

ENVIRONMENTAL PRODUCT DECLARATION

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

Asphalt Concrete base course made in the plants of Rio Maior and Escarpão
Tecnovia Industria SA



EPD HUB, HUB-3352

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GENERAL INFORMATION

MANUFACTURER

Manufacturer	Tecnovia Industria SA
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Website	www.greenlab.com.pt

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 1.1, 5 Dec 2023 c-PCR Bituminous Mixtures DN-PAV-03077
Sector	Construction product
Category of EPD	Third party verified EPD
Scope of the EPD	Cradle to gate with modules C1-C4, D
EPD author	Ricardo Mateus, Cláudia Jacinto, Cátia Fernandes - Greenlab
EPD verification	Independent verification of this EPD and data, according to ISO 14025: <input type="checkbox"/> Internal verification <input checked="" type="checkbox"/> External verification
EPD verifier	Sarah Curpen, 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	Asphalt Concrete base course made in the plants of Rio Maior and Escarpão
Place of production	Escarpão and Rio Maior, Portugal
Period for data	July of 2022 to june of 2023
Averaging in EPD	No averaging
Variation in GWP-fossil for A1-A3	- %

ENVIRONMENTAL DATA SUMMARY

Declared unit	1 tonne
Declared unit mass	1000 kg
GWP-fossil, A1-A3 (kgCO ₂ e)	2,72E+01
GWP-total, A1-A3 (kgCO ₂ e)	2,73E+01
Secondary material, inputs (%)	0,02
Secondary material, outputs (%)	90
Total energy use, A1-A3 (kWh)	84,8
Net freshwater use, A1-A3 (m ³)	0,12

PRODUCT AND MANUFACTURER

ABOUT THE MANUFACTURER

Tecnovia Indústria, a Tecnovia Group company that stands at the forefront of construction material production in mainland Portugal. With an extensive network of quarries, concrete and asphalt plants, we lead the industry in providing high-quality aggregates, asphalt mixtures, and ready-mix concrete. Renowned for our innovative approach to asphalt paving, we are committed to leveraging cutting-edge technologies to deliver products that excel in durability, quality, and sustainability.

PRODUCT DESCRIPTION

Hot-mix bituminous mixtures (≥ 160 °C), composed of limestone aggregates sourced from the same production facility where they are manufactured, and bitumen. The main energy used to heat the aggregates is liquefied petroleum gas. The maximum size of the aggregates used in these mixtures is considered medium, making these products ideal for applications in thicker layers with high mechanical strength requirements. Common uses include base, levelling, and binder courses on highways, national roads, municipal roads, or roundabouts.

Further information can be found at www.greenlab.com.pt.

PRODUCT RAW MATERIAL MAIN COMPOSITION

Raw material category	Amount, mass %	Material origin
Metals	-	-
Minerals	94,94	Portugal
Fossil materials	5,06	Portugal
Bio-based materials	-	-

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

FUNCTIONAL UNIT AND SERVICE LIFE

Declared unit	1 tonne
Mass per declared unit	1000 kg
Functional unit	-
Reference service life	-

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	MND	MND	MND	MND	MND	MND	MND	MND	MND	x	x	x	x	x	x
Raw materials	Transport	Manufacturing	Transport	Assembly	Use	Maintenance	Repair	Replacement	Refurbishment	Operational energy use	Deconstruction/ demolition	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.

In module A1, the process of producing raw materials is included, which considers:

- The extraction of resources and production of raw materials;
- The transportation to the treatment/production centers of the raw materials;
- The energy and fuel consumption during the production of raw materials;
- The consumption of other resources (such as water) during the production of raw materials;

water and soil during the production of raw materials;

- The production of the electricity used in the manufacturing process.

In module A2, the transportation of all raw materials by truck from the production sites to the manufacturing areas was considered. The transportation distances of the raw materials were provided by the responsible department, knowing the location of the plant and the supply facilities.

In module A3, the consumption of auxiliary materials for production, general consumption, and emissions were considered. The manufacturing process required electricity and LPG for the different equipment and heating.

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.

Module A4 was not evaluated. The transport of the products included in this study in the construction sector is extremely varied, making it impossible to estimate a representative figure.

Module A5 was also not evaluated. The means of application of the products included in this study in the construction sector are varied, making it impossible to define a scenario to be analyzed.

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 its useful life, in the demolition phase, it is assumed that 100% of the waste will be collected as separate construction waste. It is estimated that there is no loss of mass during the use of the product, so it is assumed that the product at the end of its useful life has the same weight as the declared product.

In module C1 the consumption of materials and energy necessary for the pavement demolition operations at the end of its useful life is included (water, fuel, and parts consumption).

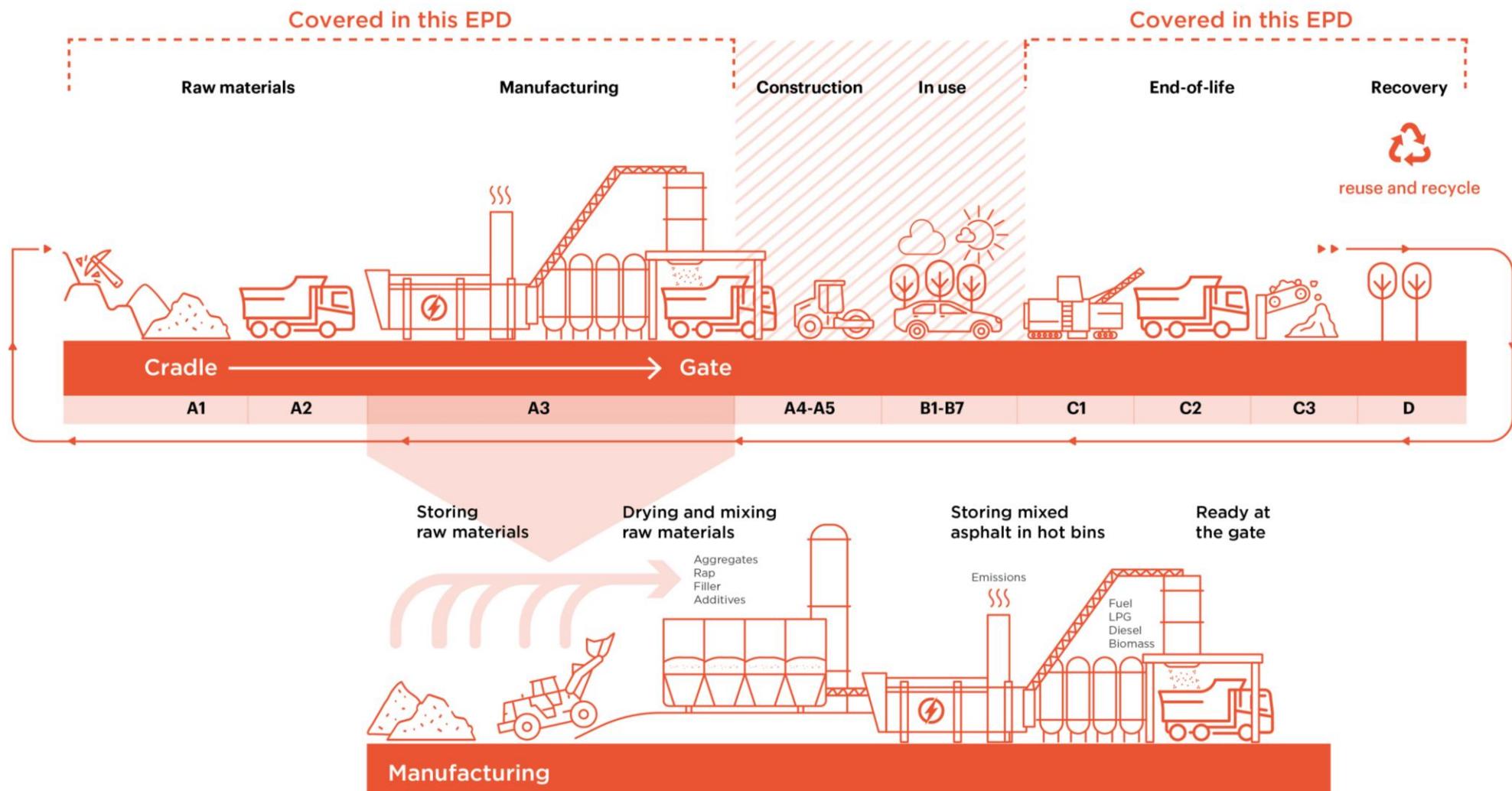
In module C2, it is considered that, at the end of its useful life, the product studied is transported by road an average distance of 60 km to the nearest waste management point, using trucks.

According to data provided by the company, 90% of the amount of waste can be reused or recycled (C3), while the remaining 10% would be discarded (C4).

According to data provided by the company, 90% of the amount of waste can be reused or recycled (C3), while the remaining 10% would be discarded (C4). For module C3, according to the c-PCR Bituminous Mixtures DN-PAV-03077, the impacts related to reprocessing of milled material should be accounted for in stage A1-A3. In the case of C4, the milled material that cannot be recycled or reused is destined for landfill.

In module D, the potential for reuse and recycling is included, expressed as net loads and benefits related to the secondary material recovered upon exiting the product system, calculating the material substitution effects only for the net resulting flow exiting the product stage.

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 material	Not applicable
Ancillary materials	No allocation
Manufacturing energy and waste	No allocation

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. The EPD Generator uses Ecoinvent v3.8, Plastics Europe, Federal LCA Commons and One Click LCA databases 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	1,30E+01	3,21E+00	1,10E+01	2,73E+01	MND	2,10E+00	8,18E-01	6,87E+00	1,94E+00	-1,70E+01								
GWP – fossil	kg CO ₂ e	1,30E+01	3,21E+00	1,10E+01	2,72E+01	MND	2,10E+00	8,18E-01	6,87E+00	1,94E+00	-1,70E+01								
GWP – biogenic	kg CO ₂ e	7,63E-03	0,00E+00	7,45E-07	7,63E-03	MND	0,00E+00	0,00E+00	-6,86E-03	-7,63E-04	0,00E+00								
GWP – LULUC	kg CO ₂ e	1,94E-02	1,26E-03	2,43E-02	4,49E-02	MND	2,20E-04	3,03E-04	5,83E-03	2,53E-03	-4,00E-03								
Ozone depletion pot.	kg CFC-11e	2,51E-06	7,42E-07	4,76E-06	8,01E-06	MND	4,43E-07	1,88E-07	1,85E-06	3,58E-07	-2,42E-06								
Acidification potential	mol H ⁺ e	3,28E-01	1,30E-02	1,30E-01	4,71E-01	MND	8,89E-03	3,45E-03	5,16E-02	1,13E-02	-3,62E-01								
EP-freshwater ²⁾	kg Pe	2,02E-04	2,27E-05	1,11E-04	3,36E-04	MND	7,47E-06	6,63E-06	1,00E-04	1,16E-05	-3,51E-04								
EP-marine	kg Ne	6,31E-02	3,89E-03	2,60E-02	9,30E-02	MND	3,22E-03	1,03E-03	1,79E-02	4,71E-03	-7,01E-02								
EP-terrestrial	mol Ne	6,94E-01	4,29E-02	2,86E-01	1,02E+00	MND	3,55E-02	1,13E-02	1,96E-01	4,61E-02	-7,97E-01								
POCP ("smog") ³⁾	kg NMVOCe	2,15E-01	1,32E-02	9,70E-02	3,25E-01	MND	1,01E-02	3,61E-03	5,64E-02	1,32E-02	-2,34E-01								
ADP-minerals & metals ⁴⁾	kg Sbe	3,07E-05	1,12E-05	7,93E-06	4,98E-05	MND	1,08E-06	1,98E-06	2,39E-05	2,62E-06	-7,81E-04								
ADP-fossil resources	MJ	1,84E+02	4,76E+01	3,01E+02	5,33E+02	MND	2,80E+01	1,23E+01	1,37E+02	2,44E+01	-2,27E+02								
Water use ⁵⁾	m ³ e depr.	3,79E+03	2,20E-01	1,18E+00	3,79E+03	MND	2,90E+02	5,50E-02	8,39E-01	9,04E-02	-5,18E+00								

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.

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	2,47E-06	2,81E-07	9,54E-07	3,70E-06	MND	1,13E-07	9,28E-08	9,89E-07	9,50E-07	-2,71E-06								
Ionizing radiation ⁶⁾	kBq IJ135e	9,19E-01	2,48E-01	1,39E+00	2,56E+00	MND	1,31E-01	5,88E-02	7,28E-01	1,14E-01	-1,52E+00								
Ecotoxicity (freshwater)	CTUe	1,69E+02	3,96E+01	1,77E+02	3,85E+02	MND	1,69E+01	1,10E+01	1,07E+02	1,80E+01	-1,84E+02								
Human toxicity, cancer	CTUh	1,44E-08	1,22E-09	1,99E-09	1,76E-08	MND	1,95E-09	2,74E-10	4,59E-09	5,52E-10	-8,12E-09								
Human tox. non-cancer	CTUh	1,49E-07	4,02E-08	5,76E-08	2,47E-07	MND	9,40E-09	1,09E-08	8,58E-08	1,29E-08	-1,85E-07								
SQP ⁷⁾	-	2,29E+06	3,43E+01	4,12E+01	2,29E+06	MND	3,66E+00	1,38E+01	2,67E+02	3,68E+01	-3,51E+01								

6) EN 15804+A2 disclaimer for Ionizing radiation, human health. This impact category deals mainly with the eventual impact of low-dose ionizing radiation on human health of the nuclear fuel cycle. It does not consider effects due to possible nuclear accidents, occupational exposure nor due to radioactive waste disposal in underground facilities. Potential ionizing radiation from the soil, from radon and from some construction materials is also not measured by this indicator; 7) SQP = Land use related impacts/soil quality.

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	1,01E+01	6,77E-01	1,25E+01	2,33E+01	MND	1,80E-01	1,41E-01	2,77E+00	2,71E-01	-1,22E+01								
Renew. PER as material	MJ	0,00E+00	0,00E+00	0,00E+00	0,00E+00	MND	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00								
Total use of renew. PER	MJ	1,01E+01	6,77E-01	1,25E+01	2,33E+01	MND	1,80E-01	1,41E-01	2,77E+00	2,71E-01	-1,22E+01								
Non-re. PER as energy	MJ	1,62E+02	4,76E+01	7,22E+01	2,82E+02	MND	2,80E+01	1,23E+01	1,37E+02	2,44E+01	-2,27E+02								
Non-re. PER as material	MJ	2,17E+01	0,00E+00	2,29E-02	2,17E+01	MND	0,00E+00	0,00E+00	-1,95E+01	-2,17E+00	0,00E+00								
Total use of non-re. PER	MJ	1,84E+02	4,76E+01	7,22E+01	3,04E+02	MND	2,80E+01	1,23E+01	1,17E+02	2,22E+01	-2,27E+02								
Secondary materials	kg	1,93E-01	1,58E-02	1,62E-02	2,25E-01	MND	3,37E-02	3,45E-03	5,50E-02	7,47E-03	-7,32E-02								
Renew. secondary fuels	MJ	9,44E-04	1,74E-04	2,43E-04	1,36E-03	MND	3,76E-05	3,50E-05	1,46E-03	1,17E-04	-3,82E-05								
Non-ren. secondary fuels	MJ	0,00E+00	0,00E+00	0,00E+00	0,00E+00	MND	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00								
Use of net fresh water	m ³	8,60E-02	6,00E-03	2,71E-02	1,19E-01	MND	1,89E-03	1,59E-03	1,11E-01	1,73E-02	-1,02E-01								

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	8,62E-01	5,39E-02	2,70E-01	1,19E+00	MND	4,53E-02	1,61E-02	2,63E-01	3,05E-02	-5,43E-01								
Non-hazardous waste	kg	7,31E+00	9,53E-01	4,31E+00	1,26E+01	MND	2,89E-01	2,66E-01	3,96E+02	5,45E+00	-1,63E+01								
Radioactive waste	kg	1,11E-03	3,28E-04	2,04E-03	3,48E-03	MND	1,97E-04	8,22E-05	8,58E-04	1,56E-04	-1,29E-03								

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	0,00E+00	0,00E+00	0,00E+00	0,00E+00	MND	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00								
Materials for recycling	kg	0,00E+00	0,00E+00	0,00E+00	0,00E+00	MND	0,00E+00	0,00E+00	9,00E+02	0,00E+00	0,00E+00								
Materials for energy rec	kg	0,00E+00	0,00E+00	0,00E+00	0,00E+00	MND	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00								
Exported energy	MJ	0,00E+00	0,00E+00	0,00E+00	0,00E+00	MND	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00								

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	1,28E+01	3,18E+00	1,09E+01	2,69E+01	MND	2,08E+00	8,09E-01	6,77E+00	1,78E+00	-1,70E+01								
Ozone depletion Pot.	kg CFC-11e	2,01E-06	5,88E-07	3,77E-06	6,37E-06	MND	3,51E-07	1,49E-07	1,47E-06	2,83E-07	-1,93E-06								
Acidification	kg SO ₂ e	2,67E-01	1,01E-02	1,07E-01	3,84E-01	MND	6,65E-03	2,68E-03	3,89E-02	8,44E-03	-2,86E-01								
Eutrophication	kg PO ₄ ³⁻ e	2,79E-02	2,30E-03	1,31E-02	4,33E-02	MND	1,48E-03	6,11E-04	1,18E-02	3,82E-02	-3,32E-02								
POCP ("smog")	kg C ₂ H ₄ e	8,20E-03	4,14E-04	4,82E-03	1,34E-02	MND	2,77E-04	1,05E-04	1,49E-03	3,84E-04	-8,82E-03								
ADP-elements	kg Sbe	3,03E-05	1,09E-05	7,81E-06	4,91E-05	MND	1,06E-06	1,92E-06	2,33E-05	2,57E-06	-7,81E-04								
ADP-fossil	MJ	1,83E+02	4,76E+01	3,01E+02	5,32E+02	MND	2,80E+01	1,23E+01	1,36E+02	2,44E+01	-2,27E+02								

ENVIRONMENTAL IMPACTS – GWP-GHG - THE INTERNATIONAL EPD SYSTEM

Impact category	Unit	A1	A2	A3	A1-A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
GWP-GHG ⁹⁾	kg CO ₂ e	1,30E+01	3,21E+00	1,10E+01	2,73E+01	MND	2,10E+00	8,18E-01	6,87E+00	1,94E+00	-1,70E+01								

9) This indicator includes all greenhouse gases excluding biogenic carbon dioxide uptake and emissions and biogenic carbon stored in the product as defined by IPCC AR 5 (IPCC 2013). In addition, the characterisation factors for the flows - CH₄ fossil, CH₄ biogenic and Dinitrogen monoxide - were updated in line with the guidance of IES PCR 1.2.5 Annex 1. This indicator is identical to the GWP-total of EN 15804:2012+A2:2019 except that the characterization factor for biogenic CO₂ is set to zero.

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.

Sarah Curpen, as an authorized verifier acting for EPD Hub Limited.

23.05.2025

