



ENVIRONMENTAL PRODUCT DECLARATION

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

KATEPAL TOPTITE 3° GREEN

Katepal Oy



HUB, HUB-0638

Publishing date 18 August 2023, last updated on 18 August 2023, valid until 18 August 2028

GENERAL INFORMATION

MANUFACTURER

Manufacturer	Katepal Oy
Address	Katepalintie 15, 37500 Lempäälä
Contact details	myynti@katepal.fi
Website	www.katepal.fi/en/

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 to HUB-0215
Scope of the EPD	Cradle to gate with options, A4-A5, and modules C1-C4, D
EPD author	Miia Kuhlman
EPD verification	Independent verification of this EPD and data, according to ISO 14025: ☐ Internal certification ☒ 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	Katepal TopTite 3° Green
Additional labels	N/A
Product reference	N/A
Place of production	Lempäälä, Finland
Period for data	2021
Averaging in EPD	No averaging
Variation in GWP-fossil for A1-A3	-

ENVIRONMENTAL DATA SUMMARY

Declared unit	1 m ² of installed Katepal TopTite 3° Green roof
Declared unit mass	5.41 kg
GWP-fossil, A1-A3 (kgCO ₂ e)	2,3E0
GWP-total, A1-A3 (kgCO ₂ e)	1,96E0
Secondary material, inputs (%)	0.176
Secondary material, outputs (%)	100.0
Total energy use, A1-A3 (kWh)	22.8
Total water use, A1-A3 (m ³ e)	0.0201

PRODUCT AND MANUFACTURER

ABOUT THE MANUFACTURER

Katepal Oy is a Finnish family-owned company with a history dating back to year 1949. Main product categories are bitumen membranes, bitumen shingles and liquid applied bitumen products.

PRODUCT DESCRIPTION

Katepal TopTite 3° Green is a bitumen membrane for roof waterproofing. It is used as a top sheet for sealed-joint roofing applications in new construction and re-roofing projects, with a minimum roof pitch of 1:20 (approx. 3°). The product is installed by mechanical fasteners and the adhesive edges with 15 cm overlapping of the product. Membranes bond to themselves with adhesive edges.

Katepal TopTite 3° Green is made of SBS- modified bitumen and reinforced with a polyester nonwoven. Upper surface of the product is covered with mineral granules excluding the adhesive edge. Bottom surface is covered with sand excluding the adhesive edge.

Katepal Green is a choice that can reduce a building's carbon emissions. The products are made with renewable and recycled raw materials, and carbon-free "green" electricity was used during the manufacturing process.

Bitumen waterproofing membranes provide a good and durable protection against water penetration. Technical service life of a single layer waterproofing system is 40 years. Technical service life is based on the studies and lifetime evaluations for SBS-modified bitumen membranes conducted by Finnish Roofing Association. The evaluations are based on visual inspection on the roofs, discussions with the owners of the buildings and also laboratory tests made for specimens taken from the roofs. These evaluations have been implemented as group studies among different materials from different manufacturers. Katepal products have been

investigated in these group studies performed in Finland for a long time, the first studies performed in 1988. The Finnish Roofing Association consists of roof material manufacturers and roof contractors operating in Finland.

Further information can be found at www.katepal.fi/en/

PRODUCT RAW MATERIAL MAIN COMPOSITION

Raw material category	Amount, mass- %	Material origin
Metals	-	-
Minerals	40-55	EU
Fossil materials	40-55	EU
Bio-based materials	2-10	EU

BIOGENIC CARBON CONTENT

Product's biogenic carbon content at the factory gate

Biogenic carbon content in product, kg C	0.0178
Biogenic carbon content in packaging, kg C	0.0737

FUNCTIONAL UNIT AND SERVICE LIFE

Declared unit	1 m ² of installed Katepal TopTite 3° Green roof
Mass per declared unit	5.41 kg
Functional unit	N/A
Reference service life	N/A

SUBSTANCES, REACH - VERY HIGH CONCERN VP

The product does not contain any REACH SVHC substances in amounts greater than 0,1% (1000 ppm).

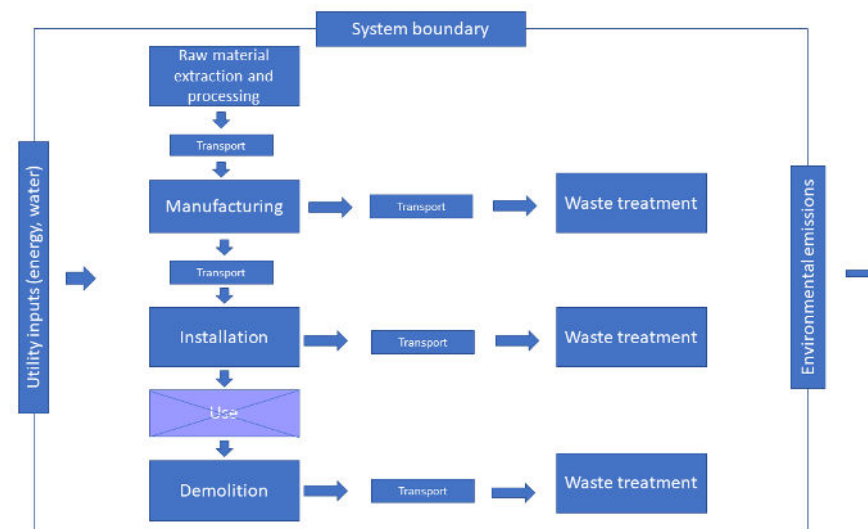
PRODUCT LIFE-CYCLE

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 also considers the material losses occurring during the manufacturing processes as well as losses during electricity transmission.

Manufacturing waste and material loss generated during manufacturing are considered in module A3. Manufacturing waste includes packaging of the raw material and the produced membrane classified as waste. Manufacturing loss includes raw material loss during manufacturing. All of the waste membranes are sent to nearest recycling facility to be crushed as asphalt raw material. Waste plastic, cardboard and paper are sent to recycling, whereas waste bitumen binder, waste polyester and wood are

sent to energy recovery. Inert mineral waste is re-used in ground work or site formation. The evaporation of cooling water is considered as a direct emission to air.

The bitumen is generally delivered as hot from the petroleum refinery to the manufacturing site, where it's heated further for the processing. The manufacturing is done by heating the raw materials (bitumen and copolymers) to a specific temperature and mixing them. The polyester nonwoven acting as a reinforcing structure is impregnated and coated with this bitumen mix. The resulting sheet is then faced with mineral granules and protective film. After cooling the product is cut to the right length, rolled and placed on a wooden pallet. The pallet is wrapped with PE shrink hood for storage and transportation.

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. Environmental impacts from installation into the building (A5) include the product installation losses, emissions of energy use in installation and generation of waste at the construction site.

Freight mode and distances for transportation from production site to the construction site has been approached by most probable scenario based on the annual sales volume of the product. The most probable scenario for transportation distance is 760 km and for transportation method lorry and ferry. 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. Also, volume capacity utilization factor is assumed to be 100 % for the nested packaged products.

Installation of the product is done by with mechanical fasteners and self-adhesive edges. The amount and type of mechanical fasteners is defined by the manufacturer, so mechanical fasteners are included in the calculation in module A5, installation. The manufacturing of the extra 0,15 m² of product needed for overlapping in installation is already accounted for in manufacturing and packaging (A1-A3), thus the declared unit is 1 m² of installed TopTite 3 °Green roof. Assumptions have been made for the waste generation during installation; the installation loss is assumed to be low, 1,5%.70% of the installation loss at the construction site is assumed to go to recycling, and 30% to incineration.

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)

At the end of life TopTite 3° Green bitumen membrane can be 100% recycled. The end-of-life scenario for bitumen membrane in this study is assumed to be 70% recycling and 30% incineration. Recycled bitumen membranes can be used as direct replacement for virgin bitumen in road construction asphalt. When the waste bitumen membranes are incinerated, energy is assumed to be recovered as electricity and heat.

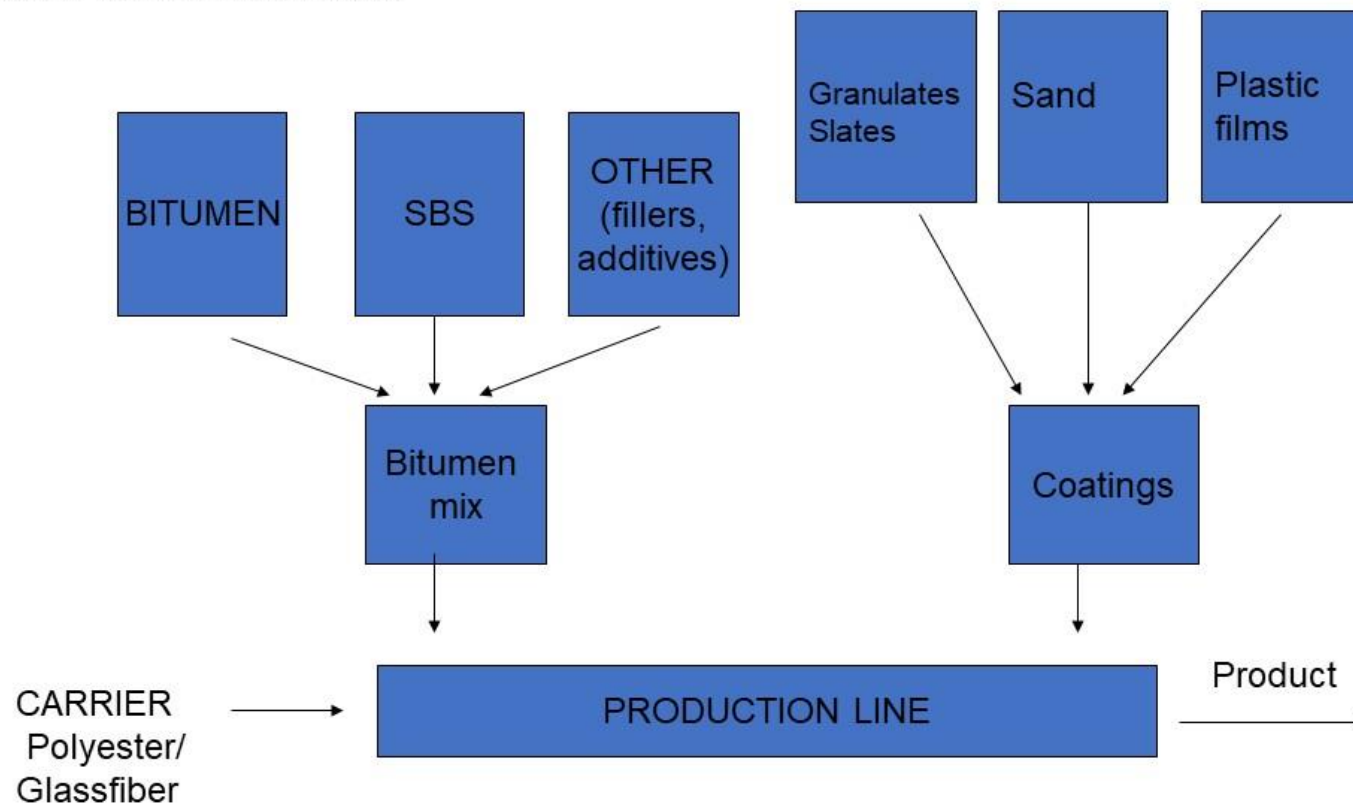
At the end-of-life, in the demolition phase 100% of the waste is assumed to be collected as separate construction waste. The consumption of energy and natural resources is negligible for disassembling of the end-of-life product, as demolition of bitumen membrane roofing is assumed to be done either manually or with a powered cutter. The impacts of demolition are assumed zero (C1).

The bitumen roofing is delivered to the nearest waste treatment plant. It is estimated that there is no mass loss during the use of the product, therefore, the end-of-life product is assumed to have the same weight as the declared product. Transportation distance to the closest waste treatment plant is estimated as 50 km and the transportation method is lorry which is the most common (C2). At the waste treatment plant, waste that can be reused, recycled or recovered for energy is separated and diverted for further use. Impacts from pre-processing needed before sending the material to recycling are considered in C3.

Net impacts due to the recycling and incineration of the bitumen membrane are considered in module D. Impacts of crushing of the bitumen membrane prior to use as a recycled raw material, as well as the incineration are taken into account as burdens. The replacement of the virgin bitumen in road construction is considered as a benefit. Also the energy recovered from incineration is considered as a benefit in module D.

MANUFACTURING PROCESS

PRODUCTION DIAGRAM



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	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	1,79E0	2,24E-1	-5,73E-2	1,96E0	6,64E-1	5,31E-1	MND	MND	MND	MND	MND	MND	MND	0E0	5,83E-2	5,23E0	0E0	-1,92E0
GWP – fossil	kg CO ₂ e	1,85E0	2,24E-1	2,27E-1	2,3E0	6,63E-1	2,26E-1	MND	MND	MND	MND	MND	MND	MND	0E0	5,82E-2	5,24E0	0E0	-2,2E0
GWP – biogenic	kg CO ₂ e	-6,38E-2	1,15E-4	-2,86E-1	-3,5E-1	2,79E-4	3,05E-1	MND	MND	MND	MND	MND	MND	MND	0E0	2,88E-5	-5,64E-3	0E0	2,86E-1
GWP – LULUC	kg CO ₂ e	7,91E-4	8,2E-5	2,31E-3	3,18E-3	2,61E-4	1,33E-4	MND	MND	MND	MND	MND	MND	MND	0E0	2,53E-5	8,57E-4	0E0	2,42E-4
Ozone depletion pot.	kg CFC ₁₁ e	9,08E-7	5,08E-8	2,48E-8	9,84E-7	1,48E-7	2,84E-8	MND	MND	MND	MND	MND	MND	MND	0E0	1,28E-8	1,19E-7	0E0	-4,71E-7
Acidification potential	mol H ⁺ e	1,15E-2	1,3E-3	7,91E-4	1,36E-2	5,56E-3	9,16E-4	MND	MND	MND	MND	MND	MND	MND	0E0	2,33E-4	5,37E-3	0E0	-1,04E-2
EP-freshwater ²⁾	kg Pe	3,95E-5	1,81E-6	1,14E-5	5,27E-5	5,14E-6	6,85E-6	MND	MND	MND	MND	MND	MND	MND	0E0	5,62E-7	2,5E-5	0E0	-3,97E-5
EP-marine	kg Ne	1,74E-3	3,63E-4	1,76E-4	2,28E-3	1,5E-3	2,04E-4	MND	MND	MND	MND	MND	MND	MND	0E0	6,68E-5	1,46E-3	0E0	-1,49E-3
EP-terrestrial	mol Ne	1,88E-2	4,02E-3	1,91E-3	2,47E-2	1,66E-2	2,16E-3	MND	MND	MND	MND	MND	MND	MND	0E0	7,39E-4	1,58E-2	0E0	-1,66E-2
POCP (“smog”) ³⁾	kg NMVOCe	7,67E-3	1,18E-3	7,35E-4	9,59E-3	4,64E-3	7,6E-4	MND	MND	MND	MND	MND	MND	MND	0E0	2,27E-4	4,86E-3	0E0	-6,23E-3
ADP-minerals & metals ⁴⁾	kg Sbe	1,62E-5	5,47E-6	2,48E-6	2,41E-5	1,59E-5	3,25E-6	MND	MND	MND	MND	MND	MND	MND	0E0	2,09E-6	1,92E-5	0E0	-1,46E-4
ADP-fossil resources	MJ	8,5E1	3,36E0	3,82E0	9,22E1	9,78E0	3,03E0	MND	MND	MND	MND	MND	MND	MND	0E0	8,66E-1	1,46E1	0E0	-4,03E1
Water use ⁵⁾	m ³ e depr.	8,21E-1	1,09E-2	6,64E-2	8,98E-1	2,98E-2	5,46E-2	MND	MND	MND	MND	MND	MND	MND	0E0	3,08E-3	3,64E-1	0E0	-3,96E-1

ADDITIONAL (OPTIONAL) 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
Particulate matter	Incidence	8,59E-8	1,57E-8	1,49E-5	1,5E-5	4,23E-8	2,35E-7	MND	MND	MND	MND	MND	MND	MND	0E0	3,55E-9	7,77E-8	0E0	-1,12E-7
Ionizing radiation ⁶⁾	kBq U235e	2,57E-1	1,47E-2	8,88E-3	2,81E-1	4,26E-2	1,05E-2	MND	MND	MND	MND	MND	MND	MND	0E0	3,79E-3	4,37E-2	0E0	-7,97E-2
Ecotoxicity (freshwater)	CTUe	4,76E1	2,57E0	4,16E0	5,43E1	7,34E0	4,85E0	MND	MND	MND	MND	MND	MND	MND	0E0	7,06E-1	1,6E1	0E0	-4,52E1
Human toxicity, cancer	CTUh	6,03E-10	7,75E-11	1,94E-10	8,74E-10	2,43E-10	5,73E-10	MND	MND	MND	MND	MND	MND	MND	0E0	2,26E-11	1,58E-9	0E0	-4,27E-10
Human tox. non-cancer	CTUh	1,77E-8	2,89E-9	2,36E-9	2,3E-8	8,05E-9	4,17E-9	MND	MND	MND	MND	MND	MND	MND	0E0	7,7E-10	2,45E-8	0E0	-1,14E-8
SQP ⁷⁾	-	1,63E0	2,99E0	4,93E-1	5,11E0	7,12E0	7,3E-1	MND	MND	MND	MND	MND	MND	MND	0E0	5,95E-1	8,93E0	0E0	-7,4E0

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	7,78E-1	4,54E-2	2,05E0	2,88E0	1,28E-1	1,78E-1	MND	MND	MND	MND	MND	MND	MND	0E0	1,47E-2	7,15E-1	0E0	-1,66E0
Renew. PER as material	MJ	2,21E0	0E0	2,87E0	5,08E0	0E0	-2,87E0	MND	MND	MND	MND	MND	MND	MND	0E0	0E0	-2,13E0	0E0	-5,13E-1
Total use of renew. PER	MJ	2,99E0	4,54E-2	4,92E0	7,96E0	1,28E-1	-2,69E0	MND	MND	MND	MND	MND	MND	MND	0E0	1,47E-2	-1,42E0	0E0	-2,17E0
Non-re. PER as energy	MJ	7,25E1	3,36E0	3,48E0	7,93E1	9,78E0	2,84E0	MND	MND	MND	MND	MND	MND	MND	0E0	8,66E-1	1,46E1	0E0	-4E1
Non-re. PER as material	MJ	1,25E1	0E0	-1,65E-1	1,23E1	0E0	-3,5E-1	MND	MND	MND	MND	MND	MND	MND	0E0	0E0	-1,2E1	0E0	-3,13E-1
Total use of non-re. PER	MJ	8,5E1	3,36E0	3,32E0	9,17E1	9,78E0	2,49E0	MND	MND	MND	MND	MND	MND	MND	0E0	8,66E-1	2,58E0	0E0	-4,03E1
Secondary materials	kg	9,05E-3	0E0	4,98E-4	9,55E-3	0E0	5,8E-3	MND	MND	MND	MND	MND	MND	MND	0E0	0E0	0E0	0E0	5,56E-2
Renew. secondary fuels	MJ	0E0	0E0	0E0	0E0	0E0	0E0	MND	MND	MND	MND	MND	MND	MND	0E0	0E0	0E0	0E0	0E0
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	m³	1,82E-2	5,79E-4	1,29E-3	2,01E-2	1,57E-3	1,32E-3	MND	MND	MND	MND	MND	MND	MND	0E0	1,51E-4	6,63E-3	0E0	-1,8E-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	9,31E-2	3,41E-3	9,31E-3	1,06E-1	1E-2	2,78E-2	MND	MND	MND	MND	MND	MND	MND	0E0	1,02E-3	0E0	0E0	-5,77E-2
Non-hazardous waste	kg	1,25E0	2,43E-1	2,97E-1	1,79E0	6,1E-1	3,77E-1	MND	MND	MND	MND	MND	MND	MND	0E0	5,66E-2	0E0	0E0	-1,44E0
Radioactive waste	kg	4,08E-4	2,31E-5	8,53E-6	4,4E-4	6,72E-5	1,36E-5	MND	MND	MND	MND	MND	MND	MND	0E0	5,87E-6	0E0	0E0	-1,2E-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	MND	MND	MND	MND	MND	MND	0E0	0E0	0E0	0E0	0E0
Materials for recycling	kg	0E0	0E0	1,84E-1	1,84E-1	0E0	1,33E-1	MND	MND	MND	MND	MND	MND	MND	0E0	0E0	3,79E0	0E0	0E0
Materials for energy rec	kg	0E0	0E0	3,6E-3	3,6E-3	0E0	1,44E-1	MND	MND	MND	MND	MND	MND	MND	0E0	0E0	1,62E0	0E0	0E0
Exported energy	MJ	0E0	0E0	0E0	0E0	0E0	0E0	MND	MND	MND	MND	MND	MND	MND	0E0	0E0	1,85E1	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	1,74E0	2,22E-1	2,24E-1	2,19E0	6,58E-1	2,36E-1	MND	MND	MND	MND	MND	MND	MND	0E0	5,77E-2	5,2E0	0E0	-2,11E0
Ozone depletion Pot.	kg CFC ₁₁ e	7,26E-7	4,04E-8	2,06E-8	7,87E-7	1,18E-7	2,36E-8	MND	MND	MND	MND	MND	MND	MND	0E0	1,02E-8	1,08E-7	0E0	-3,64E-7
Acidification	kg SO ₂ e	9,8E-3	7,7E-4	6,26E-4	1,12E-2	3,73E-3	7,04E-4	MND	MND	MND	MND	MND	MND	MND	0E0	1,2E-4	3,6E-3	0E0	-8,96E-3
Eutrophication	kg PO ₄ ³ e	1,89E-3	1,25E-4	2,73E-4	2,29E-3	5,25E-4	3,87E-4	MND	MND	MND	MND	MND	MND	MND	0E0	2,64E-5	3,3E-3	0E0	-1,61E-3
POCP ("smog")	kg C ₂ H ₄ e	5,57E-4	3,67E-5	5,17E-5	6,45E-4	1,41E-4	6,45E-5	MND	MND	MND	MND	MND	MND	MND	0E0	7,85E-6	2,72E-4	0E0	-4,29E-4
ADP-elements	kg Sbe	1,62E-5	5,47E-6	2,48E-6	2,41E-5	1,59E-5	3,25E-6	MND	MND	MND	MND	MND	MND	MND	0E0	2,09E-6	1,92E-5	0E0	-1,46E-4
ADP-fossil	MJ	8,5E1	3,36E0	3,82E0	9,22E1	9,78E0	3,03E0	MND	MND	MND	MND	MND	MND	MND	0E0	8,66E-1	1,46E1	0E0	-4,03E1

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
18.08.2023

