

ENVIRONMENTAL PRODUCT DECLARATION

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

LS3000 Timber-module

Lindner Scandinavia AB



EPD HUB, EPDHUB-0321

Publishing date 4 March 2023, last updated date 4 March 2023, valid until 4 March 2028

GENERAL INFORMATION

MANUFACTURER

Manufacturer	Lindner Scandinavia AB
Address	Redegatan 1A, Göteborg, Sweden
Contact details	scandinavia@lindner-group.com
Website	https://www.lindner-group.com/en/company/lindner-group/corporate-structure/lindner-scandinavia-ab/

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	Amar Talic, Lindner Scandinavia AB
EPD verification	Independent verification of this EPD and data, according to ISO 14025: <input type="checkbox"/> Internal certification <input checked="" type="checkbox"/> External verification
EPD verifier	N.C, 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	LS3000 Timber-module
Additional labels	Timber-based pre-fabricated façade module.
Product reference	Average covers Top module, Top Corner module, Mid module, Mid Corner module, Bottom module and Bottom Corner module.
Place of production	Munkedal, Västra Götalands län, Sweden
Period for data	2021
Averaging in EPD	Multiple products
Variation in GWP-fossil for A1-A3	-24 to +14 %

ENVIRONMENTAL DATA SUMMARY

Declared unit	1 unit
Declared unit mass	612.8 kg
GWP-fossil, A1-A3 (kgCO ₂ e)	1,06E3
GWP-total, A1-A3 (kgCO ₂ e)	6,77E2
Secondary material, inputs (%)	9.92
Secondary material, outputs (%)	85.5
Total energy use, A1-A3 (kWh)	6500.0
Total water use, A1-A3 (m ³ e)	11.2

PRODUCT AND MANUFACTURER

ABOUT THE MANUFACTURER

Lindner Scandinavia AB designs and installs complex interior and exterior building constructions in Sweden, Norway and Denmark. Concepts and products on exterior constructions are envelopes with structure of wood, glass, metal or composite that provide the optimal solution for the project. Together with the structure we integrate glass, ETFE-membrane and cladding that provide a technical and sustainable solution, without compromising the functionality or design.

PRODUCT DESCRIPTION

The wooden module consists of a glulam-based structural frame with an insulating glass and a closed field with stone wool insulation. The glass proportion is usually 30-60% of the modular area and in this calculation the glass proportion is 44% of the modular area for the weighted type module. The module can be designed in many ways to meet the individual customer's wishes and requirements, including size, glass design and above all the exterior cladding. Depending on the mentioned design variables and options, the U-value of the modular façade can vary between 0.4-0.7 W/m²K. The module is completely prefabricated, delivered when assembly is to take place, where it is hung on the building frame with specially designed steel fittings.

All reference modules (top, mid and bottom) are 2.4m wide and 0.3m thick, except the corner modules which are 1.0m wide on each side of the corner they cover. The top modules (standard and corner) are 5.0m high, the mid modules (standard and corner) are 3.8m high and the bottom modules (standard and corner) are 4.5m high. The average product has an area of 9.8 m².

Further information can be found at <https://www.lindner-group.com/en/company/lindner-group/corporate-structure/lindner-scandinavia-ab/>.

PRODUCT RAW MATERIAL MAIN COMPOSITION

Raw material category	Amount, mass- %	Material origin
Metals	15	Sweden
Minerals	53	Europe
Fossil materials	13	Europe
Bio-based materials	19	Sweden

BIOGENIC CARBON CONTENT

Product's biogenic carbon content at the factory gate

Biogenic carbon content in product, kg C	104.7
Biogenic carbon content in packaging, kg C	0

FUNCTIONAL UNIT AND SERVICE LIFE

Declared unit	1 unit
Mass per declared unit	612.8 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 does not consider the material losses occurring during the manufacturing processes.

All raw materials, such as timber, glass, aluminium and insulation are produced by different suppliers, Lindner Scandinavia AB does not produce any raw material by themselves but only assemble the different components into one complete product. The materials arrive to the manufacturing site with exact dimensions/quantities and there are therefore no, or not measurable, production losses.

All the materials, except the insulating glass units and sealants, are manufactured/produced in Sweden. The insulating glass units are

produced in Estonia and the sealants by a manufacturer in Germany. The environmental impacts covers transportation of raw materials to the manufacturing site in Munkedal, Sweden. All raw material are transported to the manufacturing site by lorry and the insulating glass units are also transported by ferry between Estonia and Sweden.

The modules are produced and assembled in a heated warehouse in Munkedal, Sweden, where they also are stored in a dry and unheated storage unit until transported to construction site. The production is manual, where simpler tools are used, such as screwdrivers and electric travelling overhead crane. Transports on the production site are mainly done by diesel forklift and electric travelling overhead crane.

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.

A module is placed lying down in a steel stand (transportation frame), which is then stacked and wrapped in plastic to weatherproof the transport. A stack consists of four stands and four modules.

Transport to the construction site is carried out by truck and trailer where 12-16 modules can be loaded and transported. The truck delivering modules also returns empty racks back to the production site which is also factored into the design.

The installation of modules takes place with the help of a crane truck and telehandler. The crane truck lifts the module up at the top while the telehandler supports at the bottom to straighten the module from its horizontal position in the rack.

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)

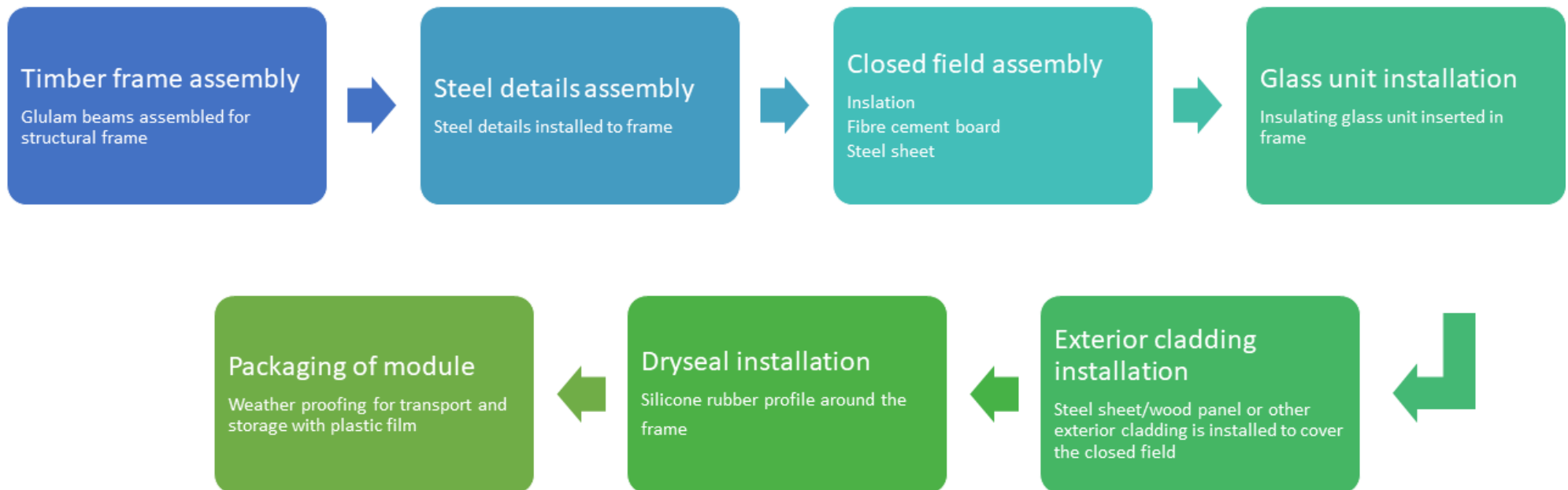
The modules can be taken down in the same way as they are installed on the building, once on the ground the materials can be separated without major procedures but require some processing. Since the modules in their entirety cannot be handled by recycling centres, demolition on site is a must in order to be able to transport the waste.

Glass, aluminium, insulation and steel are materials that are assumed to be recycled to varying degrees, while the fibre cement boards are assumed to be sent to landfill. The remaining materials, plastic and sealing materials are directly sent to municipal incineration and all of the wood is converted to secondary fuel.

According to the Swedish waste treatment operator Renova, glass and mineral wool are, if clean, 100% recycled. The mineral wool is collected by Renova in this case and sent to mineral wool producers for re-use in different ways. The same applies for flat glass panes, although, only clean glass which they sort out is forwarded. Due to the sealants/glue and spacers in the insulating glass units, 5% have been assumed to be landfilled with accordance to the insulation glass unit manufacturer. 92% of the steel products and 95% of the aluminium is assumed to be recycled according to the Geological Survey of Sweden (SGU).

All of the wood waste collected is chipped and sent to various Combined Heat and Power (CHP) plants according to the Swedish waste treatment operator Renova. Remaining materials are either 100% landfilled or 100% incinerated as mixed waste.

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	No allocation
Manufacturing energy and waste	No allocation

AVERAGES AND VARIABILITY

Type of average	Multiple products
Averaging method	Averaged by shares of total volume
Variation in GWP-fossil for A1-A3	-24 to +14 %

The raw material amounts are averaged based on six types of occurring modules in a standard facade. The six types averaged are;

- Standard-mid-area module (63%)
- Top module (16%)
- Bottom module (16%)
- Standard corner module (4%)
- Top corner module (1%)
- Bottom corner module (1%)

The percentage following each module type represents the production share of each type for a typical facade. The manufacturing, transport and packaging is identical for each module type, so the only difference is the size and therefore the raw material quantities.

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 ₂ e	5,74E2	4,1E1	6,17E1	6,77E2	7,02E1	1,44E2	MND	MND	MND	MND	MND	MND	MND	1,01E2	5,01E0	4,12E2	1,79E0	-7,98E2
GWP – fossil	kg CO ₂ e	9,52E2	4,1E1	6,27E1	1,06E3	7,08E1	1,44E2	MND	MND	MND	MND	MND	MND	MND	1,01E2	5E0	2,84E1	8,82E-1	-5,78E2
GWP – biogenic	kg CO ₂ e	-3,83E2	1,66E-2	-1,01E0	-3,84E2	3,81E-2	2,89E-2	MND	MND	MND	MND	MND	MND	MND	2,81E-2	2,69E-3	3,83E2	9,07E-1	-2,16E2
GWP – LULUC	kg CO ₂ e	5,07E0	1,66E-2	3,69E-2	5,13E0	2,56E-2	8,67E-3	MND	MND	MND	MND	MND	MND	MND	8,54E-3	1,81E-3	8,78E-3	4,45E-4	-3,97E0
Ozone depletion pot.	kg CFC-11e	9,81E-5	9,13E-6	1,8E-6	1,09E-4	1,61E-5	2,19E-5	MND	MND	MND	MND	MND	MND	MND	2,18E-5	1,14E-6	1,04E-6	2,67E-7	-5,47E-5
Acidification potential	mol H ⁺ e	1,02E1	3,32E-1	2,2E-1	1,08E1	2,03E-1	1,06E0	MND	MND	MND	MND	MND	MND	MND	1,06E0	1,44E-2	6,42E-2	7,46E-3	-5,07E0
EP-freshwater ²⁾	kg Pe	9,15E-2	3,18E-4	1,62E-3	9,35E-2	6,02E-4	4,14E-4	MND	MND	MND	MND	MND	MND	MND	4,09E-4	4,26E-5	4,63E-4	1,61E-5	-2,69E-2
EP-marine	kg Ne	3,68E0	7,79E-2	4,36E-2	3,8E0	4,04E-2	4,7E-1	MND	MND	MND	MND	MND	MND	MND	4,67E-1	2,85E-3	1,32E-2	2,5E-3	-7,03E-1
EP-terrestrial	mol Ne	2,81E1	8,66E-1	4,79E-1	2,95E1	4,5E-1	5,15E0	MND	MND	MND	MND	MND	MND	MND	5,12E0	3,18E-2	1,52E-1	2,75E-2	-9,32E0
POCP (“smog”) ³⁾	kg NMVOCe	3,74E0	2,5E-1	2,01E-1	4,19E0	1,73E-1	1,42E0	MND	MND	MND	MND	MND	MND	MND	1,41E0	1,22E-2	4,17E-2	7,96E-3	-2,64E0
ADP-minerals & metals ⁴⁾	kg Sbe	5,91E-1	9,82E-4	4,56E-4	5,93E-1	1,95E-3	1,64E-4	MND	MND	MND	MND	MND	MND	MND	1,54E-4	1,38E-4	2,27E-4	9,29E-6	-1,11E-2
ADP-fossil resources	MJ	1,67E4	6,03E2	2,29E3	1,96E4	1,07E3	1,4E3	MND	MND	MND	MND	MND	MND	MND	1,39E3	7,57E1	1,16E2	2,04E1	-7,03E3
Water use ⁵⁾	m ³ e depr.	2,93E2	1,85E0	1,45E2	4,4E2	3,5E0	2,68E0	MND	MND	MND	MND	MND	MND	MND	2,6E0	2,48E-1	2E0	9,04E-1	-1,3E2

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 ⁶⁾	MJ	4,65E3	7,9E0	7,4E1	4,73E3	1,53E1	7,63E0	MND	MND	MND	MND	MND	MND	MND	7,53E0	1,08E0	1,41E1	3,58E-1	-3,15E3
Renew. PER as material	MJ	3,07E3	0E0	0E0	3,07E3	0E0	0E0	MND	MND	MND	MND	MND	MND	MND	0E0	0E0	-3,06E3	-5,1E0	3,05E3
Total use of renew. PER	MJ	7,72E3	7,9E0	7,4E1	7,8E3	1,53E1	7,63E0	MND	MND	MND	MND	MND	MND	MND	7,53E0	1,08E0	-3,05E3	-4,74E0	-1,08E2
Non-re. PER as energy	MJ	1,64E4	6,03E2	1,61E3	1,87E4	1,07E3	1,4E3	MND	MND	MND	MND	MND	MND	MND	1,39E3	7,57E1	1,16E2	2,04E1	-7,03E3
Non-re. PER as material	MJ	6,26E2	0E0	5,78E2	1,2E3	0E0	-6,74E2	MND	MND	MND	MND	MND	MND	MND	0E0	0E0	-5,23E2	-7,4E0	4,16E2
Total use of non-re. PER	MJ	1,71E4	6,03E2	2,19E3	1,99E4	1,07E3	7,23E2	MND	MND	MND	MND	MND	MND	MND	1,39E3	7,57E1	-4,07E2	1,3E1	-6,61E3
Secondary materials	kg	6,06E1	0E0	2,2E-1	6,08E1	0E0	0E0	MND	MND	MND	MND	MND	MND	MND	0E0	0E0	0E0	0E0	2,23E2
Renew. secondary fuels	MJ	3,41E-19	0E0	0E0	3,41E-19	0E0	0E0	MND	MND	MND	MND	MND	MND	MND	0E0	0E0	0E0	0E0	0E0
Non-ren. secondary fuels	MJ	9,77E-4	0E0	0E0	9,77E-4	0E0	0E0	MND	MND	MND	MND	MND	MND	MND	0E0	0E0	0E0	0E0	0E0
Use of net fresh water	m ³	9,7E0	9,67E-2	1,44E0	11.2	1,85E-1	1,33E-1	MND	MND	MND	MND	MND	MND	MND	1,23E-1	1,31E-2	7,68E-2	2,28E-2	-3,81E0

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	9,96E1	6,26E-1	2,44E0	1,03E2	1,1E0	1,79E0	MND	MND	MND	MND	MND	MND	MND	1,5E0	7,79E-2	0E0	4,94E-2	-8,15E1
Non-hazardous waste	kg	1,73E3	3,75E1	6,96E1	1,84E3	7,59E1	2,99E1	MND	MND	MND	MND	MND	MND	MND	1,6E1	5,36E0	0E0	8,32E1	-8,84E2
Radioactive waste	kg	1,49E-1	4,15E-3	2,15E-2	1,74E-1	7,33E-3	9,76E-3	MND	MND	MND	MND	MND	MND	MND	9,74E-3	5,18E-4	0E0	1,22E-4	-2,68E-2

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	5,76E1	0E0	0E0	5,76E1	0E0	0E0	MND	MND	MND	MND	MND	MND	MND	0E0	0E0	4,09E2	0E0	0E0
Materials for energy rec	kg	1,44E-11	0E0	0E0	1,44E-11	0E0	0E0	MND	MND	MND	MND	MND	MND	MND	0E0	0E0	1,15E2	0E0	0E0
Exported energy	MJ	2,48E-1	0E0	6,98E1	7E1	0E0	4,92E2	MND	MND	MND	MND	MND	MND	MND	0E0	0E0	5,99E1	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 ₂ e	1,16E3	4,07E1	5,99E1	1,26E3	7,02E1	1,43E2	MND	MND	MND	MND	MND	MND	MND	1E2	4,96E0	2,82E1	8,65E-1	-5,67E2
Ozone depletion Pot.	kg CFC ₁₁ e	9,65E-5	7,27E-6	1,71E-6	1,05E-4	1,28E-5	1,73E-5	MND	MND	MND	MND	MND	MND	MND	1,73E-5	9,06E-7	9,17E-7	2,13E-7	-4,89E-5
Acidification	kg SO ₂ e	7,08E0	2,56E-1	1,81E-1	7,51E0	1,43E-1	1,53E-1	MND	MND	MND	MND	MND	MND	MND	1,49E-1	1,01E-2	7,25E-2	5,5E-2	-2,9E0
Eutrophication	kg PO ₄ ³ e	1,88E0	3,52E-2	6,14E-2	1,98E0	2,95E-2	2,97E-2	MND	MND	MND	MND	MND	MND	MND	2,63E-2	2,09E-3	2,09E-2	1,2E-3	-9,19E-1
POCP ("smog")	kg C ₂ H ₄ e	3,87E-1	8,9E-3	2,24E-2	4,19E-1	8,55E-3	1,54E-2	MND	MND	MND	MND	MND	MND	MND	1,54E-2	6,04E-4	2,04E-3	2,32E-4	-2,21E-1
ADP-elements	kg Sbe	5,91E-1	9,82E-4	4,56E-4	5,93E-1	1,95E-3	1,64E-4	MND	MND	MND	MND	MND	MND	MND	1,54E-4	1,38E-4	2,27E-4	9,29E-6	-1,11E-2
ADP-fossil	MJ	1,67E4	6,03E2	2,29E3	1,96E4	1,07E3	1,4E3	MND	MND	MND	MND	MND	MND	MND	1,39E3	7,57E1	1,16E2	2,04E1	-7,03E3

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.

Neena Chandramathy, as an authorized verifier acting for EPD Hub Limited
06.03.2023

