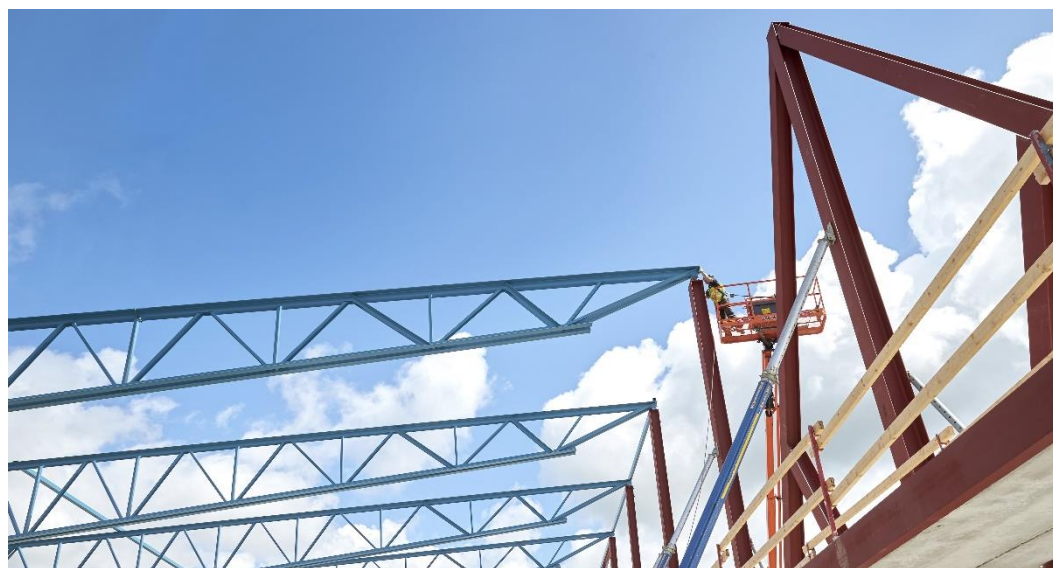


ENVIRONMENTAL PRODUCT DECLARATION

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

Structural steel components
Maku Stål AB



EPD HUB, EPD HUB-0924

Published on 20.12.2023, last updated on 20.12.2023, valid until 20.12.2028

GENERAL INFORMATION

MANUFACTURER

Manufacturer	Maku Stål AB
Address	Verkstadsgatan 15, SE-504 62 Borås, Sweden
Contact details	info@maku.se
Website	https://www.maku.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	Jörgen Svensson, Maku Stål AB
EPD verification	Independent verification of this EPD and data, according to ISO 14025: <input type="checkbox"/> Internal verification <input checked="" type="checkbox"/> External verification
EPD verifier	Elma Avdyli, as an authorized verifier for EPD Hub

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	Structural steel components
Additional labels	Painted structural steel components and Galvanized structural steel components
Product reference	SS-EN 1090-1:2009+A1:2011
Place of production	Borås, Sweden
Period for data	Calendar year 2022
Averaging in EPD	Multiple products
Variation in GWP-fossil for A1-A3	<15 %

ENVIRONMENTAL DATA SUMMARY

Declared unit	1 kg
Declared unit mass	1 kg
GWP-fossil, A1-A3 (kgCO ₂ e)	1,20E+00
GWP-total, A1-A3 (kgCO ₂ e)	1,21E+00
Secondary material, inputs (%)	85.9
Secondary material, outputs (%)	95.0
Total energy use, A1-A3 (kWh)	5.15
Total water use, A1-A3 (m ³ e)	8,33E-02

PRODUCT AND MANUFACTURER

ABOUT THE MANUFACTURER

Maku Stål AB is one of Sweden's leading manufacturers of steel truss beams. Maku has produced trusses for over 60 years and has an extensive knowledge and experience in this field. Maku also manufactures other structural steel components, such as columns, beams, and diagonals. Maku is certified according to EN 1090, which means that all trusses and structural steel components are CE marked. Maku has documented experience, a competent staff and modern equipment in their well-adapted premises in Borås, which means that truss beams and structural steel components can be manufactured with high quality and great accuracy. Maku Stål AB is part of the Weland Group.



PRODUCT DESCRIPTION

This EPD represents STRUCTURAL STEEL COMPONENTS produced at Maku Stål's facility in Borås, Sweden. STRUCTURAL STEEL COMPONENTS is for example beams, columns diagonals and roof trusses, which is integrated into buildings and used for load bearing purposes in the structure. This EPD represents both PAINTED structural steel components (99,2 % of annual production) and GALVANIZED structural steel components (0,8 % of annual production).

Further information can be found at <https://www.maku.se>.

PRODUCT RAW MATERIAL MAIN COMPOSITION

Raw material category	Amount, mass- %	Material origin
Metals	100	EU
Minerals	-	-
Fossil materials	-	-
Bio-based materials	-	-

BIOGENIC CARBON CONTENT

Product's biogenic carbon content at the factory gate

Biogenic carbon content in product, kg C	-
Biogenic carbon content in packaging, kg C	-

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	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	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 blasted to wanted surface conditions using cast iron steel shots and 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 products are painted or galvanized and then shipped.

The manufacturing process requires electricity and fuels for the different equipment as well as heating. In this case district heating is used. The steel waste produced at the plant is directed to recycling. The loss of material is considered.

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. Average distance of transportation from production plant to building site is estimated at 207 km and the transportation method is assumed to be lorry. Vehicle capacity utilization volume factor is assumed to be 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 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 loaded and unloaded properly.

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.

This EPD does not cover the installation phase.

PRODUCT USE AND MAINTENANCE (B1-B7)

This EPD does not cover the use phase.

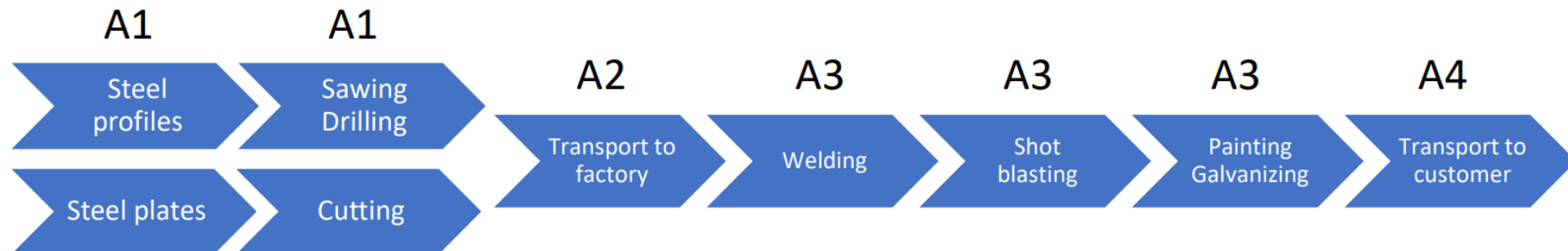
Air, soil, and water impacts during the use phase have not been studied.

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 (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	Not applicable
Ancillary materials	Allocated by mass or volume
Manufacturing energy and waste	Allocated by mass or volume

AVERAGES AND VARIABILITY

Type of average	Multiple products
Averaging method	Averaged by shares of total mass
Variation in GWP-fossil for A1-A3	<15 %

Primary data represents the manufacturing of products PAINTED Structural Steel Components and GALVANISED Structural Steel Components. 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 15 % of the relevant data (the highest compared to the lowest). The primary data was averaged by calculating a weighted average of the products consumption of raw materials, energy, and production of wastes. 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 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 ₂ e	1,05E+00	2,80E-02	1,37E-01	1,21E+00	1,80E-02	MND	MND	MND	MND	MND	MND	MND	MND	3,31E-03	4,35E-03	2,08E-02	2,64E-04	-1,46E-01
GWP – fossil	kg CO ₂ e	1,04E+00	2,79E-02	1,36E-01	1,20E+00	1,80E-02	MND	MND	MND	MND	MND	MND	MND	MND	3,31E-03	4,35E-03	2,08E-02	2,63E-04	-1,46E-01
GWP – biogenic	kg CO ₂ e	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	MND	MND	MND	MND	MND	MND	MND	MND	0,00E+00	0,00E+00	0,00E+00	0,00E+00	-2,74E-05
GWP – LULUC	kg CO ₂ e	9,90E-03	1,05E-05	2,45E-04	1,02E-02	6,75E-06	MND	MND	MND	MND	MND	MND	MND	MND	3,30E-07	1,63E-06	2,73E-05	2,49E-07	-2,33E-05
Ozone depletion pot.	kg CFC ₁₁ e	7,74E-08	6,97E-09	7,54E-09	9,19E-08	4,49E-09	MND	MND	MND	MND	MND	MND	MND	MND	7,07E-10	1,08E-09	2,57E-09	1,07E-10	-5,69E-09
Acidification potential	mol H ⁺ e	4,84E-03	8,90E-05	8,36E-04	5,76E-03	5,74E-05	MND	MND	MND	MND	MND	MND	MND	MND	3,44E-05	1,39E-05	2,64E-04	2,48E-06	-5,99E-04
EP-freshwater ²⁾	kg Pe	3,49E-05	2,00E-07	1,19E-05	4,70E-05	1,29E-07	MND	MND	MND	MND	MND	MND	MND	MND	1,10E-08	3,11E-08	1,12E-06	2,76E-09	-6,03E-06
EP-marine	kg Ne	9,66E-04	1,96E-05	1,25E-04	1,11E-03	1,27E-05	MND	MND	MND	MND	MND	MND	MND	MND	1,52E-05	3,06E-06	5,58E-05	8,57E-07	-1,23E-04
EP-terrestrial	mol Ne	1,14E-02	2,18E-04	1,80E-03	1,34E-02	1,40E-04	MND	MND	MND	MND	MND	MND	MND	MND	1,67E-04	3,39E-05	6,45E-04	9,43E-06	-1,43E-03
POCP (“smog”) ³⁾	kg NMVOCe	4,11E-03	8,58E-05	4,34E-04	4,63E-03	5,53E-05	MND	MND	MND	MND	MND	MND	MND	MND	4,59E-05	1,34E-05	1,77E-04	2,74E-06	-7,31E-04
ADP-minerals & metals ⁴⁾	kg Sbe	7,56E-06	6,84E-08	9,30E-07	8,55E-06	4,41E-08	MND	MND	MND	MND	MND	MND	MND	MND	1,68E-09	1,06E-08	2,80E-06	6,05E-10	-2,80E-06
ADP-fossil resources	MJ	1,37E+01	4,46E-01	2,44E+00	1,66E+01	2,88E-01	MND	MND	MND	MND	MND	MND	MND	MND	4,45E-02	6,95E-02	2,82E-01	7,22E-03	-1,27E+00
Water use ⁵⁾	m ³ e depr.	3,48E+00	2,06E-03	7,85E-02	3,56E+00	1,33E-03	MND	MND	MND	MND	MND	MND	MND	MND	1,20E-04	3,21E-04	5,47E-03	2,29E-05	-2,65E-02

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	1,37E+00	5,78E-03	4,42E-01	1,82E+00	3,72E-03	MND	MND	MND	MND	MND	MND	MND	MND	2,54E-04	9,00E-04	5,00E-02	6,27E-05	-1,07E-01
Renew. PER as material	MJ	6,34E-02	0,00E+00	0,00E+00	6,34E-02	0,00E+00	MND	MND	MND	MND	MND	MND	MND	MND	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
Total use of renew. PER	MJ	1,44E+00	5,78E-03	4,42E-01	1,89E+00	3,72E-03	MND	MND	MND	MND	MND	MND	MND	MND	2,54E-04	9,00E-04	5,00E-02	6,27E-05	-1,07E-01
Non-re. PER as energy	MJ	1,38E+01	4,46E-01	2,48E+00	1,67E+01	2,88E-01	MND	MND	MND	MND	MND	MND	MND	MND	4,45E-02	6,95E-02	2,82E-01	7,22E-03	-1,27E+00
Non-re. PER as material	MJ	1,36E-01	0,00E+00	6,57E-03	1,42E-01	0,00E+00	MND	MND	MND	MND	MND	MND	MND	MND	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
Total use of non-re. PER	MJ	1,39E+01	4,46E-01	2,48E+00	1,69E+01	2,88E-01	MND	MND	MND	MND	MND	MND	MND	MND	4,45E-02	6,95E-02	2,82E-01	7,22E-03	-1,27E+00
Secondary materials	kg	7,92E-01	1,26E-04	6,76E-02	8,59E-01	8,10E-05	MND	MND	MND	MND	MND	MND	MND	MND	1,74E-05	1,96E-05	3,14E-04	1,52E-06	8,47E-02
Renew. secondary fuels	MJ	1,07E-02	1,11E-06	2,64E-06	1,07E-02	7,15E-07	MND	MND	MND	MND	MND	MND	MND	MND	5,70E-08	1,73E-07	1,63E-05	3,96E-08	-1,35E-05
Non-ren. secondary fuels	MJ	1,27E-05	0,00E+00	0,00E+00	1,27E-05	0,00E+00	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	8,10E-02	5,92E-05	2,24E-03	8,33E-02	3,82E-05	MND	MND	MND	MND	MND	MND	MND	MND	2,70E-06	9,22E-06	1,65E-04	7,90E-06	-3,06E-04

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	4,01E-01	4,79E-04	1,26E-02	4,14E-01	3,08E-04	MND	MND	MND	MND	MND	MND	MND	MND	5,96E-05	7,45E-05	1,92E-03	0,00E+00	-4,89E-02
Non-hazardous waste	kg	1,85E+00	8,32E-03	5,35E-01	2,39E+00	5,36E-03	MND	MND	MND	MND	MND	MND	MND	MND	4,19E-04	1,30E-03	6,12E-02	5,00E-02	-2,39E-01
Radioactive waste	kg	9,17E-05	3,08E-06	1,66E-05	1,11E-04	1,98E-06	MND	MND	MND	MND	MND	MND	MND	MND	3,13E-07	4,79E-07	1,65E-06	0,00E+00	4,22E-07

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	1,54E-05	0,00E+00	0,00E+00	1,54E-05	0,00E+00	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	5,89E-03	0,00E+00	6,42E-02	7,01E-02	0,00E+00	MND	MND	MND	MND	MND	MND	MND	MND	0,00E+00	0,00E+00	9,50E-01	0,00E+00	0,00E+00
Materials for energy rec	kg	9,00E-03	0,00E+00	0,00E+00	9,00E-03	0,00E+00	MND	MND	MND	MND	MND	MND	MND	MND	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
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	0,00E+00	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 ₂ e	1,15E+00	2,77E-02	1,34E-01	1,31E+00	1,78E-02	MND	MND	MND	MND	MND	MND	MND	MND	3,27E-03	4,31E-03	2,05E-02	2,58E-04	-1,39E-01
Ozone depletion Pot.	kg CFC ₁₁ e	3,71E-08	5,52E-09	6,64E-09	4,93E-08	3,56E-09	MND	MND	MND	MND	MND	MND	MND	MND	5,60E-10	8,59E-10	2,08E-09	8,43E-11	-6,36E-09
Acidification	kg SO ₂ e	4,41E-03	7,22E-05	6,69E-04	5,15E-03	4,65E-05	MND	MND	MND	MND	MND	MND	MND	MND	2,45E-05	1,12E-05	2,13E-04	1,87E-06	-4,84E-04
Eutrophication	kg PO ₄ ³ e	7,01E-04	1,53E-05	4,44E-04	1,16E-03	9,86E-06	MND	MND	MND	MND	MND	MND	MND	MND	5,69E-06	2,38E-06	7,05E-05	4,03E-07	-2,49E-04
POCP ("smog")	kg C ₂ H ₄ e	4,07E-04	3,37E-06	3,67E-05	4,47E-04	2,17E-06	MND	MND	MND	MND	MND	MND	MND	MND	5,36E-07	5,24E-07	8,07E-06	7,84E-08	-8,36E-05
ADP-elements	kg Sbe	3,64E-06	6,65E-08	9,40E-07	4,64E-06	4,29E-08	MND	MND	MND	MND	MND	MND	MND	MND	1,65E-09	1,04E-08	2,80E-06	5,96E-10	-2,79E-06
ADP-fossil	MJ	1,41E+01	4,46E-01	2,48E+00	1,71E+01	2,88E-01	MND	MND	MND	MND	MND	MND	MND	MND	4,45E-02	6,95E-02	2,82E-01	7,22E-03	-1,27E+00

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 compliance 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.

Elma Avdyli as an authorized verifier for EPD Hub Limited
20.12.2023

