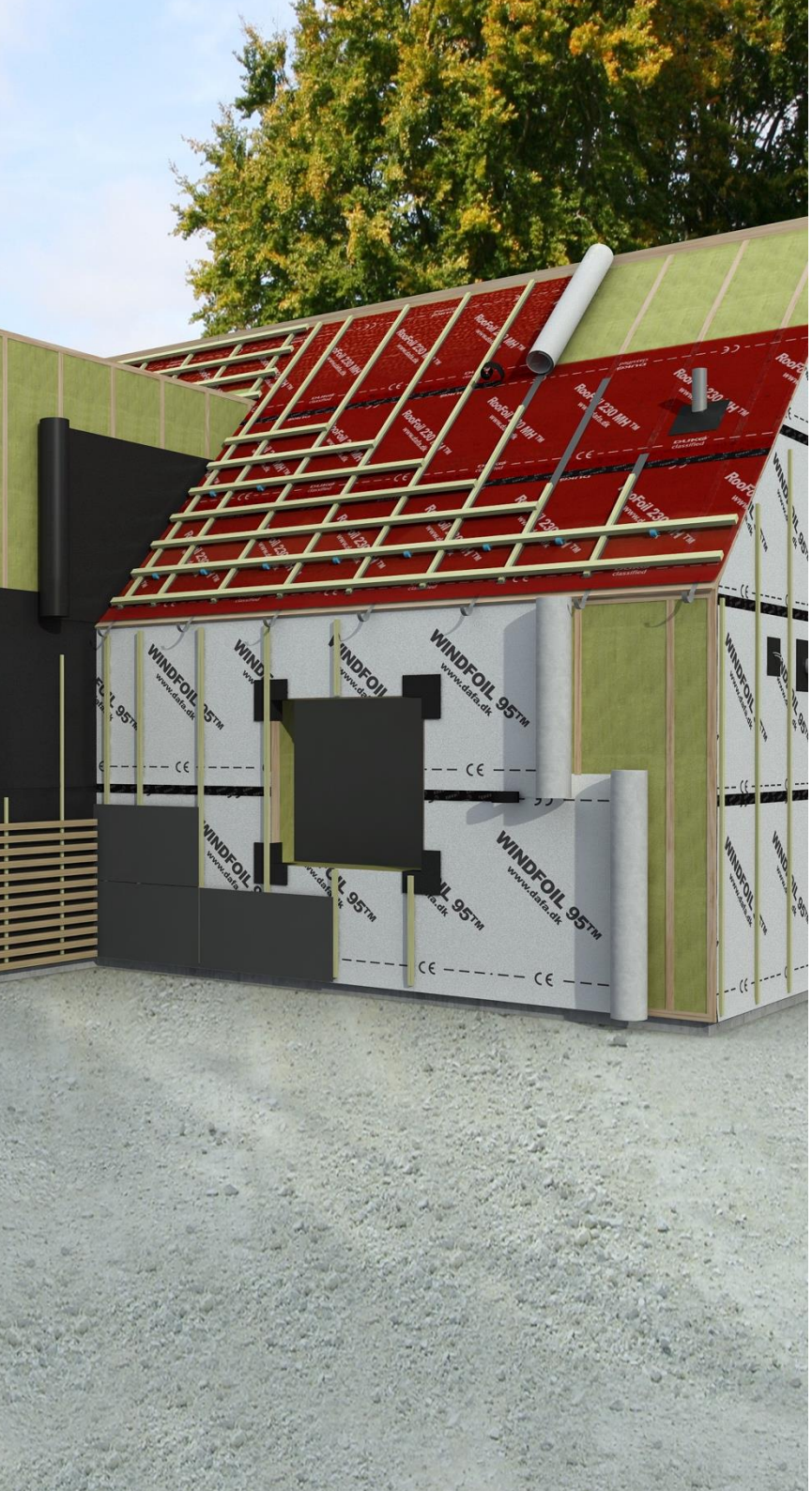


ENVIRONMENTAL PRODUCT DECLARATION

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

DAFA RooFoil 230 MH and DAFA RooFoil 230 MH Plus
DAFA A/S

EPD HUB, HUB-0565
Publishing date 7 July 2023, last updated on 7 July 2023, valid until 7 July 2028

Created with One Click LCA

GENERAL INFORMATION

MANUFACTURER

Manufacturer	DAFA A/S
Address	Holmstrupgaardvej 12, 8220 Brabrand Denmark
Contact details	dbs@dafa-group.com
Website	https://dafa-build.com/en

EPD STANDARDS, SCOPE AND VERIFICATION

Program operator	EPD Hub, hub@epdhub.com
Reference standard	EN 15804+A2:2019, ISO 14025 and ISO 21930
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-A5, and modules C1-C4, D.
EPD author	Mathias Walther
EPD verification	Independent verification of this EPD and data, according to ISO 14025: ☐ Internal certification ☑ External verification
EPD verifier	Sergio A. Ballén Zamora, 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	DAFA RooFoil 230 MH, DAFA RooFoil 230 MH Plus
Additional labels	DAFA RooFoil
Product reference	DAFA RooFoil 230 MH, DAFA RooFoil 230 MH Plus
Place of production	Denmark, Aarhus
Period for data	2022
Averaging in EPD	No averaging
Variation in GWP-fossil for A1-A3	N.A.

ENVIRONMENTAL DATA SUMMARY

Declared unit	1 m2
Declared unit mass	0.235 kg
GWP-fossil, A1-A3 (kgCO2e)	1,02E0
GWP-total, A1-A3 (kgCO2e)	9,94E-1
Secondary material, inputs (%)	1.88
Secondary material, outputs (%)	100.0
Total energy use, A1-A3 (kWh)	4.99
Total water use, A1-A3 (m3e)	1,61E-2

PRODUCT AND MANUFACTURER

ABOUT THE MANUFACTURER

DAFA Building Solutions for the building industry with a focus on holistic and environmentally beneficial solutions.
Products and systems that seal and make buildings long-lasting and more sustainable - both for renewal and new constructions.

PRODUCT DESCRIPTION

DAFA RooFoil is a highly diffusible three-layer membrane for pitch roofs and walls made of two polypropylene (PP) fleece layers and an in-between layer of PP film. The PP film is glued together with the PP fleece with a polyurethane (PU) adhesive. This product is heat and UV resistant, its outdoor exposure is up to 3 months, and it is resistant to driving rain. The only difference between the two products is that “RooFoil 230 MH Plus” has a strip of adhesive mounted on it which goes under the cut-off rule.
Further information can be found at https://dafa-build.com/en.

DOP

Declared performance Harmonized technical specification EN 13859-1:2010, EN 13859-2:2010

ESSENTIAL CHARACTERISTICS	METHOD	UNIT	PERFORMANCE
Length	EN 1848-2	m	50
Width	EN 1848-2	m	1,50 (+1,0 / -0,4 %)
Mass per unit area	EN 1849-2	g/m²	230 ± 10
Resistance to water penetration	EN 1928 Method A		W1
Water vapor transmission	EN 1931, DIN EN ISO 12572	m	Sd = 0,02 (+0,07/-0,01)
Reaction to fire	EN 13501-1	Class	E
Tensile strength MD	EN 12311-1	N/50 mm	680 ± 20
Tensile strength CD	EN 12311-1	N/50 mm	600 ± 20
Elongation MD	EN 12311-1	%	55 ± 15
Elongation CD	EN 12311-1	%	70 ± 15
Tear resistance MD	EN 12310-1	N	300 ± 15
Tear resistance CD	EN 12310-1	N	340 ± 20
After artificial ageing	EN 13859-1; EN13859-2		
Resistance to water penetration	EN 1928 method A		W 1
Tensile strength MD	EN 12311-1	N/50 mm	620 ± 20
Tensile strength CD	EN 12311-1	N/50 mm	550 ± 20
Elongation MD	EN 12311-1	%	50 ± 15
Elongation CD	EN 12311-1	%	70 ± 15
Temperature resistance		°C	-40 to +100

PRODUCT RAW MATERIAL MAIN COMPOSITION

Raw material category	Amount, mass- %	Material origin
Metals	0	
Minerals	0	
Fossil materials	100	EU
Bio-based materials	0	

BIOGENIC CARBON CONTENT

Product’s biogenic carbon content at the factory gate

Biogenic carbon content in product, kg C	0,00545
Biogenic carbon content in packaging, kg C	0

FUNCTIONAL UNIT AND SERVICE LIFE

Declared unit	1 m2
Mass per declared unit	0.235 kg

SUBSTANCES, REACH - VERY HIGH CONCERN

The product contains no 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./dem.	Transport	Waste ...	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.

Manufacturing:
The manufacturing is located in Denmark, Aarhus. The top and bottom fleece (PP) as well as film (PP) are already supplied and delivered as a finished product. The top fleece differs from the bottom web in terms of thickness. The fleeces are laminated to the up and downside of a foil. Prior to the lamination, the glue is melted in extruders and subsequently applied to the fleece via slot dies. Subsequently a DAFA logo is printed on the product, and it is cut in size. If necessary self-adhesive tapes are applied to the side edges of the side of the webs. Finally, the rolls are stacked on reusable pallets and in packed in foil. The distance to the manufacturing site is 764 km and is by lorry. There is no internal transport.

Packaging:
The breathable membranes for pitch roof and wall are wrapped on a cardboard winding tube. The rolls are than packed in PE film and stacked on reusable pallets, which are also packed in PE plastic film. All packaging materials are recyclable or even reusable (pallets).

TRANSPORT AND INSTALLATION (A4-A5)

Transportation impacts occurring from final product delivery to the 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. The average distance of transportation from storage to the retailer's site is 200 km, and the transportation method is by lorry.
The vehicle capacity utilization volume factor is assumed to be 1 which means full load. In reality, it may vary, but as the role of transportation emissions in total results is small, the variation 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. (Empty returns are considered in the ecoinvent database.)
Transportation does not cause losses as the product is packaged properly.

Environmental impacts from installation into the building considers the generation of waste packaging materials, release of biogenic

carbon dioxide from wood pallets and the electricity consumption of power tools.

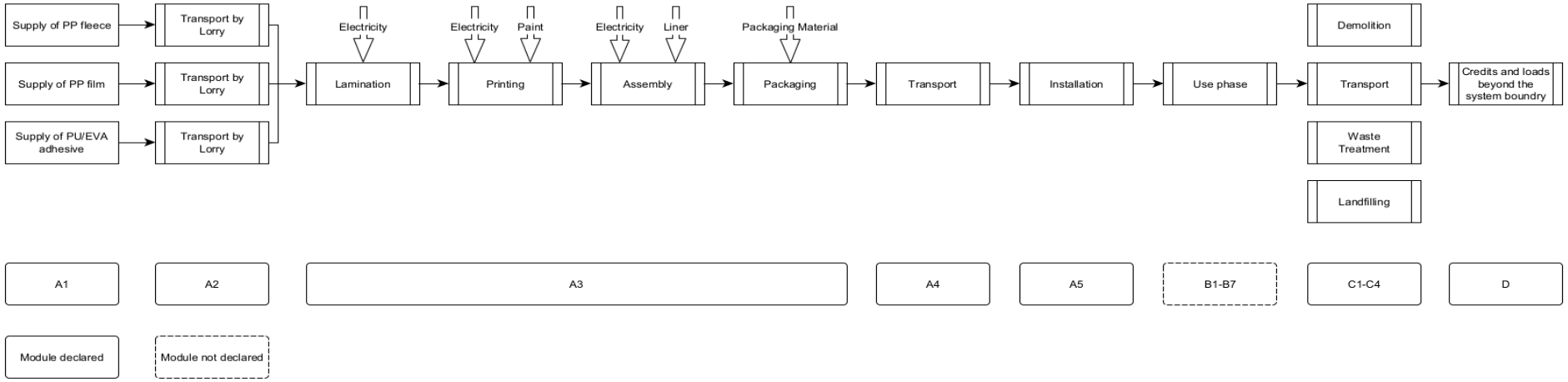
PRODUCT USE AND MAINTENANCE (B1-B7)

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)

For C1 it has been assumed that the product can be uninstalled manually by using hand cutting tools. The end-of-life waste scenario per input material has been chosen and for each raw material 100% incineration has been modelled under the consideration of suitable loads and benefits. Transportation distance to treatment is assumed to be 50 km and the transportation method is assumed to be lorry (C2). Module C3 accounts for energy and resource inputs for sorting and treating these waste streams for recycling and incineration with energy recovery with efficiency greater than 60%. The energy recovered mitigates 85% district heat, and 15% electricity. Additionally, waste that is incinerated without energy recovery or landfilled is included in Module C4. Due to the material and energy recovery potential of parts in the end of life product and packaging, the energy recovered from incineration replaces electricity and heat production (D). The benefits and loads of incineration are included in Module D. All end-of-life product is assumed to be sent to the closest facilities.

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	Allocated by mass or volume

AVERAGES AND VARIABILITY

Type of average	No averaging
Averaging method	Not applicable
Variation in GWP-fossil for A1-A3	N.A.

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_2e	8,49E-1	1,24E-1	1,98E-2	9,94E-1	7,6E-3	0E0	MND	MND	MND	MND	MND	MND	MND	0E0	1,91E-3	5,82E-1	0E0	-4,09E-1
GWP – fossil	kg CO_2e	8,72E-1	1,24E-1	1,98E-2	1,02E0	7,67E-3	0E0	MND	MND	MND	MND	MND	MND	MND	0E0	1,91E-3	5,59E-1	0E0	-4,08E-1
GWP – biogenic	kg CO_2e	-2,31E-2	0E0	0E0	-2,31E-2	0E0	0E0	MND	MND	MND	MND	MND	MND	MND	0E0	0E0	2,31E-2	0E0	0E0
GWP – LULUC	kg CO_2e	6,13E-4	4,97E-5	3,89E-5	7,01E-4	3,07E-6	0E0	MND	MND	MND	MND	MND	MND	MND	0E0	7,65E-7	4,75E-6	0E0	-9,27E-4
Ozone depletion pot.	kg CFC_{-11}e	3,07E-8	2,88E-8	5,44E-10	6,01E-8	1,78E-9	0E0	MND	MND	MND	MND	MND	MND	MND	0E0	4,43E-10	1,23E-9	0E0	-4,01E-8
Acidification potential	mol H^+e	2,97E-3	3,53E-4	8,16E-5	3,4E-3	2,18E-5	0E0	MND	MND	MND	MND	MND	MND	MND	0E0	5,44E-6	1,29E-4	0E0	-6,11E-3
EP-freshwater[2)]	kg Pe	3,83E-5	8,88E-7	1,63E-6	4,08E-5	5,48E-8	0E0	MND	MND	MND	MND	MND	MND	MND	0E0	1,37E-8	1,47E-7	0E0	-5,68E-5
EP-marine	kg Ne	5,21E-4	7,05E-5	1,51E-5	6,07E-4	4,35E-6	0E0	MND	MND	MND	MND	MND	MND	MND	0E0	1,08E-6	6,03E-5	0E0	-7,81E-4
EP-terrestrial	mol Ne	6,17E-3	7,84E-4	2,26E-4	7,18E-3	4,83E-5	0E0	MND	MND	MND	MND	MND	MND	MND	0E0	1,21E-5	6,2E-4	0E0	-9,68E-3
POCP ("smog")[3)]	kg NMVOCe	2,3E-3	3,01E-4	4,49E-5	2,64E-3	1,86E-5	0E0	MND	MND	MND	MND	MND	MND	MND	0E0	4,63E-6	1,5E-4	0E0	-2,5E-3
ADP-minerals & metals[4)]	kg Sbe	9,4E-6	4,5E-7	7,96E-8	9,93E-6	2,77E-8	0E0	MND	MND	MND	MND	MND	MND	MND	0E0	6,92E-9	5,05E-8	0E0	-1,82E-6
ADP-fossil resources	MJ	2,33E1	1,85E0	2,72E-1	2,54E1	1,14E-1	0E0	MND	MND	MND	MND	MND	MND	MND	0E0	2,85E-2	1,04E-1	0E0	-1,1E1
Water use[5)]	m^3e depr.	5,21E-1	8,67E-3	1,46E-2	5,44E-1	5,34E-4	0E0	MND	MND	MND	MND	MND	MND	MND	0E0	1,33E-4	2,21E-2	0E0	-3,17E-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[8)]	MJ	2,32E0	3,58E-2	2,22E-1	2,58E0	1,66E-3	0E0	MND	MND	MND	MND	MND	MND	MND	0E0	4,14E-4	4,07E-3	0E0	-5,78E0
Renew. PER as material	MJ	0E0	0E0	0E0	0E0	0E0	0E0	MND	MND	MND	MND	MND	MND	MND	0E0	0E0	0E0	0E0	0E0
Total use of renew. PER	MJ	2,32E0	3,58E-2	2,22E-1	2,58E0	1,66E-3	0E0	MND	MND	MND	MND	MND	MND	MND	0E0	4,14E-4	4,07E-3	0E0	-5,78E0
Non-re. PER as energy	MJ	3,32E1	2,46E0	2,78E-1	3,6E1	1,14E-1	0E0	MND	MND	MND	MND	MND	MND	MND	0E0	2,85E-2	1,04E-1	0E0	-1,1E1
Non-re. PER as material	MJ	1,82E1	0E0	0E0	1,82E1	0E0	0E0	MND	MND	MND	MND	MND	MND	MND	0E0	0E0	-2,89E1	0E0	0E0
Total use of non-re. PER	MJ	5,14E1	2,46E0	2,78E-1	5,41E1	1,14E-1	0E0	MND	MND	MND	MND	MND	MND	MND	0E0	2,85E-2	-2,88E1	0E0	-1,1E1
Secondary materials	kg	4,14E-3	8,38E-4	6,4E-5	5,04E-3	3,89E-5	0E0	MND	MND	MND	MND	MND	MND	MND	0E0	9,7E-6	9,26E-5	0E0	-1,62E-3
Renew. secondary fuels	MJ	8,52E-3	9,22E-6	3,32E-7	8,53E-3	4,28E-7	0E0	MND	MND	MND	MND	MND	MND	MND	0E0	1,07E-7	3,26E-6	0E0	-7,01E-6
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	2,58E-2	3,14E-4	8,85E-4	2,7E-2	1,46E-5	0E0	MND	MND	MND	MND	MND	MND	MND	0E0	3,63E-6	8,27E-4	0E0	-1,83E-2

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	3,72E-2	2,8E-3	2,16E-3	4,21E-2	1,3E-4	0E0	MND	MND	MND	MND	MND	MND	MND	0E0	3,24E-5	0E0	0E0	-9,07E-2
Non-hazardous waste	kg	8,93E-1	4,97E-2	6,98E-2	1,01E0	2,31E-3	0E0	MND	MND	MND	MND	MND	MND	MND	0E0	5,76E-4	2,35E-1	0E0	-3,17E0
Radioactive waste	kg	4,52E-5	1,69E-5	1,2E-6	6,34E-5	7,86E-7	0E0	MND	MND	MND	MND	MND	MND	MND	0E0	1,96E-7	0E0	0E0	-3,95E-5

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	1,57E-2	0E0	0E0	1,57E-2	0E0	0E0	MND	MND	MND	MND	MND	MND	MND	0E0	0E0	0E0	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	2,25E-2	0E0	0E0	2,25E-2	0E0	0E0	MND	MND	MND	MND	MND	MND	MND	0E0	0E0	9,67E0	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	8,77E-1	4,05E-2	1,96E-2	9,37E-1	7,6E-3	0E0	MND	MND	MND	MND	MND	MND	MND	0E0	1,9E-3	5,58E-1	0E0	-3,93E-1
Ozone depletion Pot.	kg CFC_{-11}e	2,48E-8	7,51E-9	4,82E-10	3,28E-8	1,41E-9	0E0	MND	MND	MND	MND	MND	MND	MND	0E0	3,51E-10	1,11E-9	0E0	-3,31E-8
Acidification	kg SO_2e	3,07E-3	9,54E-5	6,22E-5	3,23E-3	1,79E-5	0E0	MND	MND	MND	MND	MND	MND	MND	0E0	4,46E-6	9,19E-5	0E0	-5,13E-3
Eutrophication	kg PO_4^3e	1,17E-3	2,06E-5	6,18E-5	1,25E-3	3,86E-6	0E0	MND	MND	MND	MND	MND	MND	MND	0E0	9,62E-7	6,65E-5	0E0	-2,02E-3
POCP (“smog”)	kg C_2H_4e	2,12E-4	4,82E-6	3,03E-6	2,2E-4	9,03E-7	0E0	MND	MND	MND	MND	MND	MND	MND	0E0	2,25E-7	1,99E-6	0E0	-2,3E-4
ADP-elements	kg Sbe	6,09E-6	1,45E-7	8,02E-8	6,31E-6	2,71E-8	0E0	MND	MND	MND	MND	MND	MND	MND	0E0	6,76E-9	3,94E-8	0E0	-1,81E-6
ADP-fossil	MJ	2,65E1	6,09E-1	2,78E-1	2,74E1	1,14E-1	0E0	MND	MND	MND	MND	MND	MND	MND	0E0	2,85E-2	1,04E-1	0E0	-1,1E1

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.

Sergio A. Ballén Zamora, as an authorized verifier acting for EPD Hub Limited
07.07.2023