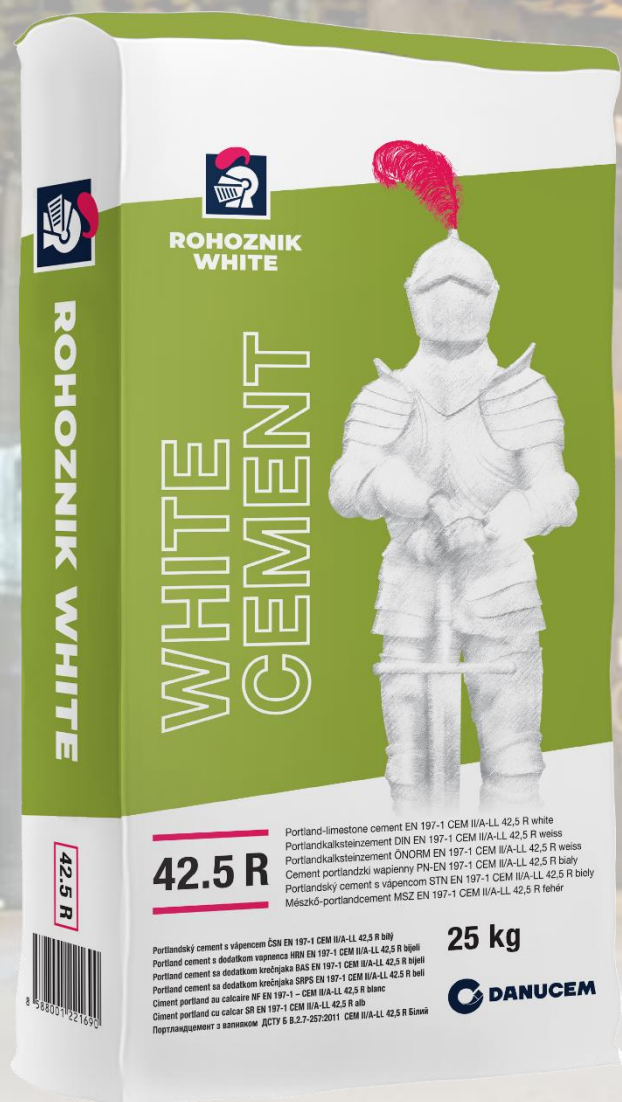




ENVIRONMENTAL PRODUCT DECLARATION

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

CEM II/A-LL 52.5 N; CEM II/A-LL 42.5 R; White Portland-limestone cement
Danucem Slovensko a.s.

EPD HUB, HUB-0912

Publishing date 04 December 2023, last updated date 04 December 2023, valid until 04 December 2028

GENERAL INFORMATION

MANUFACTURER

Manufacturer	Danucem Slovensko a.s.
Address	906 38 Rohožník, Slovak Republic
Contact details	robert.polc@danucem.com
Website	www.danucem.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
EPD author	Silvia Vilčeková
EPD verification	Independent verification of this EPD and data, according to ISO 14025: ☐ Internal certification ☒ External verification
EPD verifier	Elisabet Amat, 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	White Portland-limestone cement
Additional labels	CEM II/A-LL 52.5 N WHITE CEM II/A-LL 42.5 R WHITE
Product reference	-
Place of production	906 38 Rohožník, Slovakia
Period for data	2022
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)	1,1E3
GWP-total, A1-A3 (kgCO ₂ e)	1,1E3
Secondary material, inputs (%)	0.0
Secondary material, outputs (%)	0.0
Total energy use, A1-A3 (kWh)	2130.0
Total water use, A1-A3 (m ³ e)	3,03E0

PRODUCT AND MANUFACTURER

ABOUT THE MANUFACTURER

DANUCEM Slovensko a.s. is the largest producer and supplier of building materials - cement, aggregates and ready-mixed concrete and related services in Slovakia. Premium quality cements are produced in DANUCEM cement plants Rohožník and Turňa nad Bodvou. DANUCEM Slovensko a.s. has implemented the quality management system EN ISO 9001, the environmental management system EN ISO 14001 and the occupational health and safety management system EN ISO 45001.

For DANUCEM and CRH Company sustainability is the key value and we commit us to the highest standards of environmental management in all our activities. Our management systems are implemented optimally and checked regularly, with respect to the best available practices in this industry. Sharing of knowledge in the DANUCEM Group plays a significant role in this process. Our policy, applied in all our groups, obliges us to:

- to follow all relevant environmental regulations,
- to improve environmental management in order to achieve the best practices,
- to monitor and report on the performance of environmental management in accordance with our policy,
- to maintain open communication and ensure that our employees and contractors carry out their environmental obligations,
- to handle challenges of the climate change proactively,
- to prevent environmental pollution, reduce emissions and optimize the consumption of energy, water and other natural resources,
- to promote sustainable products, processes and new business innovations,
- to develop positive relationships with other parties and to aim to be good neighbours in every community in which we operate.

PRODUCT DESCRIPTION

White Portland-limestone cement strength class of 52.5 N with a guaranteed minimum strength of 52.5 MPa after 28 days and minimum 20 MPa after 2 days. The White Portland-limestone cement opens new dimensions in design and construction, excellent quality, high strength, and aesthetic appearance.

Advantages:

- Suitable for winter use as well
- Pumpability, decreased sedimentation
- Excellent compatibility with plastification admixtures
- Superior quality and high durability
- Good initial and final strength
- Production of white or coloured concrete, plaster or mortar with suitable pigments
- High strength and an unlimited formability
- Fine surface textures
- Decorative harmony and universal use

Applications:

- Dry construction mixtures
- Interlocking pavers and patio pavers
- Precast concrete products
- White and coloured concrete
- Garden architecture elements
- Products in combination with grey cement

Shipping options:

bulk in silo trucks, dispatched from: Rohožník Plant

Product Standards:

EN 197-1:2011, EN 196-1, EN 196-2, EN 196-3

Technical specification / Physical properties of the product:

Further information can be found at www.danucem.com

PRODUCT RAW MATERIAL MAIN COMPOSITION

Raw material category	Amount, mass- %	Material origin
Metals	< 0.1%	SK, EU
Minerals	> 99%	SK, EU
Fossil materials	0%	-
Bio-based materials	0	-

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).

TECHNICAL PARAMETERS OF THE PRODUCT

Parameter	Test method	EN 197-1:2011	Typical value
SO3 content (%wt.)	EN 196-2	≤ 4.0	2.7
Cl- content (%wt.)	EN 196-2	≤ 0.1	0.01
Volume stability (mm)	EN 196-3	≤ 10	0.5
Setting time (min.)	EN 196-3	≥ 45	125
Compressive strength in 2 days (MPa)	EN 196-1	≥ 20.0	31.0
Compressive strength in 28 days (MPa)	EN 196-1	≥ 52.5	57.0

CEM II/A-LL 52.5 N white meets the requirements of Decree No. 275/2004 on Reduced Cr⁶⁺ Content.

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	MND	MND	MND	MND	MND
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)

Cement production is a complex process that begins with mining and grinding raw materials that include limestone and clay, to a fine powder, called raw meal. Raw meal is heated to a sintering temperature in a cement kiln and then a fusion temperature, which is about 1500°C - 1600°C to sinter the materials into clinker. In this process, the chemical bonds of the raw materials are broken down and then they are recombined into new compounds. The result is called clinker. The clinker is ground to a fine powder in a cement mill and mixed with gypsum, limestone, granulated blast furnace slag and other minor additional constituents to create cement.

Direct emissions related to calcination process are taken into account in the manufacturing stage.

The distance of extracted raw materials transport to the plant represents 1.5 km. Transport is carried out by conveyor belt.

The environmental impacts considered for the production stage cover the manufacturing of the production materials and fuels used by machines as well as handling of waste formed in the production processes at the manufacturing facilities are included in this stage. The environmental impacts of this stage have been calculated using the most recent data in regard to what applied in the factory. The data is from the year 2022. The study considers the losses of main raw materials occurring during the manufacturing process.

TRANSPORT AND INSTALLATION (A4-A5)

This EPD does not cover transportation (A4) and installation (A5).

PRODUCT USE AND MAINTENANCE (B1-B7)

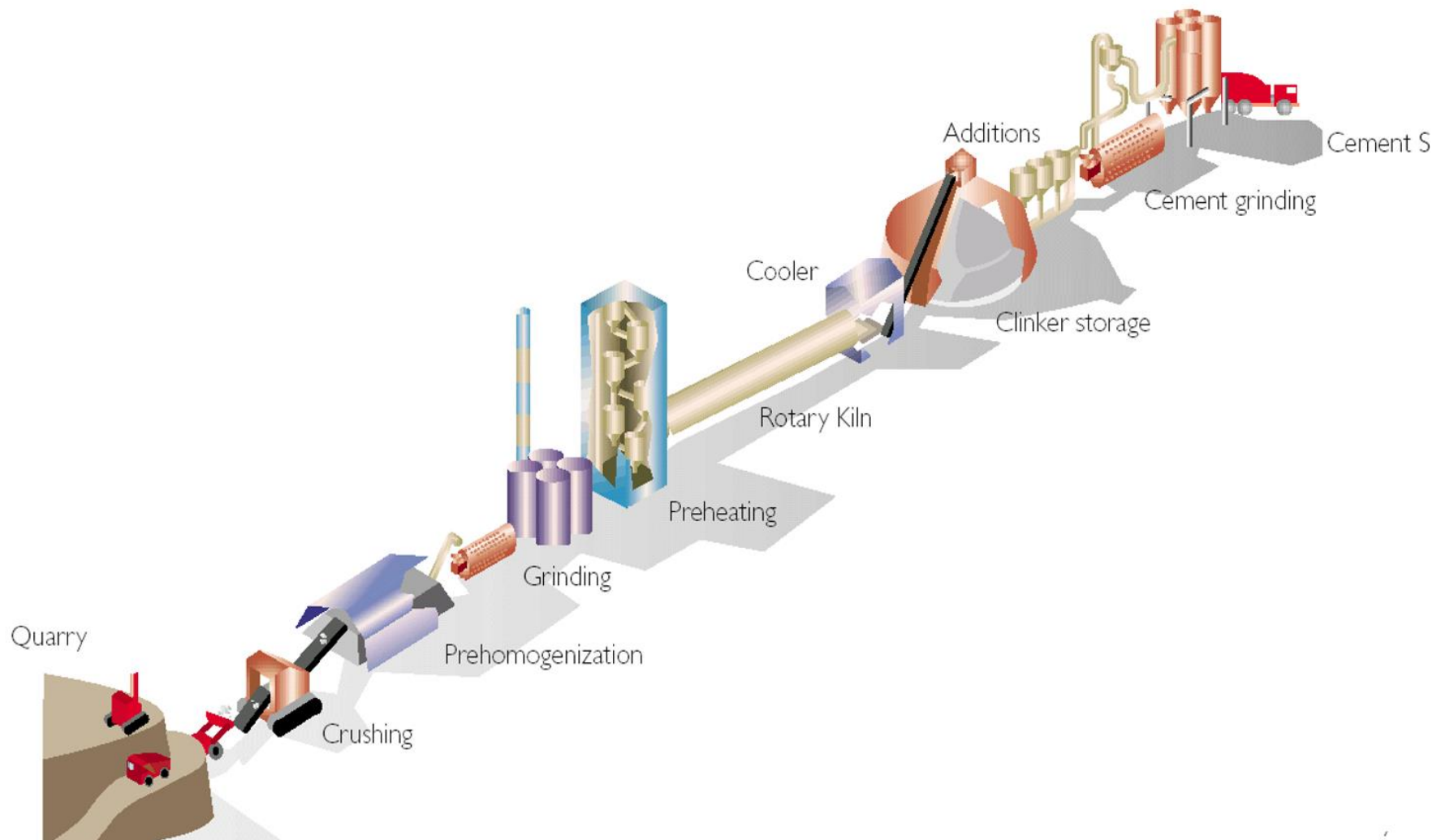
This EPD does not cover the use phase. Air, soil, and water impacts during the use phase have not been studied.

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

PRODUCT END OF LIFE (C1-C4, D)

Since cement is an intermediate product, other modules than A1-A3 are not relevant. Therefore, this EPD does not cover the end-of-life phase.

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.

Allocation is based on annual production rate and made with high accuracy and precision. The values for 1 t of the produced product which is used within this study are calculated by considering the total product weight per annual production.

In the production plant, several kinds of products are produced; since the production processes of these products are similar, the annual production percentages are taken into consideration for allocation. According to the ratio of the annual production of the declared product to the total annual production at the factory, the annual total energy consumption and generated waste per the declared product are allocated.

In this study, allocation has been done in the following ways:

Data type	Allocation
Raw materials	Allocated by mass or volume
Packaging materials	Not applicable
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	- %

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	3,56E1	1,03E1	1,05E3	1,1E3	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND
GWP – fossil	kg CO ₂ e	3,5E1	1,02E1	1,06E3	1,1E3	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND
GWP – biogenic	kg CO ₂ e	4,75E-1	4,78E-2	-2,48E0	-1,96E0	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND
GWP – LULUC	kg CO ₂ e	4,32E-2	1,07E-2	4,35E-1	4,89E-1	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND
Ozone depletion pot.	kg CFC-11e	5,37E-6	1,57E-6	3,29E-5	3,99E-5	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND
Acidification potential	mol H ⁺ e	2,55E-1	7,72E-2	3,99E0	4,33E0	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND
EP-freshwater ²⁾	kg Pe	2,06E-3	3,71E-4	2E-2	2,24E-2	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND
EP-marine	kg Ne	4,62E-2	2,64E-2	4,58E-1	5,31E-1	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND
EP-terrestrial	mol Ne	6,01E-1	2,92E-1	5,12E0	6,02E0	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND
POCP (“smog”) ³⁾	kg NMVOCe	1,44E-1	8,09E-2	2,67E0	2,9E0	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND
ADP-minerals & metals ⁴⁾	kg Sbe	3,41E-3	9,84E-5	3,27E-4	3,84E-3	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND
ADP-fossil resources	MJ	5,91E2	1,51E2	6,31E3	7,05E3	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND
Water use ⁵⁾	m ³ e depr.	3,07E1	1,43E0	3,23E1	6,44E1	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND

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.

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	7,13E1	1,08E1	2,18E2	3,01E2	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND
Renew. PER as material	MJ	0E0	0E0	0E0	0E0	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND
Total use of renew. PER	MJ	7,13E1	1,08E1	2,18E2	3,01E2	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND
Non-re. PER as energy	MJ	5,91E2	1,51E2	6,31E3	7,05E3	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND
Non-re. PER as material	MJ	0E0	0E0	0E0	0E0	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND
Total use of non-re. PER	MJ	5,91E2	1,51E2	6,31E3	7,05E3	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND
Secondary materials	kg	0E0	0E0	0E0	0E0	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND
Renew. secondary fuels	MJ	0E0	0E0	0E0	0E0	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND

Non-ren. secondary fuels	MJ	0E0	0E0	3,29E2	3,29E2	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND
Use of net fresh water	m ³	1,83E0	4,83E-2	1,14E0	3,03E0	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND

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	1,89E0	5,61E-1	3,89E1	4,14E1	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND
Non-hazardous waste	kg	8,99E1	2,01E1	7,94E2	9,04E2	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND
Radioactive waste	kg	2,61E-3	9,1E-4	1,62E-2	1,97E-2	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND

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	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND
Materials for recycling	kg	0E0	0E0	0E0	0E0	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND
Materials for energy rec	kg	0E0	0E0	0E0	0E0	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND
Exported energy	MJ	0E0	0E0	0E0	0E0	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND

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	3,43E1	1E1	1,03E3	1,08E3	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND
Ozone depletion Pot.	kg CFC ₁₁ e	6,29E-6	1,32E-6	3,25E-5	4,01E-5	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND
Acidification	kg SO ₂ e	1,84E-1	5,54E-2	3,56E0	3,79E0	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND
Eutrophication	kg PO ₄ ³ e	7,1E-2	1,95E-2	6,81E-1	7,71E-1	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND
POCP ("smog")	kg C ₂ H ₄ e	7,48E-3	2,13E-3	2,3E-1	2,4E-1	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND
ADP-elements	kg Sbe	3,41E-3	9,84E-5	3,27E-4	3,84E-3	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND
ADP-fossil	MJ	5,91E2	1,51E2	6,31E3	7,05E3	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND

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.

Elisabet Amat, as an authorized verifier acting for EPD Hub Limited
04.12.2023



ANNEX: LIFE-CYCLE ASSESSMENT RESULT VISUALIZATION

