



Heidelberg Materials

CEM II/B-V 42,5 N QUATRO CEM

EPD

Environmental Product Declaration for Portland Composite Cement



Environmental Product Declaration
in accordance with ISO 14025:2006 and
EN 15804:2012+A2:2019/AC:2021

Registration number: **EPD-IES-0015852**

An EPD should provide current information and may be updated if conditions change.

The stated validity is therefore subject to the continued registration and publication at www.environdec.com.



GENERAL INFORMATION

Programme:	The International EPD® System
Address	EPD International AB Box 210 60 SE-100 31 Stockholm Sweden
Website	www.environdec.com
E-mail	info@environdec.com

CEN standard EN 15804 serves as the Core Product Category Rules (PCR)

Product category rules (PCR):

PCR 2019:14 v.1.3.4 Product Category rules | Construction products | The International EPD® System
UN CPC: 3744

PCR review was conducted by: The Technical Committee of the International EPD System. See www.environdec.com for a list of members. Review chair: Claudia A. Peña, University of Concepción, Chile. The review panel may be contacted via the Secretariat www.environdec.com/contact.

Independent third-party verification of the declaration and data, according to ISO 14025:2006 and EN 15804:2012+A2:2019/AC:2021

EPD process certification EPD verification

Third party verifier: Eurocert S.A.

Accredited by: Hellenic Accreditation System SA (E.S.Y.D), Accreditation No. 21

Procedure for follow-up of data during EPD validity involves third party verifier

Yes No

The EPD owner has the sole ownership, liability, and responsibility for the EPD. EPDs within the same product category but registered in different EPD programs, or not compliant with EN 15804:2012+A2:2019/AC:2021, may not be comparable. For two EPDs to be comparable, they must be based on the same PCR (including the same version number) or be based on fully-aligned PCRs or versions of PCRs; cover products with identical functions, technical performances and use (e.g. identical declared/functional units); have equivalent system boundaries and descriptions of data; apply equivalent data quality requirements, methods of data collection, and allocation methods; apply identical cut-off rules and impact assessment methods (including the same version of characterisation factors); have equivalent content declarations; and be valid at the time of comparison. For further information about comparability, see EN 15804 and ISO 14025.

COMPANY INFORMATION

Owner of the EPD: Heidelberg Materials Vulkan JSC

Contact: Ivayla Vasileva – Sustainable Development Manager

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Description of the organisation: Building materials manufacturer

Product-related or management system-related certifications: Product group classification: UN CPC 3744, The CEN standard EN 15804:2012+A2:2019/AC:2021 serves as the core Product Category Rules, PCR 2019:14 Construction products (EN 15804:A2); Version 1.11; 2021-02-05 c-PCR-001 Cement and Building Lime (EN 16908:2017) 2010-12-20, PCR review was conducted by The Technical Committee of the International EPD® System and Independent third-party verification of the declaration and data in accordance with ISO 14025:2006 and EN 15804:2012+A2:2019/AC:2021

Name and location of production site(s): Heidelberg Materials Vulkan JSC, Vulkan District, 6400 Dimitrovgrad, Bulgaria



INTRODUCTION

As part of Heidelberg Materials, a symbol of competence and quality in integrated building materials manufacturing for over 145 years, our company has a strong local presence in Bulgaria. Our operations span nearly 50 countries worldwide and include the following entities in Bulgaria:

1. Heidelberg Materials Devnya Cement Plant
2. Heidelberg Materials Vulkan Grinding Center
3. Damyanitza Terminal
4. Heidelberger Beton - Ready-Mix Plant
5. Quarries

Drawing upon 77 years of industry expertise and fueled by our commitment to sustainable growth, the local subsidiaries that constitute Heidelberg Materials (HM) in Bulgaria are established leaders in the local market. Our core activity involves transforming raw materials into essential products such as cement and concrete. These products meet the global demand for safe, resilient, and eco-friendly solutions for housing and infrastructure projects.

Our state-of-the-art Heidelberg Materials Devnya cement plant boasts cutting-edge cement production technology, earning it prestigious awards in categories such as "Investor of the Year," "Industrial Building of the Year," and "Greenest Company."

Enabling New Levels of Sustainable Construction

At Heidelberg Materials, we prioritize sustainability, circularity, and technological innovation across all aspects of our operations. Our commitment extends to offering customers innovative, low-carbon footprint construction products. Under our new global



brand, evoBuild and evoZero we provide products characterized by sustainability credentials:

- **Low-Carbon Products:** These meet stringent CO₂ thresholds.
- **Circular Products:** They contain a specific recycled aggregates content.

Adhering to our Sustainability Policy and Integrated Management System, we actively reduce the carbon footprint of our production activities. Additionally, we implement various projects to achieve carbon-neutral production without compromising quality. Our corporate clients benefit from our mobile laboratory services, which offer professional advice and on-site assistance during large construction projects. The mobile laboratory travels extensively across the country, aiding in product recipe optimization.





Towards a Carbon-Neutral Future

Heidelberg Materials Devnya and Heidelberg Materials Vulkan operate throughout the built environment value chain, aiming for a carbon-neutral future. Our roadmap includes:

- **Net CO₂ Emissions Reduction:** Reduce our Scope 1 CO₂ emissions to 400 kg per ton of cementitious material.
- **Low-Carbon Cementitious Products:** We develop these products and collaborate on carbon capture R&D projects at the cement plant.
- **Alternative Fuels:** Over the past 6 years, we've successfully incorporated alternative fuels, driving down the CO₂ footprint of our products and operations.

Our goal is to deliver carbon-neutral concrete by 2050.

Project ANRAV: Pioneering Carbon Capture

In July 2022, Heidelberg Materials Devnya achieved a significant milestone. It became the first company in Eastern Europe to secure funding from the European Union's Innovation Fund for carbon capture, utilization, and storage (CCUS). Project ANRAV, in partnership with another Bulgarian company, aims to capture 0.8 Mt CO₂ per year. This groundbreaking initiative will reduce industrial carbon emissions in the country by approximately 8% over a 10-year period, positioning us as a carbon-neutral company and contributing to the country's overall carbon reduction efforts.

ANRAV



Introduction to Environmental Product Declarations (EPDs)

The release of our cement Environmental Product Declarations (EPDs) marks a significant milestone for Heidelberg Materials in Bulgaria. These EPDs aim to provide comprehensive information about the environmental performance of our cements. By doing so, they play a crucial role in shaping how the construction industry assesses the environmental impact of buildings and infrastructure projects – both now and in the future.

Our EPDs go beyond mere documentation. They establish a robust, science-based framework for driving environmental improvements across the sites Heidelberg Materials Bulgaria and throughout the supply chain. As a result, our customers, who aspire to be leaders in sustainable infrastructure and construction, gain added value from these transparent and data-driven declarations.



1 CEMENT PLANT



1 CEMENT GRINDING FACILITY



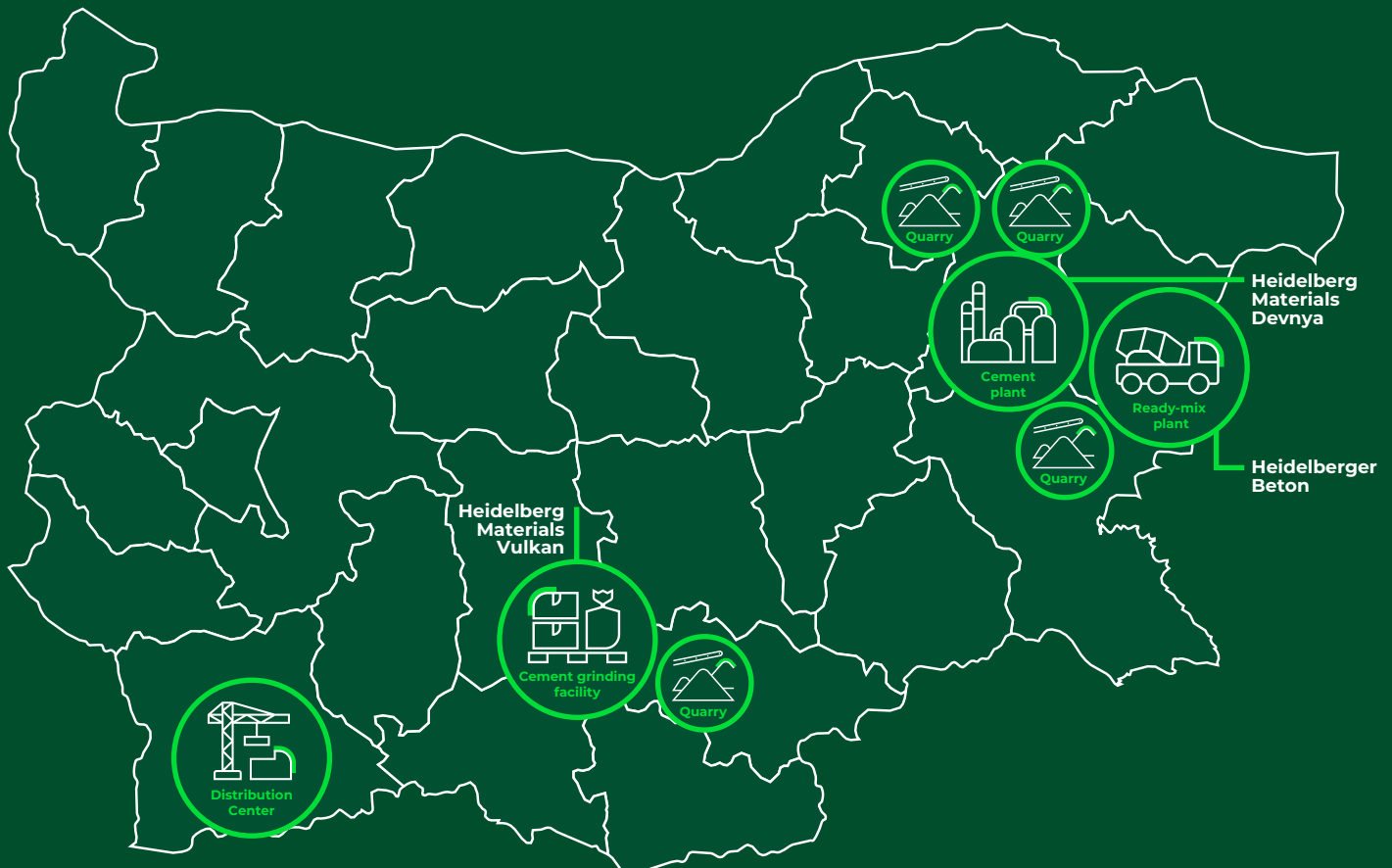
1 DISTRIBUTION CENTER



1 READY MIX PLANT



4 QUARRIES



PRODUCT INFORMATION

Product name: QUATRO CEM

Product identification: CEM II/B-V 42,5 N

Compressive Strength 28 days (MPa): 42,5 – 62,5

Product description: Cement plays a crucial role in construction and civil engineering as a fundamental material. It serves as a hydraulic binder- a fine powder which, when mixed with water, becomes a paste capable of bonding, curing and increasing its strength in both air and water environments. Cement serves as the main ingredient for making concrete, mortar, grouts and various types of plasters.

The production of cement involves grinding cement clinker along with other primary or minor constituents. Upon adding water to cement, a cement paste forms, which subsequently sets and hardens through hydration reactions. The specified product is a type of cement conforming to the composition of Portland Mixed Cement CEM II/B-V 42,5 N. It is manufactured by Heidelberg Materials Bulgaria at the VULKAN plant.

This product-specific Environmental Product Declaration (EPD) pertains to cement types CEM II/B-V 42,5 N, meeting the requirements outlined in EN 197-1.

For marketing this product within the European Union and the European Free Trade Association (EU/EFTA, excluding Switzerland), Regulation (EU) No. 305/2011 (Construction Product Regulation, CPR) applies. The product necessitates a Declaration of Performance, considering EN 197-1, as well as the CE marking. Additionally, the application and use of the product must adhere to the relevant national provisions.

Applications:

Cement finds diverse applications, primarily serving as a binder for both concrete and mortar. Its use in concrete is governed by EN 206 and national application to EN 206. According to this standard, cement conforming to EN 197-1 demonstrates general suitability. This type of cement has a broad range of applications, particularly in construction projects, ready-mixed concrete production, and the manufacturing of concrete products.

Technical Data: The declared cement corresponds to the 42.5 standard compressive strength class with normal strength development @ in accordance with EN 197-1.

The product's performance data, aligned with its Essential Characteristics as per EN 197-1, is documented in the Declaration of Performance.

Product Information and Certifications: The technical characteristics and composition of the product are shown in the tables below. For more information, you can visit the Heidelberg Materials company website.

Technical characteristics according to EN 197-1		CEM II/B-M (P-L) 32,5 N
Mechanical properties	Compressive Strength 2 days (MPa)	≥ 10
	Compressive Strength 28 days (MPa)	42,5 - 62,5
Chemical properties	Sulfate content (SO ₃ , % w/w)	≤ 3.5
	Chloride content (Cl, % w/w)	≤ 0.1
Physical properties	Initial setting time (min)	≥ 60
	Soundness (mm)	≤ 10

Composition % by mass*	
Clinker	65-79
Fly ash	21-35
Minor additional constituents	0-5

Gypsum/Anhydrite/Residual Gypsum, added to cement as setting regulators is not included in the mentioned composition.

Delivery Options:

- Bulk (Silo truck)
- Big bags 1,4 tons
- 25 kg paper bag / 1.6 ton pallet

LIFE CYCLE ASSESSMENT (LCA) INFORMATION



Functional unit / Declared unit: The declared unit for this study is one metric ton (1,000kg).

Reference Service Life: The reference service life is not relevant in this case due to the cradle-to-gate boundary conditions.

Time Representativeness: The data used in this study cover the reporting year 2023.

Database(s) and LCA Software Used: The study utilized the GCCA Industry EPD Tool for Cement and Concrete along with the SAP 7700.1.7 and Ecoinvent (v 3.5.) databases.

Goal and scope: This Environmental Product Declaration (EPD) evaluates the environmental impacts of producing one metric ton of CEM II/B-V 42,5 N cement from cradle to gate (phases A1 to A3).

Data Quality: ISO 14044 was applied in terms of data collection and quality requirements. The data concerning the modules A3 (product manufacturing) and A2 (transportation) were provided by Heidelberg materials Devnya and involved all input and output materials to the plant, the consumed utilities (energy, water) and the distances and means of transport for each input stream. The background data for the module A1 e.g. electricity generation, raw materials and fuels production were recovered from SAP 7700.1.7 and Ecoinvent (v 3.5.) databases. Regarding electricity mix, guarantees of origin in combination with the latest (2023) national residual electricity mix as published in Association of Issuing Bodies and administers the central electronic registry for Guarantees of Origin were

utilized, resulting in an energy mix with global warming potential impact equal to GWP-GHG 0,437kg CO₂ eq/ kWh.

The GCCA EPD tool (version 4.2) was developed by Quantis and verified by Studio Fieschi. The International EPD® System ensures compliance with ISO 14025 and EN 15804:2012+A2:2019/AC:2021 rules. The underlying database for the GCCA EPD tool comes from the SAP 7700.1.7 and Ecoinvent (v 3.5.) databases and cement manufacturing data obtained through the GNR process.

Generic data used in this study include:

- CO₂ emission factors for different transportation modes
- CO₂ emission factors for fuels and raw materials
- Specific emission factor for the energy mix (kg CO₂/ kWh)

For Heidelberg Materials Devnya JSC Plant, no data was missing. The technical staff provided all necessary raw data, including information from SAP system, flow meters for water consumption, and continuously recorded emissions data (Dust, NO_x, SO₂, TOC, NH₃). Other emissions were spot measured by independent laboratories, and average values were calculated based on their reports.

Geographical Scope: The study covers a worldwide geographical scope.

Allocations: Wherever possible, allocation has been avoided. The production process was divided into two sub-processes: clinker production and cement

production. Input and output data associated with each sub-process were meticulously recorded. When data couldn't be directly attributed to a specific product, they were assigned based on physical properties (such as mass). Fortunately, no by-products arise during clinker and cement production, eliminating the need for allocations related to by-products.

Water, Wastes, and Emissions Allocation: For water (both consumed and recycled), waste, and emissions allocation, the "clinker to cement ratio" was employed. This ratio allowed the volumes to be allocated appropriately between clinker and cement.

Exclusions: The study does not include the following aspects:

- Capital equipment production
- Equipment maintenance
- Human labor and employee transport

Assumptions: Regarding road and sea transportation, a 16-32 metric ton EURO4 lorry and a bulk carrier for dry goods were used, respectively. The cement recipe, including material percentage participation, was defined by the pre-verified and automated ERP system (SAP) used by the company.

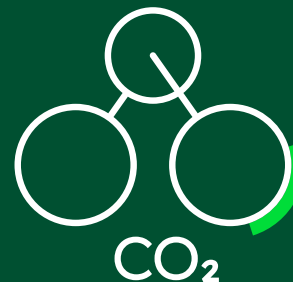
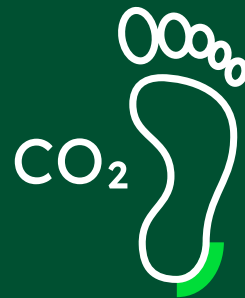
Packaging Consideration: The impact of the packaging process is considered in the final results.

Cut-Off Rules: The cut-off rule was applied for insufficient data or data gaps that account for less than 1% of the total input mass or mass per module. Specifically:

- For unit processes with insufficient input data or data gaps, the cut-off criteria were set at 1% of renewable and non-renewable primary energy usage and 1% of the total mass input.
- The total of neglected input flows for the "cradle-to-gate" stages should not exceed 5% of energy usage and mass, as per EN 15804:2012+A2:2019/AC:2021. The LCA model adheres to default cut-off criteria from the SAP 7700.1.7 and Ecoinvent (v 3.5.) databases, and any custom processes developed for this project follow the same guidelines.

Comparability: EPD performance for construction products that do not comply with EN 15804:2012+A2:2019/AC:2021 may not be directly comparable. Additionally, EPDs from separate programs within the same product category might also lack comparability.

System Boundaries: The scope of this study covers the "cradle-to-gate" product stage (modules A1-A3). The exclusion of modules C1-C4 and D is justified by the fulfillment of three criteria specified in EN 15804:2012+A2:2019/AC:2021.

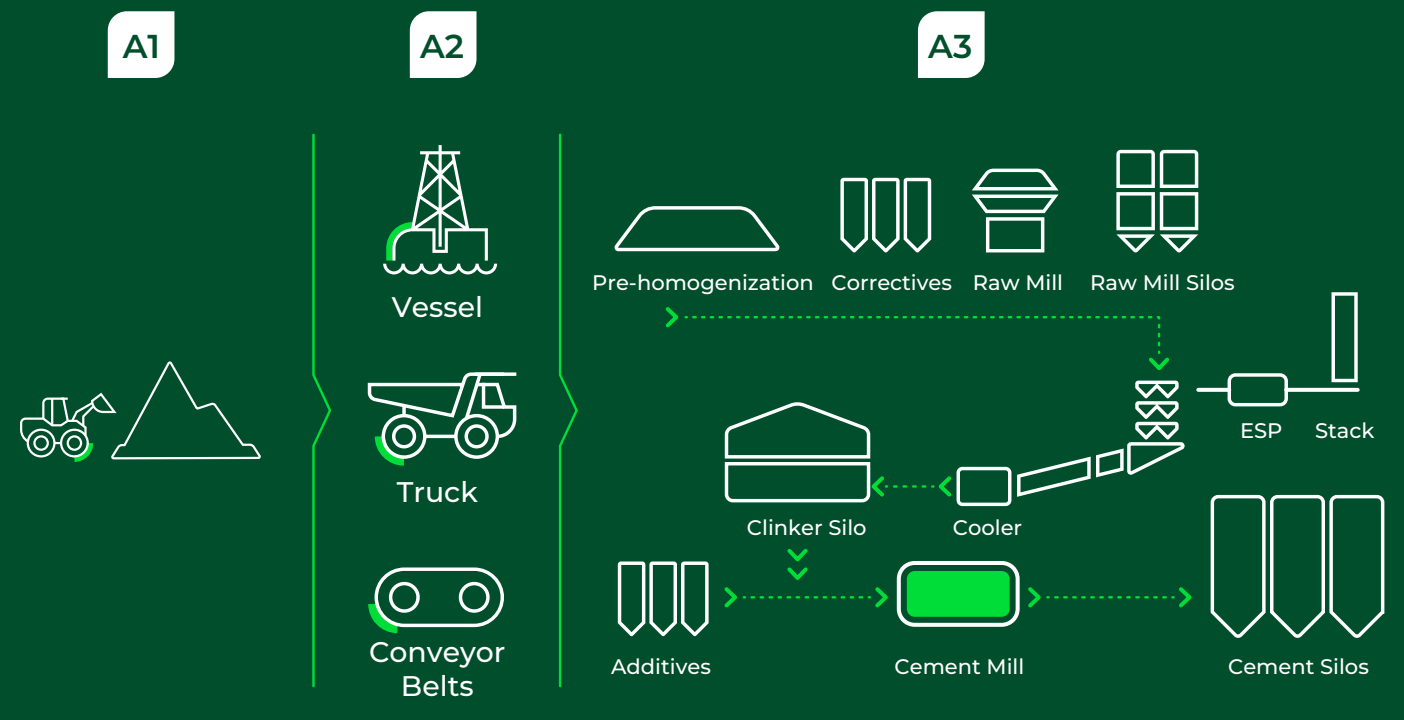


SYSTEM DIAGRAM

The scope of this study is “Gradle to gate” covering the product stage (modules A1-A3), since the product fulfills the three conditions required by EN 15804:2012+A2:2019/AC:2021, about the exclusion of modules C1-C4 and D.

	Product Stage			Construction Stage		Use Stage							End-of-life Stage				Resource Recovery
	Raw Materials Supply	Transport	Manufacturing	Transport	Construction installation	Use	Maintenance	Repair	Replacement	Refurbishment	Operational energy use	Operational water use	De-construction and demolition	Transport	Waste processing for reuse, recovery and/or recycling	Disposal	Reuse-Recovery-Recycling-potential
Modules	A1	A2	A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
Modules declared	X	X	X	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Geography	EU	EU	BG														
Specific data used	>90 %																
Variation - products	Nor relevant																
Variation - sites	Nor relevant																

More information: X= included, ND = Module Not Declared.



ENVIRONMENTAL INFORMATION

For construction services, the total value of A1-A3 shall be replaced with the total value of A1-A5.



Potential environmental impact – mandatory indicators according to EN 15804:2012+A2:2019/AC:2021 Results per functional or declared unit

Indicator	Unit	Tot.A1-A3
GWP – total	kg CO ₂ eq.	5.83E+02
GWP – fossil	kg CO ₂ eq.	5.83E+02
GWP – biogenic	kg CO ₂ eq.	2.34E-01
GWP – luluc	kg CO ₂ eq.	5.14E-02
ODP	kg CFC 11 eq.	1.25E-05
AP	mol H ⁺ eq.	3.00E+00
EP-freshwater ⁽¹⁾	kg P eq.	4.46E-02
EP – marine	kg N eq.	3.49E-03
EP – terrestrial	mol N eq.	7.85E+00
POCP	kg NMVOC eq.	1.48E+00
ADP – minerals & metals* ⁽²⁾	kg Sb eq.	1.52E-04
ADP – fossil* ⁽²⁾	MJ	2.50E+03
WDP ⁽²⁾	m ³	2.61E+01
GWP-GHG	kg CO ₂ eq.	5.83E+02

Acronyms

GWP-fossil = Global Warming Potential fossil fuels; **GWP-biogenic** = Global Warming Potential biogenic; **GWP-luluc** = Global Warming Potential land use and land use change; **ODP** = Depletion potential of the stratospheric ozone layer; **AP** = Acidification potential, Accumulated Exceedance; **EP-freshwater** = Eutrophication potential, fraction of nutrients reaching freshwater end compartment; **EP-marine** = Eutrophication potential, fraction of nutrients reaching marine end compartment; **EP-terrestrial** = Eutrophication potential, Accumulated Exceedance; **POCP** = Formation potential of tropospheric ozone; **ADP-minerals & metals** = Abiotic depletion potential for non-fossil resources; **ADP-fossil** = Abiotic depletion for fossil resources potential; **WDP** = Water (user) deprivation potential, deprivation-weighted water consumption

1. Eutrophication aquatic freshwater shall be given in both kg PO₄-3 eq and kg P eq.

2. The results of this environmental impact indicator shall be used with care as the uncertainties of these results are high, or as there is limited experienced with the indicator.
* Disclaimer: The estimated impact results are only relative statements, which do not indicate the endpoints of the impact categories, exceeding threshold values, safety margins and/or risks.

The EN 15804 reference package based on EF 3.1 has been used.

USE OF RESOURCES

Results per functional or declared unit		
Indicator	Unit	Tot.A1-A3
PERE	MJ	1.68E+02
PERM	MJ	9.54E+01
PERT	MJ	2.63E+02
PENRE	MJ	2.48E+03
PENRM	MJ	1.83E+01
PENRT	MJ	2.50E+03
SM	kg	2.19E+02
RSF	MJ	7.58E+02
NRSF	MJ	1.12E+03
NFW	m ³	6.92E-01

Acronyms: PERE = Use of renewable primary energy excluding renewable primary energy resources used as raw materials; PERM = Use of renewable primary energy resources used as raw materials; PERT = Total use of renewable primary energy resources; PENRE = Use of non-renewable primary energy excluding nonrenewable primary energy resources used as raw materials; PENRM = Use of non-renewable primary energy resources used as raw materials; PENRT = Total use of non-renewable primary energy re-sources; SM= Use of secondary material; RSF = Use of renewable secondary fuels; NRSF = Use of non-renewable secondary fuels; NFW = Use of net fresh water.

Indicator	Unit	Tot.A1-A3
HWD	kg	2.97E-02
NHWD	kg	0.00E+00
RWD	kg	0.00E+00

Acronyms: HWD = Hazardous waste disposed; NHWD = Non-hazardous waste disposed; RWD = Radioactive waste disposed.

Indicator	Unit	Tot.A1-A3
CRU	kg	1.03E+00
MFR	kg	1.74E+01
MER	kg	6.56E-02
EEE	MJ	0.00E+00
EET	MJ	0.00E+00

Acronyms: CRU = Components for re-use; MFR = Materials for recycling ; MER = Materials for energy recovery; EEE = Exported electrical energy; EET = Exported thermal energy.

EXTRA INDICATORS

Results per functional or declared unit		
Indicator	Unit	Tot.A1-A3
CC	kg CO ₂ ekv.	4.06E+02
CWRS	kg CO ₂ ekv.	1.80E-01
CWNRS	kg CO ₂ ekv.	1.14E+02

Acronyms: CC = Emissions from calcination and removals from carbonation; CWRS = Emissions from combustion of waste from renewable sources used in production processes; CWNRS = Emissions from combustion of waste from non-renewable sources used in production processes.

INFORMATION ON BIOGENIC CARBON CONTENT

Results per functional or declared unit		
Biogenic carbon content	Unit	Tot.A1-A3
Biogenic carbon content in product	kg C	0.00E+00

Note: 1 kg biogenic carbon is equivalent to 44/12 kg CO₂.

ADDITIONAL INFORMATION

Heidelberg Materials Devnya JSC and Heidelberg Materials Vulkan JSC affirm that all their cement products comply with the REACH Regulation (EC) No 1907/2006, which pertains to the Registration, Evaluation, Authorization, and Restriction of Chemicals. Notably, these cement products do not contain any Substances of Very High Concern (SVHC) currently listed on the candidate list. It's important to

note that the REACH SVHC list is dynamic and undergoes frequent updates. Consequently, the company remains committed to continuous evaluation, research, and review to meet the requirements of the regulation. For further details on cement product safety handling, refer to the Safety Data Sheet (SDS) available on the company's website at www.heidelbergmaterials.bg

REFERENCES

- GPI v.4.0:2021-03-29 General Programme Instructions of the International EPD® System
- PCR 2019:14 v.1.3.4 Product Category rules | Construction products | The International EPD® System
- EN 15804:2012+A2:2019/AC:2021 Sustainability of construction works - Environmental Product Declarations Core rules for the product category of construction products
- EN 413-1:2011 Masonry cement
- c-PCR-001 Cement and building lime (EN 16908:2017+A1:2022) | The International EPD® System EN 16908:2017+A1:2022 Cement and building lime - Environmental product declarations - Product category rules complementary to EN 15804:2012+A2:2019/AC:2021
- ISO 14020:2000 Environmental labels and declarations - General principles
- ISO 14025:2006 Environmental labels and declarations - Type III environmental declarations - Principles and procedures
- ISO 14040:2006 Environmental management - Life Cycle Assessment - Principles and framework
- ISO 14044:2006 Environmental management - Life Cycle Assessment - Requirements and guidelines
- Industry EPD Tool for Cement and Concrete (<https://concrete-epd-tool.org/>)
- Tool version is: GCCA EPD Tool The Industry GCCA (Global Cement and Concrete Association) EPD Tool version 4.2
 - LCA Database (Ecoinvent Version 3.5)
- Association of Issuing Bodies and administers the central electronic registry for Guarantees of Origin. <https://www.aib-net.org/>
- LCA Database (Ecoinvent Version 3.5)

CONTACT INFORMATION

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**Heidelberg
Materials**