

# ENVIRONMENTAL PRODUCT DECLARATION

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



Armourcoat Ltd. | Cast Panels

ARMOURCOAT®

SUSTAINABLE LUXURY FINISHES



EPD HUB, HUB-0338

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One Click  Created with One Click LCA

## GENERAL INFORMATION

### MANUFACTURER

Manufacturer	Armourcoat Ltd /Armourcoat USA LLC
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
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 Cast Panels
	Armourcoat Stone Cast Panels, Concrete Effect Panels, Timber Effect Panels, Bas-Relief Panels
Product reference	AC, CE, TE
Place of production	UK & USA
Period for data	2022
Averaging in EPD	Multiple factories
Variation in GWP-fossil for A1-A3	12.17 %

### ENVIRONMENTAL DATA SUMMARY

Declared unit	1m <sup>2</sup>
Declared unit mass	14.13 kg
GWP-fossil, A1-A3 (kgCO <sub>2</sub> e)	2.56E0
GWP-total, A1-A3 (kgCO <sub>2</sub> e)	2.09E0
Secondary material, inputs (%)	6.04
Secondary material, outputs (%)	96.5
Total energy use, A1-A3 (kWh)	14.3
Total water use, A1-A3 (m <sup>3</sup> e)	0.0156

## 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 ISO9001, ISO 14001 and ISO 45001.

### PRODUCT DESCRIPTION

Armourcoat Cast Panels are prefabricated cast panels for wall decoration that can be made in a wide variety of natural stone colours and patterns. Armourcoat Cast Panels can be made to emulate cast concrete (Concrete Effect) and wood shuttered concrete (Timber Effect) or stone.

A combination of a gypsum binder mixed with a variety of natural aggregates such as limestone, sand, mother of pearl, mica and earth pigments offers a huge array of decorative surface solutions.

A broad range of modular panel designs can be achieved ranging from concrete panels with shutter holes to complex geometric designs and more organic and sculptural forms. The panels can be designed so that the pattern or design flows naturally from one panel to another.

It is also possible to integrate joint lines within the design so that the surface does not read as a series of adjoining panels. One of the key advantages of this modularity is that relatively few moulds are required to complete large wall areas.

Further information can be found at [www.armourcoat.com](http://www.armourcoat.com).

### PRODUCT RAW MATERIAL MAIN COMPOSITION

Raw material category	Amount, mass- %	Material origin
Water	8.3	UK
Minerals	90.6	UK/EU
Fossil materials	1.1	EU

### 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	0.133

### FUNCTIONAL UNIT AND SERVICE LIFE

Declared unit	1m <sup>2</sup>
Mass per declared unit	14.13 kg
Functional unit	Panel and adhesive with a weight of 14.13kg required for the decoration of 1m <sup>2</sup> of wall area
Reference service life	life of the building - 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	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 Cast Panels are cast in custom made moulds using the Armourcoat casting binder combined with the selected natural stone aggregates and natural earth pigments if required. The ingredients are carefully weighted out and mixed with water/resin gauging liquid using a plaster mixer. The material is either mixed relatively dry and hand packed into the surface of the mould or mixed wetter and poured into the mould. A glass-fibre matt and a layer of gypsum are used to reinforce the rear of the panel and the back is struck off flush with the back of the mould. The panels are left for 30 - 60 minutes to set hard and are then removed and

placed in special racks to dry out. Air is forced between the panels to dry them out from both sides and once dry they are inspected in accordance with ISO 9001 Quality standards. Waste materials from the production process are the scraps of set material and the bucket washings together with the empty paper sacks in which the gypsum and other aggregate were delivered. Approximately 4% of the raw materials used in the panel production end up as waste.

The raw material paper sacks are recycled, and the hard casting scraps are sent to landfill.

Panels are packaged in reusable collapsible crates. The crates are returned to the factory for reuse once the panels have been unloaded. Based on the losses we incur against the total number of crate deliveries; each crate will get used five times on average. Armourcoat Cast Panels are manufactured in UK and USA. The MDF used in the creation of the mould master falls below the cut off criteria and is excluded from this study.

### 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.

The transportation distance is defined in accordance with the EN 15804 +A2 Reference norm. Average distance of transportation from production plant to building site is assumed as 100 km and the transportation method is assumed to be lorry. Sculptural panels are shipped by Sea for overseas projects.

Armourcoat Cast Panels are cut to fit where necessary, ready to be bonded permanently to the substrate. The panels are fixed to the substrate using Bondplast adhesive that is applied to the wall surface with a notched trowel. The panels are pressed into the adhesive with specific packers to control the joint width between panels and carefully adjusted to ensure accurate alignment at the joins.

### PRODUCT USE AND MAINTENANCE (B1-B7)

The product has a reference service life of 60 years. Armourcoat Cast Panels are very hard and durable and are very resistant to impact damage. It is therefore assumed that the product will last in situ with no requirements for maintenance, repair or replacement over the lifetime of the product. There is no requirement for energy or water during the lifetime of the product .

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

### PRODUCT END OF LIFE (C1-C4, D)

Armourcoat Cast Panels are normally bonded to a plasterboard substrate using Bondplast (gypsum adhesive).

In the UK Armourcoat Cast Panels can be recycled as gypsum waste and is recycled into plasterboard production. Other outcome may occur outside the UK or in countries where gypsum recycling facilities are not available.

Module C1- Since the consumption of energy and natural resources is negligible for disassembling at the end-of-life product, the impacts of demolition are assumed zero.

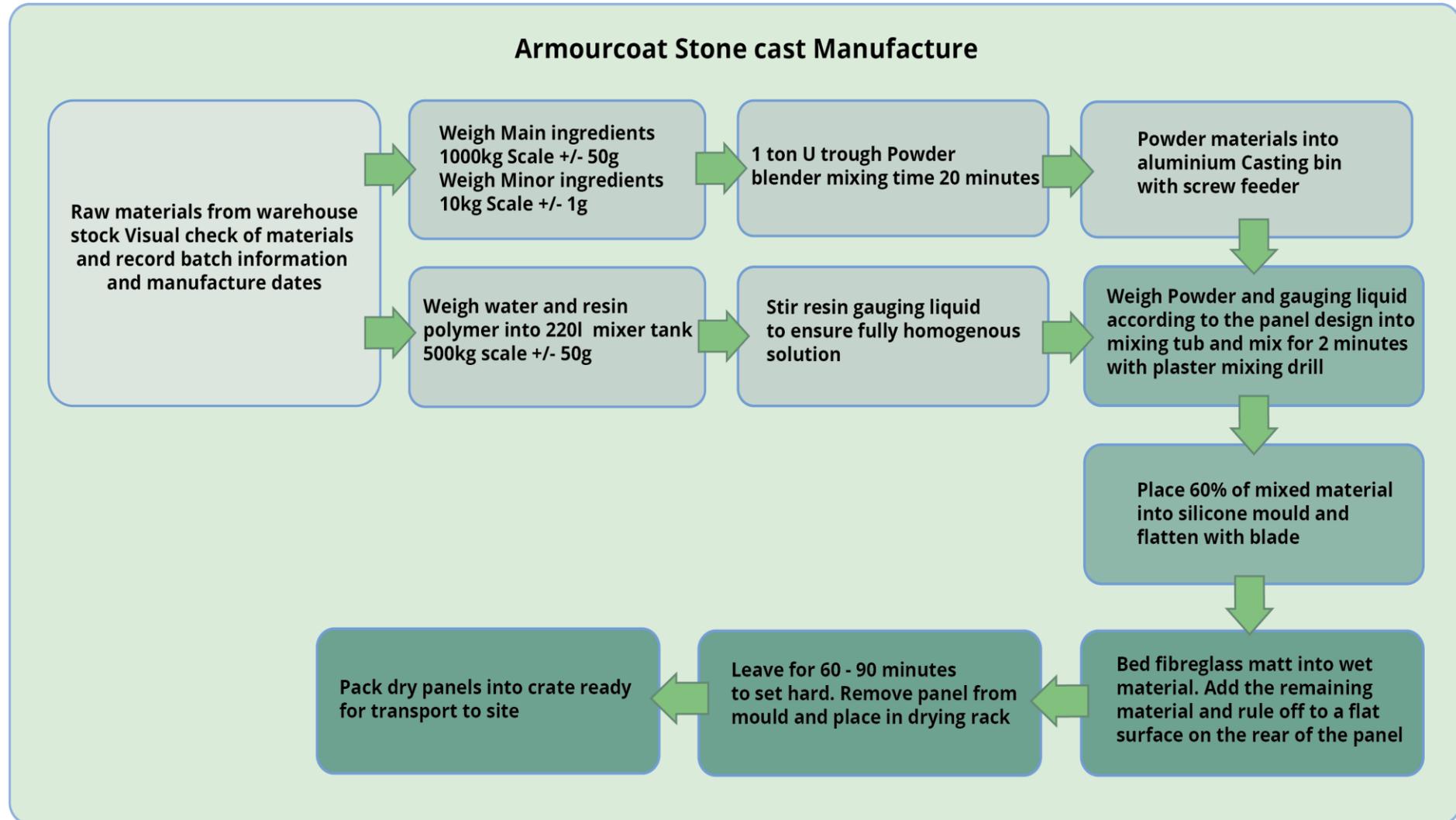
Module C2- All the end-of-life product is assumed to be sent to the closest recycling facilities. Transportation distance to the closest disposal area is assumed to be 80 km and the transportation method is assumed as lorry which is the most common.

Module C3 -Due to the composition of the product it can generally be crushed down to a powder and recycled as gypsum waste for reuse in the manufacture of gypsum plasterboard.

Module C4 - Allocation used in Ecoinvent 3.6 environmental data sources follows the methodology 'allocation, cut-off by classification'. This methodology is in line with the requirements of the EN 15804 - standard.

Module D – It is assumed that Wooden pallets are incinerated for the benefit of generation of heat and electricity.

## 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	Multiple factories
Averaging method	Averaged by shares of total mass
Variation in GWP-fossil for A1-A3	12.17 %

The average material use/m<sup>2</sup> was determined by analysing the last two years of panel production both in the UK and the US. In the UK we predominantly manufacture Concrete Effect panels and small quantity of custom Armourcast panels. In the US the Timber Effect panels are more popular and we do not undertake any custom Armourcast production.

We calculated the average by multiplying the material quantity weighed out to produce each panel type against the total number of panels produced in a two-year period to achieve an average panel weight of 12.13kg/m<sup>2</sup>.

The quantity of Bondplast is determined by the quantity we send to site for each install and our allowance is 2kg/m<sup>2</sup>. The range of total mass including the Bondplast adhesive is from 13.7 kg to 18 kg/m<sup>2</sup>.

For the custom Armourcast panels we may vary the type of aggregate used in the manufacture process to achieve different aesthetic appearance such as substituting crushed stone for sand or including mica flakes to give a speckled surface but as these alternative ingredients would have significantly less impact that the change of panel weight. Custom Armourcast could also be requested with a very deep relief but as the custom work accounts for less than 5% of our total production at present it is unlikely to significantly affect the overall averages.

Whilst the quantity of materials used has been averaged across all production sites, all other calculations have been made for the UK factory and raw material distances calculated accordingly.

In the US our factory is located very close to the gypsum manufacturer and the transport distances for the gypsum and lightweight glass aggregate are also less than in the UK. In the US less energy is used in the drying of the panels and a transport distance of 400km has been assumed which will cover the principal markets in California. As we are selling the panels to separate installers the crates are seldom returned so a 1x use has been applied to the pallet/crate and it is assumed these will be incinerated with the benefit of heat and electricity.

#### 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 <sup>1)</sup>	kg CO <sub>2</sub> e	1.26E0	4.75E-1	3.56E-1	2.09E0	1.41E-1	6.13E-1	MND	3.51E-8	1.03E-1	7.19E-2	2.64E-3	3.91E-1						
GWP – fossil	kg CO <sub>2</sub> e	1.25E0	4.73E-1	8.43E-1	2.56E0	1.42E-1	1.48E-1	MND	3.43E-8	1.03E-1	7.18E-2	2.63E-3	-4.23E-2						
GWP – biogenic	kg CO <sub>2</sub> e	1.11E-2	1.35E-3	-4.88E-1	-4.76E-1	1.03E-4	4.89E-1	MND	7E-10	7.46E-5	1.42E-4	5.22E-6	4.33E-1						
GWP – LULUC	kg CO <sub>2</sub> e	8.56E-4	3.24E-4	1.26E-3	2.44E-3	4.27E-5	1.35E-4	MND	5.66E-11	3.09E-5	2.13E-5	7.82E-7	-5.54E-5						
Ozone depletion pot.	kg CFC-11e	1.13E-7	9.15E-8	8.77E-8	2.92E-7	3.34E-8	1.94E-8	MND	3.04E-15	2.42E-8	2.96E-8	1.08E-9	-4.92E-9						
Acidification potential	mol H <sup>+</sup> e	8.43E-3	2.86E-3	3.22E-3	1.45E-2	5.96E-4	8.45E-4	MND	2E-10	4.31E-4	6.81E-4	2.5E-5	-1.07E-4						
EP-freshwater <sup>2)</sup>	kg Pe	3.94E-5	1.09E-5	2.72E-5	7.75E-5	1.15E-6	4.35E-6	MND	2.81E-12	8.36E-7	8.67E-7	3.18E-8	-1.19E-6						
EP-marine	kg Ne	1.59E-3	9.46E-4	6.57E-4	3.2E-3	1.8E-4	1.96E-4	MND	3.19E-11	1.3E-4	2.35E-4	8.61E-6	-7.65E-6						
EP-terrestrial	mol Ne	1.83E-2	1.05E-2	7.69E-3	3.65E-2	1.98E-3	2.22E-3	MND	3.7E-10	1.44E-3	2.58E-3	9.48E-5	-1.22E-4						
POCP (“smog”) <sup>3)</sup>	kg NMVOCe	5.2E-3	3.03E-3	2.14E-3	1.04E-2	6.38E-4	6.38E-4	MND	1.16E-10	4.62E-4	7.5E-4	2.75E-5	-3.04E-5						
ADP-minerals & metals <sup>4)</sup>	kg Sbe	3.67E-4	6.26E-6	3.17E-6	3.77E-4	2.42E-6	1.91E-5	MND	1.01E-12	1.75E-6	6.56E-7	2.41E-8	-4.89E-4						
ADP-fossil resources	MJ	1.86E1	7.18E0	2.02E1	4.59E1	2.21E0	2.68E0	MND	5.86E-7	1.6E0	2.01E0	7.36E-2	-1.2E0						
Water use <sup>5)</sup>	m <sup>3</sup> e depr.	3.54E-1	4.78E-2	5.13E-2	4.54E-1	8.21E-3	3.17E-2	MND	2.06E-6	5.94E-3	9.28E-2	3.4E-3	-3.34E-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	7.63E-8	3.96E-8	1.88E-8	1.35E-7	1.28E-8	8.88E-9	MND	1.68E-15	9.29E-9	1.32E-8	4.86E-10	2.52E-10						
Ionizing radiation <sup>6)</sup>	kBq U235e	4.68E-2	3.5E-2	3.17E-1	3.99E-1	9.64E-3	2.17E-2	MND	4.05E-9	6.98E-3	8.23E-3	3.02E-4	-2.19E-2						
Ecotoxicity (freshwater)	CTUe	4.34E1	6.32E0	1.13E1	6.1E1	1.69E0	3.32E0	MND	6.25E-7	1.22E0	1.27E0	4.65E-2	-4.57E-1						
Human toxicity, cancer	CTUh	5.76E-10	2.75E-10	3.69E-10	1.22E-9	4.31E-11	6.98E-11	MND	9.37E-17	3.12E-11	3E-11	1.1E-12	4.07E-12						
Human tox. non-cancer	CTUh	2.29E-8	7.36E-9	7.58E-9	3.79E-8	2E-9	2.16E-9	MND	2.09E-15	1.45E-9	9.25E-10	3.39E-11	3.34E-10						
SQP <sup>7)</sup>	-	6.6E0	7.91E0	1.23E0	1.57E1	3.33E0	1.65E0	MND	5.17E-8	2.41E0	3.41E0	1.25E-1	-1.52E-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 <sup>8)</sup>	MJ	1.05E0	3.08E-1	4.29E0	5.66E0	2.78E-2	2.96E-1	MND	7.95E-8	2.01E-2	1.62E-2	5.95E-4	-2.09E-1						
Renew. PER as material	MJ	0E0	0E0	4.7E0	4.7E0	0E0	-4.46E0	MND	0E0	0E0	0E0	0E0	-5.06E0						
Total use of renew. PER	MJ	1.05E0	3.08E-1	8.99E0	1.04E1	2.78E-2	-4.17E0	MND	7.95E-8	2.01E-2	1.62E-2	5.95E-4	-5.26E0						
Non-re. PER as energy	MJ	1.86E1	7.18E0	2.02E1	4.59E1	2.21E0	2.68E0	MND	5.86E-7	1.6E0	2.01E0	7.36E-2	-1.2E0						
Non-re. PER as material	MJ	0E0	0E0	0E0	0E0	0E0	0E0	MND	0E0	0E0	0E0	0E0	0E0						
Total use of non-re. PER	MJ	1.86E1	7.18E0	2.02E1	4.59E1	2.21E0	2.68E0	MND	5.86E-7	1.6E0	2.01E0	7.36E-2	-1.2E0						
Secondary materials	kg	8.54E-1	0E0	0E0	8.54E-1	0E0	4.27E-2	MND	0E0	0E0	0E0	0E0	0E0						
Renew. secondary fuels	MJ	0E0	0E0	0E0	0E0	0E0	0E0	MND	0E0	0E0	0E0	0E0	0E0						
Non-ren. secondary fuels	MJ	0E0	0E0	0E0	0E0	0E0	0E0	MND	0E0	0E0	0E0	0E0	0E0						
Use of net fresh water	m <sup>3</sup>	8.67E-3	1.92E-3	5.02E-3	0.0156	4.59E-4	1.03E-3	MND	1.17E-7	3.33E-4	2.2E-3	8.05E-5	-2.14E-4						

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	5.41E-2	1.7E-2	5.92E-2	1.3E-1	2.14E-3	7.16E-3	MND	3.44E-9	1.55E-3	0E0	6.87E-5	-1.55E-3						
Non-hazardous waste	kg	1.67E0	8.65E-1	1.38E0	3.92E0	2.37E-1	9.31E-1	MND	1.25E-7	1.72E-1	0E0	5E-1	2.56E-1						
Radioactive waste	kg	4.33E-5	4.65E-5	1.5E-4	2.4E-4	1.51E-5	1.45E-5	MND	3.16E-12	1.1E-5	0E0	4.87E-7	-1.01E-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	0E0	0E0	0E0	0E0	0E0						
Materials for recycling	kg	0E0	0E0	0E0	0E0	0E0	0E0	MND	0E0	0E0	1.36E1	0E0	0E0						
Materials for energy rec	kg	0E0	0E0	0E0	0E0	0E0	4.32E-1	MND	0E0	0E0	0E0	0E0	0E0						
Exported energy	MJ	0E0	0E0	0E0	0E0	0E0	0E0	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 <sub>2</sub> e	1.2E0	4.68E-1	8.28E-1	2.5E0	1.41E-1	1.44E-1	MND	3.35E-8	1.02E-1	7.04E-2	2.58E-3	-4.18E-2						
Ozone depletion Pot.	kg CFC <sub>11</sub> e	9.34E-8	7.46E-8	9.73E-8	2.65E-7	2.65E-8	1.72E-8	MND	3.43E-15	1.92E-8	2.34E-8	8.59E-10	-5.8E-9						
Acidification	kg SO <sub>2</sub> e	6.82E-3	1.83E-3	2.94E-3	1.16E-2	2.89E-4	1.12E-3	MND	1.62E-10	2.09E-4	2.84E-4	1.04E-5	-9.61E-5						
Eutrophication	kg PO <sub>4</sub> <sup>3</sup> e	1.64E-3	5.74E-4	8.35E-4	3.05E-3	5.83E-5	1.76E-4	MND	9.18E-11	4.22E-5	5.5E-5	2.02E-6	2.87E-7						
POCP ("smog")	kg C <sub>2</sub> H <sub>4</sub> e	3.56E-4	8.16E-5	1.29E-4	5.67E-4	1.83E-5	3.21E-5	MND	1.08E-11	1.32E-5	2.08E-5	7.64E-7	-4.77E-6						
ADP-elements	kg Sbe	3.67E-4	6.26E-6	3.17E-6	3.77E-4	2.42E-6	1.91E-5	MND	1.01E-12	1.75E-6	6.56E-7	2.41E-8	-4.89E-4						
ADP-fossil	MJ	1.86E1	7.18E0	2.02E1	4.59E1	2.21E0	2.68E0	MND	5.86E-7	1.6E0	2.01E0	7.36E-2	-1.2E0						

## 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

