

ENVIRONMENTAL PRODUCT DECLARATION

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

nSPB and SPB wall sandwich panels with 170 mm WEE core
Ruukki Construction



EPD HUB, HUB-0687

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GENERAL INFORMATION

MANUFACTURER

Manufacturer	Ruukki Construction
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Contact details	Mira Laukkanen, mira.laukkanen@ruukki.com
Website	https://www.ruukki.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	Sister EPD
Scope of the EPD	Cradle to gate with options, A4-B7, and modules C1-C4, D
EPD author	Mira Laukkanen, Ruukki Construction
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	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	nSPB and SPB wall sandwich panels with 170 mm WEE core
Additional labels	Energy and Patina variants
Product reference	-
Place of production	Oborniki, Poland
Period for data	2021
Averaging in EPD	No averaging
Variation in GWP-fossil for A1-A3	- %

Results are valid for all steel thicknesses ranging from 0,5 mm / 0,5 mm to 0,7 mm / 0,7 mm.

ENVIRONMENTAL DATA SUMMARY

Functional unit	1 m ²
Functional unit mass	21 kg
GWP-fossil, A1-A3 (kgCO ₂ e)	3,31E1
GWP-total, A1-A3 (kgCO ₂ e)	3,13E1
Secondary material, inputs (%)	1.4
Secondary material, outputs (%)	21.7
Total energy use, A1-A3 (kWh)	159.0
Total water use, A1-A3 (m ³ e)	5,55E0

PRODUCT AND MANUFACTURER

ABOUT THE MANUFACTURER

Ruukki makes steel-based products for walls and roofs, for both commercial buildings and private homes. Our strong presence in 10 European countries enables us to serve customers locally. We are of Nordic origin, part of SSAB, sharing values, and long experience in steel and construction industry. More information about the manufacturer can be found at <https://www.ruukki.com/>.

PRODUCT DESCRIPTION

nSPB and SPB sandwich panels with WEE core consist of mineral wool insulating core bonded between two colour-coated steel sheets. These sandwich panels are used for structural purposes for external or internal walls. Sandwich panels with this core type are available in thicknesses ranging from 150 to 230 mm. This EPD applies to a nSPB or SPB panel with 170 mm thick WEE mineral wool core.

Our selection of sandwich panels also includes Energy panels with extremely low air leakage rates. The term Energy refers to airtight energy efficient panel structures that is guaranteed by joint tightness and special tolerances in production. We also offer Patina sandwich panels that have an external facing made of natural and untreated Cor-Ten® steel.

Further information can be found at <https://www.ruukki.com/>.

PRODUCT RAW MATERIAL MAIN COMPOSITION

Raw material category	Amount, mass- %	Material origin
Metals	41,1	EU
Minerals	56,6	EU
Fossil materials	2,4	EU
Bio-based materials	0	-

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	0.616

FUNCTIONAL UNIT AND SERVICE LIFE

Mass per functional unit	21 kg
Functional unit	1 m2 thermal insulation panels with R-value of 4,55 m2K/W
Reference service life	60 years

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	x	MND	MND	MND	MNR	MNR		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.

Panel facings are mainly made of colour-coated, hot-dip galvanised steel sheeting. Steel is an alloy of mainly iron and carbon, with small amounts of alloying elements. These elements improve the chemical and physical properties of steel such as strength, durability and corrosion resistance. The alloying elements of steel are closely linked to its chemical matrix. The steel density is 7 850 kg/m³. The zinc coating quantity is 275 g/m², but lower zinc quantities or other metal coatings may also be used, depending on end use application. The steel sheets used in the panels are typically coated with Hiarc (PVDF) or polyester on the external facing side and with

polyester on the internal facing of the panel, however it is allowed to use other types of organic coatings as the protection of the steel facings. Additionally, external facing may be based on Cor-Ten® (weathering steel).

Sandwich panel core is made of stone wool. Density for WEE core is 70 kg/m³. Due to their non-combustible core material; sandwich panels with a mineral wool core provide excellent fire safety. A polyurethane adhesive is used to bond the mineral wool core to the steel facings.

Sandwich panels that conform to this environmental product declaration are manufactured at Ruukki's plant in Oborniki, Poland. Raw materials are transported to the production site by truck and ship. After manufacturing, the products are wrapped to protect them during handling and transport. A typical package consists of a wooden pallet, plastic straps, a plastic stretch wrap, corner pads made of cardboard or steel, plank wood and cardboard. Panel facings are protected with plastic wrap (PE) to protect the steel facings from mechanical damage during loading, unloading, storage and installation.

Mineral wool dust is produced during the manufacturing of the panels. This product loss and its treatment are taken into account. The wool dust is returned back to the wool supplier who uses it again in wool manufacturing.

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.

Finished products are transported by truck and ship. Ruukki's logistics unit is responsible for most of the transportation of raw materials and products. Logistics aims to optimise transport, maximise payloads and

combine transport as efficiently as possible. Environmental impacts for transport of finished product to the building site (A4), have been calculated based on the weighted average of the market shares.

Installation of the product to the building (A5) includes an average of used electricity and diesel that machines consume during installation. It is assumed that installation of 1 m² of sandwich panel consumes 0,37 kWh electricity and 15,6 MJ diesel. There is also estimated to be 2 % material loss during installation. The steel loss is assumed to be recycled by 95 % and the rest 5 % of steel loss is assumed to go to landfill. The rates for steel are based on World Steel Association, 2020. Mineral wool loss is assumed to be landfilled. Based on Plastics Europe 2022, 47 % of packaging plastics is assumed to be recycled, 32 % is incinerated and 21 % is landfilled. Packaging cardboard is assumed to be recycled. Packaging pallets are assumed to be incinerated with 73 % efficiency.

PRODUCT USE AND MAINTENANCE (B1-B7)

Maintenance B2 is included in the EPD. The maintenance includes washing and painting the external wall. The wall is estimated to be washed four times and painted once with a double layer during the reference service life. Exception are external surfaces of Patina panels that do not require maintenance actions. It is assumed that lifter consumes 0,5 kWh electricity per 1 m² of panel during the reference service life. The reference service life presents an estimated life in normal outdoor and indoor conditions with maximum corrosivity category C3.

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

PRODUCT END OF LIFE (C1-C4, D)

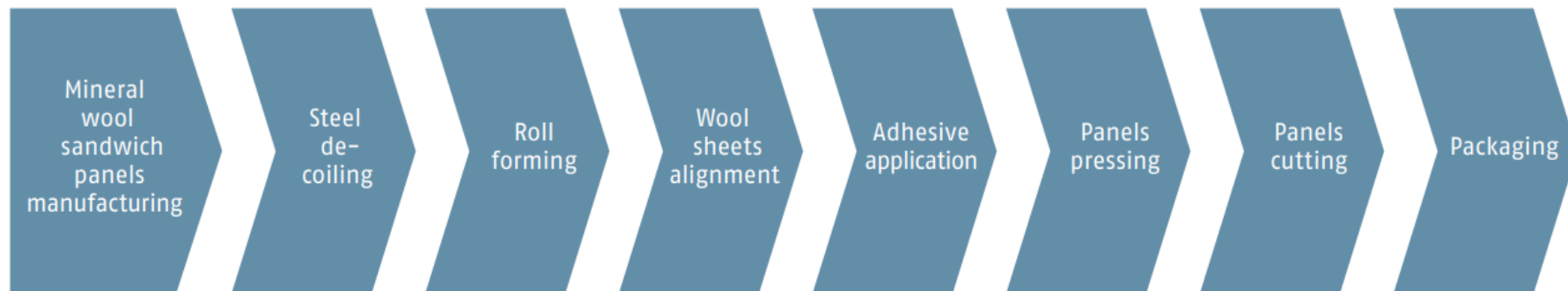
The deconstruction of the sandwich panels was calculated based on data provided directly by EkoExpert, the supplier that provides Ruukki the service of disposal of their waste panels. According to the information

collected from EkoExpert, the main input for dismantling the panels into different waste streams is the electricity to power the tools required. According to their estimations, approximately 0,89 MJ of electricity are needed per square meter of panel dismantled. After dismantling, the waste is transported to waste processing. The new paint layer added during use phase B2 is taken into account when calculating the amount of waste to end-of-life. Transport to waste processing is assumed to be 50 km by truck.

Waste materials from demolition is sorted and steel scrap is cycled back to the steel industry by the scrap trade. Scrap steel has a strong market position: an average of 95 % of the steel removed from buildings at the end of their life cycle is used in the production of new steel. Ruukki's mineral wool sandwich panels can be recycled and it is recommended that panels are sent to a reclamation facility where steel can be separated from the insulation core. Undamaged sandwich panels can be reused in less demanding applications. Damaged sandwich elements can be dismantled – steel is an important and fully recyclable raw material in new construction – and the clean mineral wool can be granulated and used in the manufacture of mineral blowing wool and, subject to certain restrictions, in the production of insulation wool, for example. Mineral wool is non-combustible and unsuitable for composting, but otherwise its disposal is not restricted.

In this EPD, the end of life calculation is made with 95 % recycling rate for steel. 5 % of steel is assumed to go to landfill. The rates for steel are based on World Steel Association, 2020. All mineral wool is assumed to be landfilled. The benefits and loads of recycling and incineration of the product and packaging (in modules A5 and C) are included in module 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	No allocation
Packaging materials	Allocated by mass or volume
Ancillary materials	Not applicable
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	- %

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 ¹⁾	kg CO ₂ e	2,92E1	1,97E0	8,83E-2	3,13E1	1,2E0	5,04E0	MND	1,6E0	MND	MND	MND	MND	MND	1,1E-1	9,66E-2	1,87E-1	6,74E-2	-1,48E1
GWP – fossil	kg CO ₂ e	2,93E1	1,97E0	1,89E0	3,31E1	1,2E0	2,75E0	MND	1,5E0	MND	MND	MND	MND	MND	1,06E-1	9,65E-2	1,98E-1	6,73E-2	-1,62E1
GWP – biogenic	kg CO ₂ e	-8,31E-2	1,04E-3	-1,81E0	-1,89E0	8,47E-4	2,28E0	MND	-1,23E-1	MND	MND	MND	MND	MND	3,19E-3	7,01E-5	-1,14E-2	1,33E-4	1,45E0
GWP – LULUC	kg CO ₂ e	1,04E-2	7,12E-4	1,89E-3	1,3E-2	3,69E-4	6,07E-4	MND	2,23E-1	MND	MND	MND	MND	MND	2,47E-4	2,9E-5	2,25E-4	2E-5	-1,02E-2
Ozone depletion pot.	kg CFC ₁₁ e	2,43E-6	4,47E-7	1,48E-7	3,03E-6	2,81E-7	3,92E-7	MND	1,32E-7	MND	MND	MND	MND	MND	8,94E-9	2,27E-8	2,85E-8	2,77E-8	-6,15E-7
Acidification potential	mol H ⁺ e	9,02E-2	8,98E-3	1,19E-2	1,11E-1	5,65E-3	1,97E-2	MND	1,68E-2	MND	MND	MND	MND	MND	6,19E-4	4,05E-4	2,41E-3	6,39E-4	-9,05E-2
EP-freshwater ²⁾	kg Pe	1,15E-4	1,65E-5	6,59E-5	1,97E-4	9,66E-6	5,93E-5	MND	1,45E-4	MND	MND	MND	MND	MND	1,15E-5	7,85E-7	1,37E-5	8,13E-7	-1,04E-3
EP-marine	kg Ne	1,96E-2	2,61E-3	1,86E-3	2,4E-2	1,66E-3	7,45E-3	MND	2,19E-3	MND	MND	MND	MND	MND	7,9E-5	1,22E-4	5,31E-4	2,2E-4	-1,74E-2
EP-terrestrial	mol Ne	2,48E-1	2,89E-2	3,34E-2	3,1E-1	1,84E-2	8,28E-2	MND	1,57E-2	MND	MND	MND	MND	MND	9,69E-4	1,35E-3	6,16E-3	2,42E-3	-1,97E-1
POCP (“smog”) ³⁾	kg NMVOCe	6,1E-2	8,72E-3	7,38E-3	7,71E-2	5,79E-3	2,26E-2	MND	5,67E-3	MND	MND	MND	MND	MND	2,46E-4	4,34E-4	1,68E-3	7,03E-4	-8,37E-2
ADP-minerals & metals ⁴⁾	kg Sbe	1,46E-3	4,56E-5	1,31E-5	1,52E-3	2,02E-5	3,48E-5	MND	2,16E-5	MND	MND	MND	MND	MND	7,74E-7	1,65E-6	1,1E-5	6,15E-7	-4,24E-2
ADP-fossil resources	MJ	4,87E2	2,58E1	3,53E1	5,48E2	1,86E1	3,6E1	MND	2,54E1	MND	MND	MND	MND	MND	2,18E0	1,5E0	2,75E0	1,88E0	-1,51E2
Water use ⁵⁾	m ³ e depr.	1,09E0	9,61E-2	6,04E-1	1,79E0	6,86E-2	1,39E-1	MND	8,21E-1	MND	MND	MND	MND	MND	2,74E-2	5,58E-3	3,9E-2	8,7E-2	-8,35E0

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 ⁶⁾	MJ	1,65E2	4,17E-1	1,15E1	1,77E2	2,32E-1	4,06E0	MND	4,07E0	MND	MND	MND	MND	MND	4,14E-1	1,89E-2	4,32E-1	1,52E-2	-1,82E1
Renew. PER as material	MJ	-1,24E-3	0E0	2,23E1	2,23E1	0E0	-2,23E1	MND	0E0	MND	MND	MND	MND	MND	0E0	0E0	0E0	0E0	8,84E-2
Total use of renew. PER	MJ	1,65E2	4,17E-1	3,38E1	1,99E2	2,32E-1	-1,82E1	MND	4,07E0	MND	MND	MND	MND	MND	4,14E-1	1,89E-2	4,32E-1	1,52E-2	-1,81E1
Non-re. PER as energy	MJ	3,42E2	2,97E1	2,57E1	3,97E2	1,86E1	3,3E1	MND	2,54E1	MND	MND	MND	MND	MND	2,18E0	1,5E0	2,75E0	1,88E0	-1,47E2
Non-re. PER as material	MJ	2,87E1	0E0	9,61E0	3,83E1	0E0	-9,61E0	MND	0E0	MND	MND	MND	MND	MND	0E0	0E0	0E0	-2,87E1	4,26E-3
Total use of non-re. PER	MJ	3,7E2	2,97E1	3,53E1	4,35E2	1,86E1	2,34E1	MND	2,54E1	MND	MND	MND	MND	MND	2,18E0	1,5E0	2,75E0	-2,68E1	-1,47E2
Secondary materials	kg	2,94E-1	0E0	2,85E-3	2,97E-1	0E0	5,94E-3	MND	2,07E-2	MND	MND	MND	MND	MND	0E0	0E0	0E0	0E0	6,03E0
Renew. secondary fuels	MJ	2,2E-9	0E0	0E0	2,2E-9	0E0	4,41E-11	MND	0E0	MND	MND	MND	MND	MND	0E0	0E0	0E0	0E0	0E0
Non-ren. secondary fuels	MJ	2,8E-8	0E0	0E0	2,8E-8	0E0	5,6E-10	MND	0E0	MND	MND	MND	MND	MND	0E0	0E0	0E0	0E0	0E0
Use of net fresh water	m ³	5,54E0	5,09E-3	5,74E-3	5,55E0	3,83E-3	1,15E-1	MND	2,52E-2	MND	MND	MND	MND	MND	6,55E-4	3,12E-4	1,12E-3	2,06E-3	-2,91E-1

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	6,94E-1	3,03E-2	1,23E-1	8,47E-1	1,81E-2	7,21E-2	MND	2,12E-1	MND	MND	MND	MND	MND	7,41E-3	1,46E-3	0E0	1,75E-3	-5,53E0
Non-hazardous waste	kg	6E0	2,09E0	2,41E0	1,05E1	1,97E0	3,08E0	MND	4,91E0	MND	MND	MND	MND	MND	5,17E-1	1,61E-1	0E0	1,28E1	-6,33E1
Radioactive waste	kg	6,54E-3	2,04E-4	5,6E-5	6,8E-3	1,27E-4	2,93E-4	MND	5,5E-5	MND	MND	MND	MND	MND	1,42E-5	1,03E-5	0E0	1,24E-5	-1,81E-4

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	0E0	MND	MND	MND	MND	MND	0E0	0E0	0E0	0E0	0E0
Materials for recycling	kg	0E0	0E0	9,03E-1	9,03E-1	0E0	2,78E-1	MND	0E0	MND	MND	MND	MND	MND	0E0	0E0	8,04E0	0E0	0E0
Materials for energy rec	kg	0E0	0E0	0E0	0E0	0E0	1,08E0	MND	0E0	MND	MND	MND	MND	MND	0E0	0E0	0E0	0E0	0E0
Exported energy	MJ	0E0	0E0	0E0	0E0	0E0	1,8E1	MND	0E0	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 ₂ e	4,46E1	1,7E0	1,88E0	4,82E1	1,19E0	3,03E0	MND	1,68E0	MND	MND	MND	MND	MND	1,04E-1	9,56E-2	1,95E-1	6,6E-2	-1,56E1
Ozone depletion Pot.	kg CFC ₁₁ e	8,41E-7	3,09E-7	1,21E-7	1,27E-6	2,23E-7	2,92E-7	MND	1,41E-7	MND	MND	MND	MND	MND	1,06E-8	1,8E-8	2,42E-8	2,2E-8	-5,52E-7
Acidification	kg SO ₂ e	1,23E-1	4,22E-3	8,6E-3	1,36E-1	2,96E-3	6,97E-3	MND	1,69E-2	MND	MND	MND	MND	MND	5,36E-4	1,96E-4	1,5E-3	2,66E-4	-8,65E-2
Eutrophication	kg PO ₄ ³ e	1,68E-2	7,89E-4	2,48E-3	2,01E-2	5,46E-4	2,57E-3	MND	4,15E-3	MND	MND	MND	MND	MND	3,63E-4	3,97E-5	6,1E-4	5,15E-5	-4,65E-2
POCP ("smog")	kg C ₂ H ₄ e	1,17E-2	2,44E-4	6,76E-4	1,27E-2	1,66E-4	5,54E-4	MND	8,25E-4	MND	MND	MND	MND	MND	2,04E-5	1,24E-5	7,01E-5	1,95E-5	-9,7E-3
ADP-elements	kg Sbe	1,46E-3	4,56E-5	1,31E-5	1,52E-3	2,02E-5	3,48E-5	MND	2,16E-5	MND	MND	MND	MND	MND	7,74E-7	1,65E-6	1,1E-5	6,15E-7	-4,24E-2
ADP-fossil	MJ	4,87E2	2,58E1	3,53E1	5,48E2	1,86E1	3,6E1	MND	2,54E1	MND	MND	MND	MND	MND	2,18E0	1,5E0	2,75E0	1,88E0	-1,51E2

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
08.09.2023

