

ENVIRONMENTAL PRODUCT DECLARATION

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



Armourcoat Ltd. | Limewash


ARMOURCOAT[®]

SUSTAINABLE LUXURY FINISHES



EPD HUB, HUB-0339

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One Click  Created with One Click LCA

GENERAL INFORMATION

MANUFACTURER

Manufacturer	Armourcoat Ltd
Address	Unit 2/3a Morewood Close, Sevenoaks, TN132HU
Contact details	sales@armourcoat.co.uk
Website	www.armourcoat.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 EN 16908 Cement and building lime
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	Duncan Mackellar
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	H.N, 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	Armourcoat Limewash
Additional labels	Armourcoat Lime Paint
Product reference	ALW
Place of production	United Kingdom
Period for data	2022
Averaging in EPD	No averaging
Variation in GWP-fossil for A1-A3	0 %

ENVIRONMENTAL DATA SUMMARY

Declared unit	1m ²
Declared unit mass	0.2 kg
GWP-fossil, A1-A3 (kgCO ₂ e)	6.44E-2
GWP-total, A1-A3 (kgCO ₂ e)	5.41E-2
Secondary material, inputs (%)	0.0521
Secondary material, outputs (%)	0.0
Total energy use, A1-A3 (kWh)	0.17
Total water use, A1-A3 (m ³ e)	3.53E-4

PRODUCT AND MANUFACTURER

ABOUT THE MANUFACTURER

Armourcoat Ltd is a Manufacturer and supplier of luxury sustainable decorative surface finishes and performance coatings.

Armourcoat Ltd was incorporated in the UK in 1986 as a specialist manufacturer of ultra-hard plasters and renders for Squash and Rackets courts.

In 1990 Armourcoat diversified into a range of decorative plasters and paints and has become the leading company worldwide for specialist natural decorative plasters and sustainable decorative solutions.

Armourcoat has offices in the UK and USA and has agents and distributors in over 40 countries around the world. Armourcoat is fully accredited to ISO 9001, ISO 14001, and ISO 45001.

PRODUCT DESCRIPTION

Armourcoat Limewash is a natural and breathable wall coating based on slaked lime putty.

It is applied to the substrate by brush in 2-3 coats and creates a natural decorative later with soft tonal variation and outstanding breathability.

Armourcoat Limewash is made from the finest aged lime putty combined with whitening.

Armourcoat Limewash contains no VOCs and has zero emissions.

Further information can be found at www.armourcoat.com.

PRODUCT RAW MATERIAL MAIN COMPOSITION

Raw material category	Amount, mass- %	Material origin
water	70	UK
Minerals	30	UK

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 0.002

FUNCTIONAL UNIT AND SERVICE LIFE

Declared unit 1m2

Mass per declared unit 0.2 kg

Functional unit To decorate 1m2 of substrate with three coats of limewash, equivalent to 0.2kg of products.

Reference service life 10 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	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.

Armourcoat Limewash is manufactured in the UK by Armourcoat Ltd. Armourcoat Limewash is made from slaked lime putty made from the finest quicklime. The raw materials are checked, accurately weighed and carefully combined with water in a specialist mixer. Each batch is allocated a specific batch number and a quality control check is performed on every batch. The Limewash is then packed into 6kg units using a vacuum packing dispenser. Finished product is packed onto a Euro pallet and stretch wrapped ready for warehouse storage.

Residue in the mixing pan is incorporated into the next mix so the only

waste is at the final clean down.

Wastewater containing minerals from cleaning pans is separated in the onsite sludge removal and the residue sent to a local waste manager located 50 km from the manufacturing plant.

Materials and wastewater below 1% of mass which included the stretch wrap film and raw material paper sacks have been excluded from this study in accordance with the cut off rules.

Plastic buckets are deemed to be single use, but the wooden pallets are allocated for use twice as the Limewash is usually sent out in smaller quantities without a pallet and the pallets are recycled back into production.

Pallets are based on a reuse scenario of two times. Most of the limewash orders are between 2- 20 units and therefore are not always sent out on a pallet and the pallets are typically recycled back to manufacture production.

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.

Armourcoat Limewash is manufactured in our UK Factory and transported by road for projects in the UK. For UK projects the transportation distance is defined according to PCR norm. Average distance of transportation from Armourcoat Ltd to building site is assumed as 100 km and the transportation method is assumed to be lorry. The material is hand applied by brush and therefore no additional energy or materiel is required in the application process. Any unused material is left with the client for touch up or repair and as the material has an indefinite shelf life there is no waste during the installation process. Plastic buckets are assumed as single use and are sent for to waste disposal.

Waste from Wooden pallets and buckets are assumed to be incinerated for generation of heat and electricity.

A5 A negative emissions figure for Carbon dioxide is added in A5 as the Limewash absorbs Carbon dioxide from the air and releases water into the atmosphere in a process known as carbonation.

LIME CYCLE

Chalk, limestone and marble are all forms of Calcium Carbonate. When limestone or chalk is burnt in a kiln, Carbon dioxide is released into the atmosphere, and you are left with Calcium Oxide which is commonly known as Quicklime. Quicklime is then slaked with water to form lime putty or Hydrated lime and when exposed to the air lime naturally harden by absorbing Carbon dioxide from the atmosphere and over time turns back into limestone.

PRODUCT USE AND MAINTENANCE (B1-B7)

Armourcoat Limewash can be wiped with a damp cloth to clean off minor marks and scuffs. It will darken significantly as soon as it gets wet but will return to the original shade once dry.

If the surface is badly scuffed or discoloured the surface can be lightly sanded and a further coat of limewash can be applied to the surface.

At the end of the installation phase any residual material is left with the client for subsequent repairs if they are required. Provided it is kept in a sealed airtight container and stored in a cool environment Armourcoat limewash will remain usable indefinitely.

There is no assumption that the walls will be damaged or disfigured and therefore B1 - B7 are excluded for the purpose of this study.

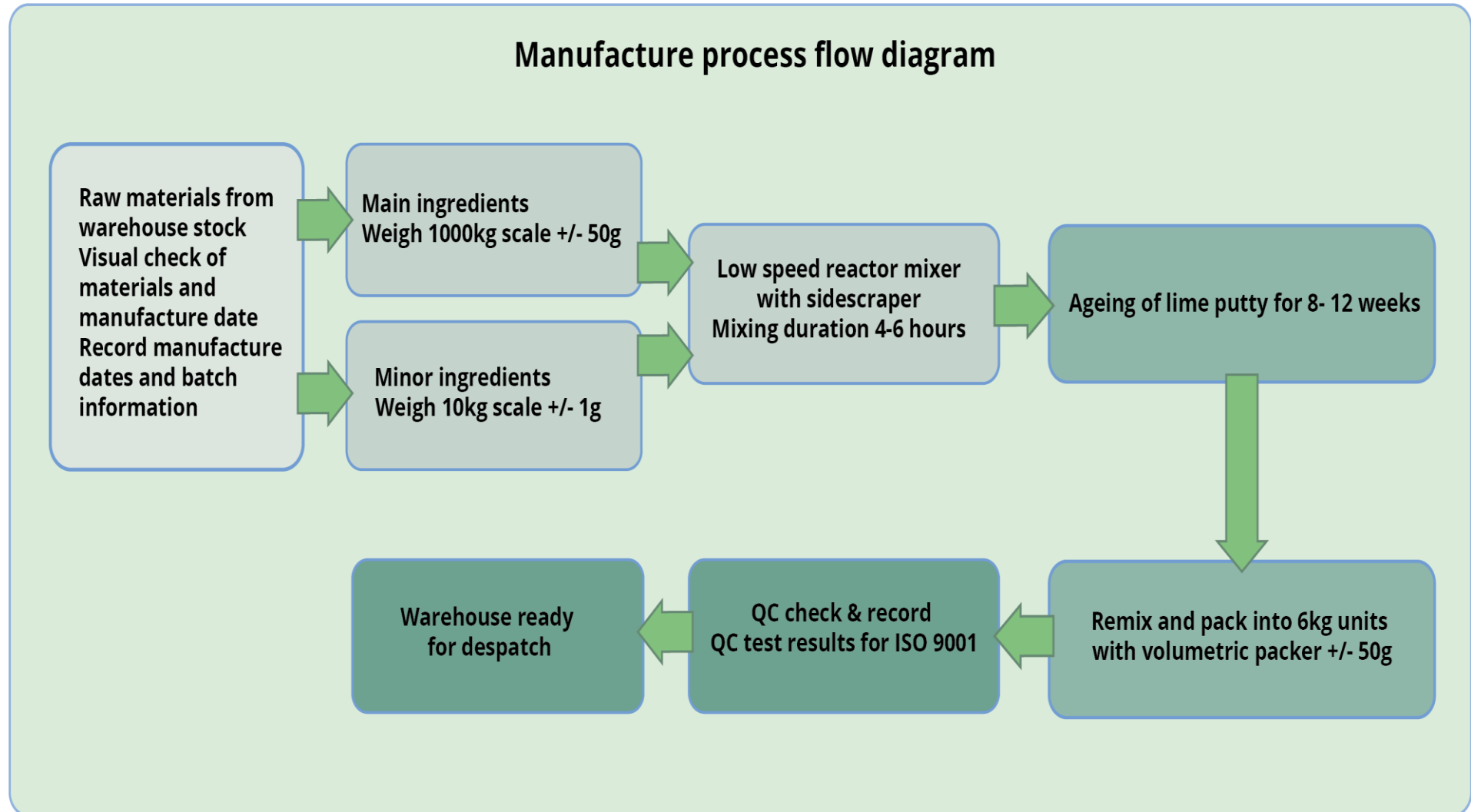
Air, soil, and water impacts during the use phase have not been studied.

PRODUCT END OF LIFE (C1-C4, D)

Armourcoat Limewash forms a thin (50 -100um) layer on the substrate to which it is applied. It is impractical to remove it and therefore it is assumed that it will be recycled or disposed of at end of life along with the plasterboard substrate. The consumption of energy and natural resources is negligible for the removal of the plasterboard, so the impacts of demolition are assumed zero (C1). In the UK our products can be recycled with the plasterboard substrate. It is assumed that the waste will be transported to the nearest construction waste recycling plant. (50km) (C2) There is no waste processing for reuse , recovery or recycling of the Limewash product (C3) Based on a conservative approach we have assumed 100% landfill for the limewash residue (C4)

Wooden pallets and buckets are incinerated for generation of heat and electricity and the benefits are declared. (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	Allocated by mass or volume
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	0 %

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	4.12E-2	6.31E-4	1.23E-2	5.41E-2	1.89E-3	-4.12E-3	MND	MND	MND	MND	MND	MND	MND	3.51E-8	8.36E-4	2.77E-8	6.66E-4	4.9E-3
GWP – fossil	kg CO ₂ e	4.11E-2	6.31E-4	2.26E-2	6.44E-2	1.91E-3	-1.14E-2	MND	MND	MND	MND	MND	MND	MND	3.43E-8	8.35E-4	2.69E-8	6.6E-4	-1.44E-3
GWP – biogenic	kg CO ₂ e	1.73E-5	4.58E-7	-1.04E-2	-1.04E-2	1.39E-6	7.3E-3	MND	MND	MND	MND	MND	MND	MND	7E-10	4.45E-7	8.22E-10	5.33E-6	6.36E-3
GWP – LULUC	kg CO ₂ e	4.04E-6	1.9E-7	2.69E-5	3.12E-5	5.74E-7	1.22E-7	MND	MND	MND	MND	MND	MND	MND	5.66E-11	2.96E-7	5.36E-11	3.17E-7	-1.2E-5
Ozone depletion pot.	kg CFC-11e	2.51E-9	1.48E-10	1.49E-9	4.14E-9	4.49E-10	2.2E-11	MND	MND	MND	MND	MND	MND	MND	3.04E-15	1.9E-10	2.54E-15	2.05E-10	-1.06E-9
Acidification potential	mol H ⁺ e	5.44E-5	2.65E-6	1.02E-4	1.59E-4	8.02E-6	2.21E-6	MND	MND	MND	MND	MND	MND	MND	2E-10	3.41E-6	1.76E-10	5.63E-6	-1.24E-4
EP-freshwater ²⁾	kg Pe	1.41E-7	5.13E-9	9.84E-7	1.13E-6	1.55E-8	5.65E-9	MND	MND	MND	MND	MND	MND	MND	2.81E-12	6.98E-9	2.49E-12	1.15E-8	-9.6E-7
EP-marine	kg Ne	1.03E-5	7.98E-7	1.83E-5	2.94E-5	2.42E-6	9.54E-7	MND	MND	MND	MND	MND	MND	MND	3.19E-11	1.01E-6	2.2E-11	1.91E-6	-1.38E-5
EP-terrestrial	mol Ne	1.18E-4	8.82E-6	2.08E-4	3.35E-4	2.67E-5	1.04E-5	MND	MND	MND	MND	MND	MND	MND	3.7E-10	1.12E-5	2.63E-10	2.1E-5	-1.64E-4
POCP (“smog”) ³⁾	kg NMVOCe	4.24E-5	2.84E-6	8.44E-5	1.3E-4	8.58E-6	2.53E-6	MND	MND	MND	MND	MND	MND	MND	1.16E-10	3.43E-6	7.09E-11	6.07E-6	-4.51E-5
ADP-minerals & metals ⁴⁾	kg Sbe	1.98E-8	1.08E-8	2.08E-7	2.38E-7	3.26E-8	2.78E-9	MND	MND	MND	MND	MND	MND	MND	1.01E-12	2.26E-8	2.89E-13	7.09E-9	-2.09E-8
ADP-fossil resources	MJ	1.76E-1	9.81E-3	5.79E-1	7.65E-1	2.97E-2	2.48E-3	MND	MND	MND	MND	MND	MND	MND	5.86E-7	1.26E-2	5.1E-7	1.55E-2	-2.13E-1
Water use ⁵⁾	m ³ e depr.	8.13E-3	3.65E-5	1.32E-2	2.13E-2	1.1E-4	3.83E-5	MND	MND	MND	MND	MND	MND	MND	2.06E-6	4.05E-5	2.05E-6	6.94E-4	-1.74E-3

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	2.29E-10	5.71E-11	7.94E-10	1.08E-9	1.73E-10	1.09E-11	MND	MND	MND	MND	MND	MND	MND	1.68E-15	5.82E-11	8.07E-16	1.08E-10	-9.72E-10
Ionizing radiation ⁶⁾	kBq U235e	7.8E-4	4.29E-5	1.95E-3	2.77E-3	1.3E-4	1.04E-5	MND	MND	MND	MND	MND	MND	MND	4.05E-9	5.5E-5	3.99E-9	6.08E-5	-1.26E-3
Ecotoxicity (freshwater)	CTUe	2.78E-1	7.5E-3	2.81E-1	5.67E-1	2.27E-2	4.02E-3	MND	MND	MND	MND	MND	MND	MND	6.25E-7	9.72E-3	4.06E-7	1.11E-2	-3.29E-1
Human toxicity, cancer	CTUh	2.97E-12	1.92E-13	1.06E-11	1.38E-11	5.8E-13	5.19E-13	MND	MND	MND	MND	MND	MND	MND	9.37E-17	2.82E-13	1.71E-17	4.06E-13	-3.43E-12
Human tox. non-cancer	CTUh	2.65E-10	8.89E-12	2.03E-10	4.77E-10	2.69E-11	2.08E-11	MND	MND	MND	MND	MND	MND	MND	2.09E-15	1.1E-11	3.97E-16	8.48E-12	-1.12E-10
SQP ⁷⁾	-	1.98E-2	1.48E-2	2.78E-2	6.24E-2	4.48E-2	1E-3	MND	MND	MND	MND	MND	MND	MND	5.17E-8	1.05E-2	3.63E-8	5.54E-2	-1.38E-2

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	1.15E-2	1.24E-4	6.51E-2	7.67E-2	3.74E-4	1.63E-4	MND	MND	MND	MND	MND	MND	MND	7.95E-8	1.78E-4	8.09E-8	2.56E-4	-5.23E-2
Renew. PER as material	MJ	0E0	0E0	9.4E-2	9.4E-2	0E0	-9.4E-2	MND	MND	MND	MND	MND	MND	MND	0E0	0E0	0E0	0E0	-9.42E-1
Total use of renew. PER	MJ	1.15E-2	1.24E-4	1.59E-1	1.71E-1	3.74E-4	-9.38E-2	MND	MND	MND	MND	MND	MND	MND	7.95E-8	1.78E-4	8.09E-8	2.56E-4	-9.94E-1
Non-re. PER as energy	MJ	1.76E-1	9.81E-3	3.49E-1	5.35E-1	2.97E-2	2.48E-3	MND	MND	MND	MND	MND	MND	MND	5.86E-7	1.26E-2	5.1E-7	1.55E-2	-2.13E-1
Non-re. PER as material	MJ	0E0	0E0	2.29E-1	2.29E-1	0E0	-2.29E-1	MND	MND	MND	MND	MND	MND	MND	0E0	0E0	0E0	0E0	0E0
Total use of non-re. PER	MJ	1.76E-1	9.81E-3	5.79E-1	7.65E-1	2.97E-2	-2.27E-1	MND	MND	MND	MND	MND	MND	MND	5.86E-7	1.26E-2	5.1E-7	1.55E-2	-2.13E-1
Secondary materials	kg	0E0	0E0	1.04E-4	1.04E-4	0E0	0E0	MND	MND	MND	MND	MND	MND	MND	0E0	0E0	0E0	0E0	0E0
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	m ³	2.56E-4	2.04E-6	9.44E-5	3.53E-4	6.18E-6	3.76E-6	MND	MND	MND	MND	MND	MND	MND	1.17E-7	2.15E-6	1.03E-7	1.75E-5	-4.01E-5

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	2.14E-4	9.54E-6	1.21E-3	1.44E-3	2.88E-5	1.01E-4	MND	MND	MND	MND	MND	MND	MND	3.44E-9	1.28E-5	0E0	2.72E-5	-1.19E-3
Non-hazardous waste	kg	6.03E-3	1.05E-3	4.27E-2	4.98E-2	3.19E-3	4.93E-3	MND	MND	MND	MND	MND	MND	MND	1.25E-7	8.77E-4	0E0	6.26E-2	-2.81E-2
Radioactive waste	kg	1.17E-6	6.74E-8	1.33E-6	2.57E-6	2.04E-7	1.03E-8	MND	MND	MND	MND	MND	MND	MND	3.16E-12	8.63E-8	0E0	9.33E-8	-9.79E-7

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	0E0	0E0	0E0	0E0	MND	MND	MND	MND	MND	MND	MND	0E0	0E0	0E0	0E0	0E0
Materials for energy rec	kg	0E0	0E0	0E0	0E0	0E0	1.34E-2	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 ₂ e	4.1E-2	6.25E-4	2.16E-2	6.32E-2	1.89E-3	-1.14E-2	MND	MND	MND	MND	MND	MND	MND	3.35E-8	8.28E-4	2.64E-8	6.47E-4	-1.03E-3
Ozone depletion Pot.	kg CFC ₁₁ e	2E-9	1.18E-10	1.45E-9	3.57E-9	3.57E-10	2.01E-11	MND	MND	MND	MND	MND	MND	MND	3.43E-15	1.51E-10	2.96E-15	1.63E-10	-1E-9
Acidification	kg SO ₂ e	4.27E-5	1.28E-6	8.68E-5	1.31E-4	3.88E-6	1.54E-6	MND	MND	MND	MND	MND	MND	MND	1.62E-10	1.67E-6	1.49E-10	4.48E-5	-1.1E-4
Eutrophication	kg PO ₄ ³ e	7.68E-6	2.59E-7	3.36E-5	4.15E-5	7.84E-7	1.27E-6	MND	MND	MND	MND	MND	MND	MND	9.18E-11	3.44E-7	8.14E-11	9.13E-7	-2.81E-5
POCP ("smog")	kg C ₂ H ₄ e	6.06E-6	8.13E-8	9.34E-6	1.55E-5	2.46E-7	3.14E-8	MND	MND	MND	MND	MND	MND	MND	1.08E-11	1.1E-7	6.72E-12	1.69E-7	-4.48E-6
ADP-elements	kg Sbe	1.98E-8	1.08E-8	2.08E-7	2.38E-7	3.26E-8	2.78E-9	MND	MND	MND	MND	MND	MND	MND	1.01E-12	2.26E-8	2.89E-13	7.09E-9	-2.09E-8
ADP-fossil	MJ	1.76E-1	9.81E-3	5.79E-1	7.65E-1	2.97E-2	2.48E-3	MND	MND	MND	MND	MND	MND	MND	5.86E-7	1.26E-2	5.1E-7	1.55E-2	-2.13E-1

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
09.03.2023

