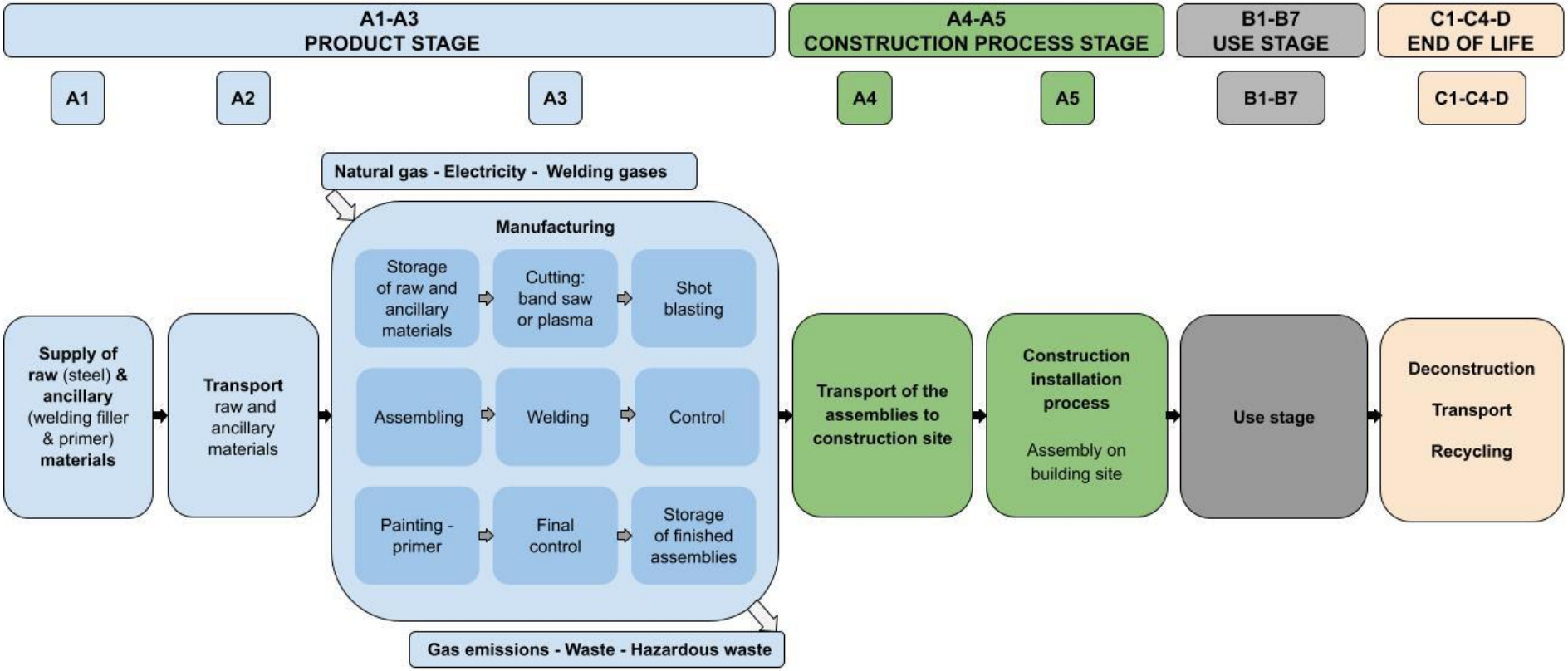
PRODUCT USE AND MAINTENANCE (B1-B7)

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). Module D also claim the benefit of avoided production of energy due to the incineration with energy recovery of wood spacer.

MANUFACTURING PROCESS AND SYSTEM BOUNDARY



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	Partly allocated by mass or volume
Packaging materials	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	Not Relevant %

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	7,99E-1	1,44E-3	1,05E-1	9,06E-1	1,89E-1	4,75E-2	MND	MND	MND	MND	MND	MND	MND	3,31E-3	4,69E-3	2,07E-2	2,64E-4	-1,11E-2
GWP – fossil	kg CO_2e	7,95E-1	1,44E-3	1,3E-1	9,26E-1	1,89E-1	2,26E-2	MND	MND	MND	MND	MND	MND	MND	3,31E-3	4,69E-3	2,08E-2	2,63E-4	-1,1E-2
GWP – biogenic	kg CO_2e	3,52E-3	5,37E-7	-2,49E-2	-2,14E-2	0E0	2,49E-2	MND	MND	MND	MND	MND	MND	MND	0E0	0E0	-9,22E-5	0E0	-2,55E-5
GWP – LULUC	kg CO_2e	1,14E-3	5,31E-7	1,05E-4	1,25E-3	6,78E-5	1,38E-5	MND	MND	MND	MND	MND	MND	MND	3,3E-7	1,73E-6	2,73E-5	2,49E-7	-5,35E-6
Ozone depletion pot.	kg $CFC_{-11}e$	8,24E-8	3,31E-10	6,7E-9	8,94E-8	4,5E-8	1,98E-9	MND	MND	MND	MND	MND	MND	MND	7,07E-10	1,08E-9	2,57E-9	1,07E-10	-5,84E-10
Acidification potential	mol H^+e	3,6E-3	6,09E-6	1,17E-3	4,78E-3	7,87E-4	1,19E-4	MND	MND	MND	MND	MND	MND	MND	3,44E-5	1,99E-5	2,64E-4	2,48E-6	-8,51E-5
EP-freshwater[2)]	kg Pe	1,29E-3	1,18E-8	1,97E-5	1,31E-3	1,29E-6	9,66E-7	MND	MND	MND	MND	MND	MND	MND	1,1E-8	3,84E-8	1,12E-6	2,76E-9	-6,63E-7
EP-marine	kg Ne	7,38E-4	1,81E-6	3,07E-4	1,05E-3	2,38E-4	3,39E-5	MND	MND	MND	MND	MND	MND	MND	1,52E-5	5,9E-6	5,58E-5	8,57E-7	-9,8E-6
EP-terrestrial	mol Ne	7,24E-3	2E-5	3,37E-3	1,06E-2	2,62E-3	3,64E-4	MND	MND	MND	MND	MND	MND	MND	1,67E-4	6,51E-5	6,45E-4	9,43E-6	-1,14E-4
POCP ("smog")[3)]	kg NMVOCe	2,23E-3	6,39E-6	8,53E-4	3,09E-3	8,45E-4	1,22E-4	MND	MND	MND	MND	MND	MND	MND	4,59E-5	2,08E-5	1,77E-4	2,74E-6	-3,17E-5
ADP-minerals & metals[4)]	kg Sbe	1,85E-6	3,37E-9	6,06E-7	2,46E-6	4,42E-7	2,25E-7	MND	MND	MND	MND	MND	MND	MND	1,68E-9	1,1E-8	2,8E-6	6,05E-10	-8,22E-9
ADP-fossil resources	MJ	1,37E1	2,16E-2	2,51E0	1,63E1	2,88E0	2,76E-1	MND	MND	MND	MND	MND	MND	MND	4,45E-2	7,05E-2	2,82E-1	7,22E-3	-1,32E-1
Water use[5)]	m^3e depr.	4,72E-1	9,67E-5	1,35E-1	6,08E-1	1,33E-2	8,72E-3	MND	MND	MND	MND	MND	MND	MND	1,2E-4	3,15E-4	5,47E-3	2,29E-5	-1,66E-3

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	1,75E0	2,44E-4	7,16E-1	2,47E0	3,74E-2	2,56E-2	MND	MND	MND	MND	MND	MND	MND	2,54E-4	7,94E-4	5E-2	6,27E-5	-2,3E-2
Renew. PER as material	MJ	2,34E-3	0E0	1,99E-1	2,01E-1	0E0	-1,99E-1	MND	MND	MND	MND	MND	MND	MND	0E0	0E0	0E0	0E0	0E0
Total use of renew. PER	MJ	1,75E0	2,44E-4	9,15E-1	2,67E0	3,74E-2	-1,74E-1	MND	MND	MND	MND	MND	MND	MND	2,54E-4	7,94E-4	5E-2	6,27E-5	-2,3E-2
Non-re. PER as energy	MJ	1,37E1	2,16E-2	2,51E0	1,62E1	2,88E0	2,75E-1	MND	MND	MND	MND	MND	MND	MND	4,45E-2	7,05E-2	2,82E-1	7,22E-3	-1,32E-1
Non-re. PER as material	MJ	1,74E-2	0E0	0E0	1,74E-2	0E0	0E0	MND	MND	MND	MND	MND	MND	MND	0E0	0E0	0E0	0E0	0E0
Total use of non-re. PER	MJ	1,37E1	2,16E-2	2,51E0	1,62E1	2,88E0	2,75E-1	MND	MND	MND	MND	MND	MND	MND	4,45E-2	7,05E-2	2,82E-1	7,22E-3	-1,32E-1

Secondary materials	kg	1,27E0	6E-6	4,62E-4	1,27E0	8,13E-4	1,48E-3	MND	MND	MND	MND	MND	MND	MND	1,74E-5	1,96E-5	3,14E-4	1,52E-6	-1,01E-5
Renew. secondary fuels	MJ	4,53E-7	6,06E-8	2,98E-6	3,5E-6	7,17E-6	5,94E-6	MND	MND	MND	MND	MND	MND	MND	5,7E-8	1,97E-7	1,63E-5	3,96E-8	-7,01E-8
Non-ren. secondary fuels	MJ	0E0	0E0	0E0	0E0	0E0	0E0	MND	MND	MND	MND	MND	MND	MND	0E0	0E0	0E0	0E0	0E0
Use of net fresh water	m^3	1,09E-2	2,8E-6	3,34E-3	1,43E-2	3,83E-4	1,4E-4	MND	MND	MND	MND	MND	MND	MND	2,7E-6	9,13E-6	1,65E-4	7,9E-6	-9,88E-5

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	5,14E-3	2,87E-5	4,15E-3	9,33E-3	3,09E-3	6,15E-3	MND	MND	MND	MND	MND	MND	MND	5,96E-5	9,34E-5	1,92E-3	0E0	-8,66E-4
Non-hazardous waste	kg	2,06E-1	4,71E-4	9,07E-1	1,11E0	5,38E-2	6,57E-2	MND	MND	MND	MND	MND	MND	MND	4,19E-4	1,54E-3	6,12E-2	5E-2	-4,4E-2
Radioactive waste	kg	6,91E-5	1,45E-7	2,27E-5	9,19E-5	1,99E-5	1,12E-6	MND	MND	MND	MND	MND	MND	MND	3,13E-7	4,71E-7	1,65E-6	0E0	-5,72E-7

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	0E0	0E0	0E0	0E0	0E0	0E0	MND	MND	MND	MND	MND	MND	MND	0E0	0E0	0E0	0E0	0E0
Materials for recycling	kg	3,07E-7	0E0	1,04E-1	1,04E-1	0E0	0E0	MND	MND	MND	MND	MND	MND	MND	0E0	0E0	9,5E-1	0E0	0E0
Materials for energy rec	kg	0E0	0E0	0E0	0E0	0E0	0E0	MND	MND	MND	MND	MND	MND	MND	0E0	0E0	0E0	0E0	0E0
Exported energy	MJ	0E0	0E0	0E0	0E0	0E0	1,45E-1	MND	MND	MND	MND	MND	MND	MND	0E0	0E0	0E0	0E0	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	7,43E-1	1,42E-3	1,29E-1	8,73E-1	1,87E-1	2,22E-2	MND	MND	MND	MND	MND	MND	MND	3,27E-3	4,64E-3	2,05E-2	2,58E-4	-1,08E-2
Ozone depletion Pot.	kg CFC_{-11}e	4,31E-8	2,62E-10	5,83E-9	4,92E-8	3,57E-8	1,73E-9	MND	MND	MND	MND	MND	MND	MND	5,6E-10	8,55E-10	2,08E-9	8,43E-11	-4,78E-10
Acidification	kg SO_2e	2,92E-3	4,73E-6	9,27E-4	3,85E-3	6,1E-4	9,27E-5	MND	MND	MND	MND	MND	MND	MND	2,45E-5	1,54E-5	2,13E-4	1,87E-6	-7,28E-5
Eutrophication	kg PO_4^3e	1,73E-3	1,08E-6	7,04E-4	2,44E-3	1,36E-4	4,78E-5	MND	MND	MND	MND	MND	MND	MND	5,69E-6	3,52E-6	7,05E-5	4,03E-7	-2,33E-5
POCP (“smog”)	kg C_2H_4e	1,88E-4	1,85E-7	2,74E-5	2,15E-4	2,4E-5	7,8E-6	MND	MND	MND	MND	MND	MND	MND	5,36E-7	6,03E-7	8,07E-6	7,84E-8	-3,11E-6
ADP-elements	kg Sbe	2,05E-6	3,27E-9	6,04E-7	2,66E-6	4,3E-7	2,22E-7	MND	MND	MND	MND	MND	MND	MND	1,65E-9	1,07E-8	2,8E-6	5,96E-10	-8,18E-9
ADP-fossil	MJ	1,09E1	2,16E-2	2,51E0	1,34E1	2,88E0	2,75E-1	MND	MND	MND	MND	MND	MND	MND	4,45E-2	7,05E-2	2,82E-1	7,22E-3	-1,32E-1

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
25.08.2023

VERIFIED ISO 14025