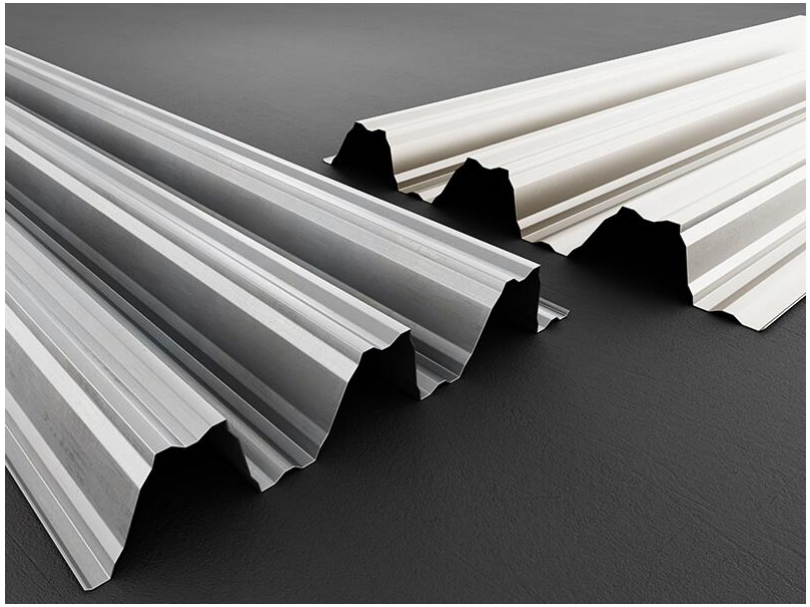
ENVIRONMENTAL PRODUCT DECLARATION

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

LL High profile sheet
Llentab Steel AB



EPD HUB, HUB-0056
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Created with One Click LCA

GENERAL INFORMATION

MANUFACTURER

Manufacturer	Llentab Steel AB
Address	Hallindenvägen 28-29, 45623 Kungshamn
Contact details	maria.syversen@llentab.se
Website	www.llentab.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 1.0, 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 and D
EPD author	Maria Syverssen, Llentab Steel AB
EPD verification	Independent verification of this EPD and data, according to ISO 14025: ☐ Internal certification ☑ External verification
EPD verifier	H.U & E.A as authorized verifiers 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	LL High profile sheet
Product reference	LL128 and LL134
Place of production	Kungshamn, Sweden
Period for data	2021
Averaging in EPD	No averaging

ENVIRONMENTAL DATA SUMMARY

Declared unit	1 kg
Declared unit mass	1 kg
GWP-fossil, A1-A3 (kgCO2e)	2,63
GWP-total, A1-A3 (kgCO2e)	2,65
Secondary material, inputs (%)	19,6
Secondary material, outputs (%)	95,5
Total energy use, A1-A3 (kWh)	9,59
Total water use, A1-A3 (m3e)	9,69E-4

PRODUCT AND MANUFACTURER

ABOUT THE MANUFACTURER

LLENTAB designs, manufactures, and sells multifunctional steel halls for a variety of industries and applications. Llentab Steel AB produces core steel, high profile sheet and roof and wall plate project-specific, at the production facility in Kungshamn (Sweden).

PRODUCT DESCRIPTION

High-profile roof plate LL128/LL134.
Roll-shaped corrugated galvanized steel sheet (Galfan®)
Also offered as a life perforation, for better acoustics.

Self-supporting roofing sheet for longer spans.
With different combinations of thickness, splicing and fastening, the product works for a wide variety of buildings with different uses.
Normally, the sheet supports the insulation and waterproofing of the roof: underlay, vapor barrier, insulation layer and outer sealing and protective membrane or corrugated steel sheet.
Galfan® – means hot dip galvanizing with low alloy zinc, 5% aluminium coating, which has been shown to have very good corrosion-protecting properties in a natural environment, which is why the roofing sheet in galvanized design, for example, may also be suitable as an uninsulated roof

Thicknesses between 0.7 and 1.5 mm
Covering width 930 mm (LL134) - 1000 mm (LL128)
Standard materials; Galvanized – S350GD+SSAB Galfan® ZA255 both sides
In life-perforated execution, punched pattern is R3T6 in part of every standing web.
Llentab AB and Llentab Steel AB have certificates for design and manufacturing control (FPC) for EN 1090-1, EXC 3 and our products are CE marked
EN1090-4:2018 - Technical requirements for cold-shaped sheet metal structures made of steel for roofs, floors and walls
EN 14782:2006 - Self-supporting sheet metal for roofing
EN10143:2006 - Continuously hot metallized sheet metal and strips of steel - Tolerances for dimensions and shape
EN 10346:2015 - Continuously hot metallized flat steel products for cold forming - Technical delivery regulations
EN 10169:2010+A1:2012 - Track coated steel sheet - Technical delivery regulations
For more information, please visit https://www.llentab.se/stalhallar/teknisk-information/. Further information can be found at www.llentab.com.

PRODUCT RAW MATERIAL MAIN COMPOSITION

Raw material category	Amount, mass- %	Material origin
Metals	100	Finland/Europe
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	0.00123

FUNCTIONAL UNIT AND SERVICE LIFE

Declared unit	1 kg
Mass per declared unit	1 kg

SUBSTANCES, REACH - VERY HIGH CONCERN

The product does not contain any REACH SVHC substances in amount greater than 0,1 %

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.

Galvanized steel sheet supplied as coils, forms and cuts to the desired length. Roll forming oil is used during the process to reduce wear on the machine line and to ensure stable manufacturing results. The finished bundles are then packaged for delivery. The manufacturing process requires electricity and fuels for the various equipment as well as heating (pellet boiler). Steel waste produced at the plant is sent for recycling. The loss of material is taken into account.

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.

Average distance of transportation from production plant to building site is assumed as 400 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 packaged properly.

Installation consumes 10 kWh of energy for assembling 1 tonne of product. This means that 0.01 kWh is required to assemble 1 kilogram of steel beam. Further, steel for bolts and fasteners is included in the modelling.

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 take 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 centre. Distance for transportation 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 rest 5 % of steel is taken to landfill for final disposal (C4). Due to the recycling process the end-of-life product is converted into a recycled steel (D).

MANUFACTURING PROCESS

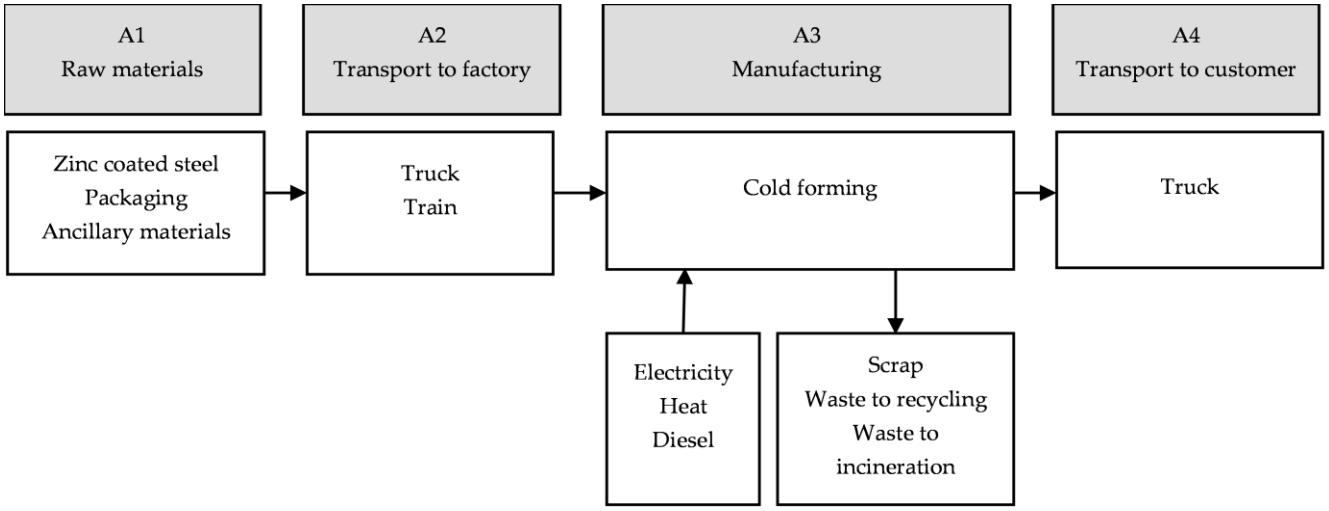

Figure 1. Overview of the studied product system for production of steel building.

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.

This LCA study includes the provision of all materials, transportation, energy and emission flows, and end of life processing of product. The use phase is not covered, assuming there are no use emissions or replacements. All industrial processes from raw material acquisition and pre-processing, production, product distribution and installation, and end-of-life management are included.

The production of capital equipment, construction activities, and infrastructure, maintenance and operation of capital equipment, personnel-related activities, energy and water use related to company management and sales activities are excluded.

The content of aluminium coating is less than 1 % of the product. Therefore it has been excluded from the LCA study.

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, as per the reference standard, allocation is conducted in the following order;

1. Allocation should be avoided.
2. Allocation should be based on physical properties (e.g., mass, volume) when the difference in revenue is small.
3. Allocation should be based on economic values.

In this study allocation could not be avoided for raw materials, packaging, ancillary material, energy consumption and waste production as the information was only measured on factory or production process level. The inputs were allocated to studied product based on annual production volume (mass).

The values for 1 kilogram of steel plate are calculated by considering the total product weight per annual production. In the factory, several kinds of steel products are produced; since the production processes of these products are similar, the annual production percentages are taken into consideration for allocation. According to the ratio of the annual production of the declared product to the total annual production at the factory, the annual total raw materials, energy consumption, packaging materials and the generated waste per the declared product are allocated. Subsequently, the product output fixed to 1 kg and the corresponding amount of product is used in the calculations.

This LCA study is conducted in accordance with all methodological considerations, such as performance, system boundaries, data quality, allocation procedures, and decision rules to evaluate inputs and outputs.

73 % of the softwood pine is assumed to be sent to the incineration facility, where 62 % of the material is converted into heat and 11 % into electricity. The remaining 27 % of the softwood pine is disposed to the landfill. (Eriksson, O & Finnveden, G. 2017)

Allocation used in environmental data sources is aligned with the above.

AVERAGES AND VARIABILITY

This EPD is product and factory specific and does not contain average calculations.

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	kg CO_2e	2,49E0	1,49E-1	1,61E-2	2,65E0	3,61E-2	2,8E-2	MND	MND	MND	MND	MND	MND	MND	3,3E-3	4,57E-3	2,57E-2	2,64E-4	-1,43E0
GWP – fossil	kg CO_2e	2,48E0	1,49E-1	7,94E-3	2,63E0	3,65E-2	2,28E-2	MND	MND	MND	MND	MND	MND	MND	3,3E-3	4,57E-3	2,72E-2	2,63E-4	-1,44E0
GWP – biogenic	kg CO_2e	1,02E-2	-3,65E-4	8,02E-3	1,79E-2	2,65E-5	5,21E-3	MND	MND	MND	MND	MND	MND	MND	9,17E-7	3,32E-6	-1,62E-3	5,22E-7	7,2E-3
GWP – LULUC	kg CO_2e	1,89E-3	6,24E-5	1,77E-4	2,13E-3	1,1E-5	1,35E-5	MND	MND	MND	MND	MND	MND	MND	2,79E-7	1,37E-6	3,2E-5	7,82E-8	-2,85E-4
Ozone depletion pot.	kg $CFC_{-11}e$	1,69E-7	3,29E-8	1,9E-9	2,04E-7	8,57E-9	2,09E-9	MND	MND	MND	MND	MND	MND	MND	7,12E-10	1,07E-9	3,32E-9	1,08E-10	-4,64E-8
Acidification potential	mol H^+e	4,6E-2	1,23E-3	4,85E-5	4,73E-2	1,53E-4	1,3E-4	MND	MND	MND	MND	MND	MND	MND	3,45E-5	1,92E-5	3,02E-4	2,5E-6	-7,08E-3
EP-freshwater[3)]	kg Pe	1,56E-4	1,22E-6	6,34E-7	1,58E-4	2,97E-7	1,24E-6	MND	MND	MND	MND	MND	MND	MND	1,33E-8	3,72E-8	1,58E-6	3,18E-9	-8,62E-5
EP-marine	kg Ne	3,58E-3	3,37E-4	1,27E-5	3,93E-3	4,61E-5	3,42E-5	MND	MND	MND	MND	MND	MND	MND	1,52E-5	5,78E-6	6,7E-5	8,61E-7	-1,37E-3
EP-terrestrial	mol Ne	1,77E-1	3,74E-3	1,51E-4	1,8E-1	5,1E-4	3,71E-4	MND	MND	MND	MND	MND	MND	MND	1,67E-4	6,38E-5	7,72E-4	9,48E-6	-1,56E-2
POCP (“smog”)	kg NMVOCe	1,2E-2	1,05E-3	5,23E-5	1,31E-2	1,64E-4	1,26E-4	MND	MND	MND	MND	MND	MND	MND	4,59E-5	2,05E-5	2,11E-4	2,75E-6	-7,43E-3
ADP-minerals & metals	kg Sbe	1,79E-4	3,89E-6	1,5E-7	1,83E-4	6,22E-7	4,57E-7	MND	MND	MND	MND	MND	MND	MND	5,03E-9	7,79E-8	1,34E-6	2,41E-9	-2,59E-5
ADP-fossil resources	MJ	2,82E1	2,26E0	3,96E-1	3,09E1	5,67E-1	2,79E-1	MND	MND	MND	MND	MND	MND	MND	4,54E-2	7,1E-2	3,35E-1	7,36E-3	-1,18E1
Water use[2)]	m^3e depr.	1,48E0	7,06E-3	5,44E-3	1,49E0	2,11E-3	7,89E-3	MND	MND	MND	MND	MND	MND	MND	8,46E-5	2,64E-4	5,29E-3	3,4E-4	-6,72E-1

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	MJ	1,94E0	3,72E-2	2,32E-1	2,21E0	7,14E-3	2,65E-2	MND	MND	MND	MND	MND	MND	MND	2,45E-4	8,94E-4	4,62E-2	5,95E-5	-1,18E0
Renew. PER as material	MJ	0E0	0E0	4,76E-2	4,76E-2	0E0	-4,76E-2	MND	MND	MND	MND	MND	MND	MND	0E0	0E0	0E0	0E0	0E0
Total use of renew. PER	MJ	1,94E0	3,72E-2	2,8E-1	2,26E0	7,14E-3	-2,11E-2	MND	MND	MND	MND	MND	MND	MND	2,45E-4	8,94E-4	4,62E-2	5,95E-5	-1,18E0
Non-re. PER as energy	MJ	2,97E1	2,26E0	3,8E-1	3,23E1	5,67E-1	2,79E-1	MND	MND	MND	MND	MND	MND	MND	4,54E-2	7,1E-2	3,35E-1	7,36E-3	-1,18E1
Non-re. PER as material	MJ	0E0	0E0	1,54E-2	1,54E-2	0E0	-1,54E-2	MND	MND	MND	MND	MND	MND	MND	0E0	0E0	0E0	0E0	-1,54E-2
Total use of non-re. PER	MJ	2,97E1	2,26E0	3,96E-1	3,23E1	5,67E-1	2,63E-1	MND	MND	MND	MND	MND	MND	MND	4,54E-2	7,1E-2	3,35E-1	7,36E-3	-1,18E1
Secondary materials	kg	2,64E-2	0E0	3,14E-5	2,65E-2	0E0	1,31E-3	MND	MND	MND	MND	MND	MND	MND	0E0	0E0	0E0	0E0	5,74E-1
Renew. secondary fuels	MJ	8,65E-23	0E0	0E0	8,65E-23	0E0	0E0	MND	MND	MND	MND	MND	MND	MND	0E0	0E0	0E0	0E0	0E0
Non-ren. secondary fuels	MJ	1,02E-21	0E0	0E0	1,02E-21	0E0	0E0	MND	MND	MND	MND	MND	MND	MND	0E0	0E0	0E0	0E0	0E0
Use of net fresh water	m^3	4,97E-4	3,7E-4	1,02E-4	9,69E-4	1,18E-4	2E-4	MND	MND	MND	MND	MND	MND	MND	4,01E-6	1,48E-5	1,41E-4	8,05E-6	-9,9E-3

6) 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	6,45E-2	2,56E-3	9,7E-4	6,81E-2	5,51E-4	5,51E-3	MND	MND	MND	MND	MND	MND	MND	4,88E-5	6,9E-5	0E0	6,87E-6	-5,56E-1
Non-hazardous waste	kg	7,72E-2	1,43E-1	1,73E-2	2,37E-1	6,1E-2	5,96E-2	MND	MND	MND	MND	MND	MND	MND	5,22E-4	7,64E-3	0E0	5E-2	-4,68E0
Radioactive waste	kg	5,63E-4	1,55E-5	4,63E-6	5,83E-4	3,89E-6	1,09E-6	MND	MND	MND	MND	MND	MND	MND	3,18E-7	4,88E-7	0E0	4,87E-8	-2,35E-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	0E0	0E0	0E0	0E0	0E0	0E0	MND	MND	MND	MND	MND	MND	MND	0E0	0E0	0E0	0E0	0E0
Materials for recycling	kg	0E0	0E0	1,6E-2	1,6E-2	0E0	9,65E-4	MND	MND	MND	MND	MND	MND	MND	0E0	0E0	9,55E-1	0E0	0E0
Materials for energy rec	kg	0E0	0E0	0E0	0E0	0E0	3,4E-3	MND	MND	MND	MND	MND	MND	MND	0E0	0E0	0E0	0E0	0E0
Exported energy	MJ	0E0	0E0	0E0	0E0	0E0	0E0	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	2,46E0	1,53E-1	7,97E-3	2,62E0	3,61E-2	2,23E-2	MND	MND	MND	MND	MND	MND	MND	3,27E-3	4,53E-3	2,67E-2	2,58E-4	-1,37E0
Ozone depletion Pot.	kg CFC_{-11}e	2,15E-13	2,71E-8	2,59E-9	2,97E-8	6,81E-9	1,82E-9	MND	MND	MND	MND	MND	MND	MND	5,63E-10	8,53E-10	2,73E-9	8,59E-11	-4,05E-8
Acidification	kg SO_2e	5,72E-3	8,54E-4	3,57E-5	6,61E-3	7,42E-5	8,14E-5	MND	MND	MND	MND	MND	MND	MND	4,87E-6	9,29E-6	1,91E-4	1,04E-6	-5,83E-3
Eutrophication	kg PO_4^3e	6,15E-4	1,27E-4	1,68E-5	7,59E-4	1,5E-5	5,14E-5	MND	MND	MND	MND	MND	MND	MND	8,57E-7	1,88E-6	7,36E-5	2,02E-7	-3,97E-3
POCP (“smog”)	kg C_2H_4e	5,29E-4	3,28E-5	2,14E-6	5,64E-4	4,7E-6	9,67E-6	MND	MND	MND	MND	MND	MND	MND	5,01E-7	5,89E-7	8,86E-6	7,64E-8	-9,43E-4
ADP-elements	kg Sbe	1,79E-4	3,89E-6	1,5E-7	1,83E-4	6,22E-7	4,57E-7	MND	MND	MND	MND	MND	MND	MND	5,03E-9	7,79E-8	1,34E-6	2,41E-9	-2,59E-5
ADP-fossil	MJ	2,82E1	2,26E0	3,96E-1	3,09E1	5,67E-1	2,79E-1	MND	MND	MND	MND	MND	MND	MND	4,54E-2	7,1E-2	3,35E-1	7,36E-3	-1,18E1

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.

Hetal Udas & Elma Avdyli as authorized verifiers acting for EPD Hub Limited
07.06.2022

VERIFIED ISO 14025