ROYAL EL MINYA CEMENT CO.

ENVIRONMENTAL PRODUCT DECLARATION

FOR CEM I 52,5 N

IN ACCORDANCE WITH ISO 14025:2006 AND EN 15804:2012+A2:2019/AC:2021 AND ISO 21930:2017

PROGRAM: THE INTERNATIONAL EPD® SYSTEM, WWW.ENVIRONDEC.COM

PROGRAM OPERATOR: EPD INTERNATIONAL AB

EPD REGISTRATION NUMBER: EPD-IES-0025202:001

VERSION DATE: 01/09/2025

VALIDITY DATE: 31/08/2030

GEOGRAPHICAL SCOPE: WORLDWIDE

AN EPD MAY BE UPDATED OR DEPUBLISHED IF CONDITIONS CHANGE. TO FIND THE LATEST VERSION OF THE EPD AND TO CONFIRM ITS VALIDITY, SEE WWW.ENVIRONDEC.COM

GENERAL INFORMATION

- **ACCOUNTABILITIES FOR PCR, LCA AND INDEPENDENT, THIRD-PARTY VERIFICATION**
- **Product Category Rules (PCR)** reviewed by the EPD Secretariat (https://www.environdec.com/support)
- **CEN standard EN 15804 serves as the Core Product Category Rules (PCR) Product Category Rules (PCR):**
  - PCR 2019:14 Construction products; Version 2.0.1.
  - c-PCR-001 Cement and Building Lime (EN 16908:2017+A1:2022) 2022-05-18
  - UN CPC: 3744
- **LCA practitioner:** Kholoud Mohsen, k.mohsen@royalcement.com
- **Independent third-party verification of the declaration and data, according to ISO 14025:2006, via: EPD verification by individual verifier.**
- **Third-party verifier:** Callum Hill director at JCH Industrial Ecology Ltd.
- **Approved by:** The International EPD® System

The EPD owner has the sole ownership, liability, and responsibility for the EPD. support@environdec.com,

EPDs within the same product category but published in different EPD programmes, may not be comparable. For two EPDs to be comparable, they shall be based on the same PCR(including the same first-digit 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/funtional units); have identical scope in terms of included life-cycle stages (unless the excluded life-cycle stages is demonstrated to be insignificant(; apply identical impact assessment methods (including the same version of characterisation factors); and be valid at the same time of comparison.

For further information about comparability, see EN 15804 and ISO 14025.

EPD International AB, Box 210 60, SE-100 31 Stockholm, Sweden, Email: support@environdec.com.

CONTENT

COMPANY INFORMATION

Royal Cement is a leading manufacturer of premium white cement, recognized as one of the most prestigious players in the global market. With operations spanning over 50 countries across Africa, the Middle East, Europe, and the United States, Royal Cement is a trusted supplier for large-scale projects and industries worldwide.

Since its establishment in 2006 and full-scale operations in 2010, Royal El Minya Cement has specialized in producing high-quality white clinker, white Portland cement, and white masonry cement.

EPD Owner: Royal El Minya Cement Co.

- **Address:** Minya Governorate, Egypt.
- **Contact:** m.aboelenien@royalcement.com, k.mohsen@royalcement.com

LCA practitioner: Kholoud Mohsen, Environmental Engineer at Royal group sustainability sector.

- **Contact:** k.mohsen@royalcement.com

Production site(s): El Minya, Egypt

PRODUCT INFORMATION

Product name: CEM I 52,5 N

Product description: Royal El Minya Cement Co. White cement products is versatile and suitable for various uses, including the production of white and colored concrete, plastering with dyes, and creating decorative elements such as interlocking pavers and garden architecture components. Its high early strength makes it particularly useful for projects requiring rapid formwork removal, while its compatibility with chemical additives enhances its workability in diverse construction scenarios.

This specific cement type is produced at the Royal El Minya Cement Co. production site at El Minya, Egypt

Packaging materials: This cement is being shipped in bulk.

TECHNICAL CHARACTERISTICS ACCORDING TO EN 197-1/2011		UNIT	CEM I 52,5 N
MECHANICAL PROPERTIES	2 days compressive strength	N/mm^2	34±2
	28 days compressive strength	N/mm^2	66±2
CHEMICAL PROPERTIES	Sulfate content (SO_3)	%	3.0 ± 0.3
	Chloride content (Cl)	%	< 0.07
	Initial setting time	min	200±10
PHYSICAL PROPERTIES	Soundness (mm)	mm	2±1
	Loss of Ignition (LOI)	%	< 4.5

COMPOSITION BY MASS	CEM I 52,5 N
Clinker	95-100 %
Minor additional constituents	0-5 %

All products are manufactured in compliance to the ES 4756-1/2022 and BS EN 197-1/2011 standards.

UN CPC code: 3744

LCA INFORMATION

Declared unit: The declared unit is one (1) ton (1000 kg).

Reference service life: Not relevant due to the cradle-to-gate boundary conditions.

Time representativeness: The data used in this study cover the reporting year of 2024.

Database(s) and LCA software used: GCCA Industry EPD Tool for Cement and Concrete (V5.2) and Ecoinvent database (V 3.10).

Goal and scope: This EPD evaluates the environmental impacts of the production of one (1) ton CEM I 52,5 N from cradle-to-gate (A1-A3).

Data quality: ISO 14044 was applied in terms of data collection and quality requirements. The data concerning the modules A1 (raw material supply), A2 (transportation) and A3 (product manufacturing) were provided by Royal El Minya Cement 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 data for the life cycle inventory was gathered in 2024 from the manufacturing site and covers the period (1/1/2024 to 31/12/2024), the primary data used was from the GCCA inventory tool (v 5.1) and the secondary data was from Ecoinvent (v 3.10).

Data quality of primary data, which contributes more than 95% to the declared environmental indicators, is judged to be excellent.

Characterization factors: EN 15804 reference package based on EF 3.1

Electricity mix: the energy mix contribution percentage of the Egyptian fuel profile for energy production were added to the GCCA tool in order to account for the emission results from the electricity consumption. Where the emissions factor published by the Egyptian Electricity Holding Company (EEHC) in the latest annual report for 2022/2023 is 376.7 tCO_2e/GWh. The primary energy mix composition is mainly 81% Natural Gas, 7% Oil, 7% Hydropower, 2.6% Solar and 2.4% wind.

The background data for the module A1 e.g. electricity generation, raw materials and fuels production were recovered from GCCA Environmental Product Declaration tool (V 5.2). GCCA's Industry EPD Tool for Cement and Concrete is a web-based calculation tool for EPDs of clinker, cement, aggregates, concrete and precast elements, available in both International and North American versions. The present report refers to the International version only.

The latter complies with the latest cement and concrete PCRs registered at the International EPD® System (Environdec), namely c-PCR-001 Cement and building limes (EN 16908) for cement and registered as complementary PCRs of PCR 2019:14 Construction products (EN 15804+A2).
The GCCA EPD tool (V 5.2) is developed by Quantis https://quantisintl.com/ and verified by Studio Fieschi http://www.studiofieschi.it/ en.
The International EPD® System, which provides the framework to develop and publish EPDs based on ISO 14025 and EN 15804, gives the final approval of the tool's compliance with the rules.
The underpinning database for the GCCA EPD tool is the version of the Ecoinvent database (V 3.10) and cement manufacturing data obtained through the GNR process (https://gccassociation.org/sustainability-innovation/gnr-gcca-in-numbers/).

The database of Ecoinvent (V 3.10) was used to complete any missing data.
Generic data used in this study concerning:
- CO_2 emission factors for different transportation way
- CO_2 emission factors for fuels and raw materials
- Specific emission factor of used energy mix (kg CO_2/kWh).

There is no missing data for the case of Cleopatra cement production plant, since all the required raw data were provided by the technical staff of the plant, using all the available sources which are:
i) The ERP system (SAP) that company uses
ii) Flow meters for consumed and recycled water
iii) Data, for emissions, which are continuously recorded and obtained by the environmental measurement reports that are carried out each quarter for the plant performance.

Geographical scope: Worldwide.

Allocations: The allocation has been avoided where that was possible. Production was split into two sub-processes, clinker and cement, and the associated input and output data for each subprocess were recorded. When data could not be directly attributed to a specific product, they were assigned by physical properties (mass).
No by-products occur during clinker and cement production; therefore, there is no need for allocations in by-products.
For water (and recycled), wastes and emissions allocation, the "clinker to cement ratio" was used for allocating the volumes to clinker or cement, respectively.

The study does not include the followings:
- Capital equipment production
- Equipment maintenance
- Human labour and employee transport.

Assumptions: For the road and sea transportation a lorry >32 metric ton, EURO6 and bulk carrier for dry goods were used respectively. The cement recipe (materials percentage participation) was defined by the pre-verified and automated ERP system (SAP) that company uses.
For CEM I 52,5 N , the packaging materials are not taken into consideration.

Cut-off rules: The cut-off rule for insufficient data or data gaps that are less than 1% of the total input mass or mass per module was applied. In case of insufficient input data or data gaps for a unit process, the cut-off criteria shall be 1% of renewable and nonrenewable primary energy usage and 1% of the total mass input of that unit process. The total of neglected input flows for the stages 'cradle through gate' shall be a maximum of 5% of energy usage and mass." (EN 15804:2012+A2:2019).
Regarding the LCA model, the default cut-off criteria are applied for all processes from the Ecoinvent database. In addition, all custom processes developed for the specific purposes of the project are consistent with the rules and guidelines of the Ecoinvent database, and hence the same cutoff criteria are applied.

Comparability: EPD performance for construction products that they do not comply with EN 15804 may not be comparable. EPDs from separate programs but within the same product category may not be comparable as well.

Description of system boundaries: The scope of this study is "cradle-to-gate" covering the product stage (modules A1-A3), since the product fulfils the three conditions required by EN 15804:2012+A2:2019, about the exclusion of modules C1-C4 and D. The EPD covers the product stage ("cradle-to-gate", A1-A3), since the three criteria of EN 15804 are met for the exclusion of stages B1-B7, C1-C4 and D.

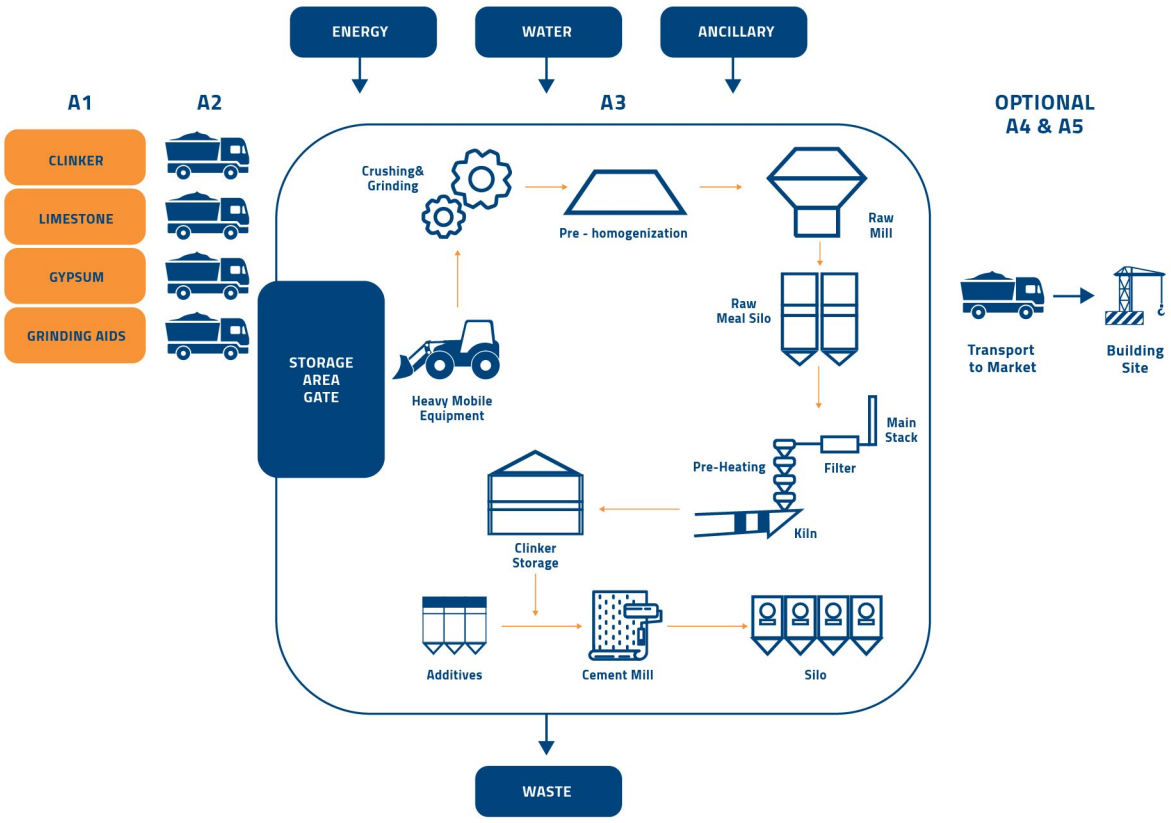
SYSTEM DIAGRAM

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

	PRODUCT STAGE			CONSTRUCTION PROCESS STAGE		USE STAGE							END OF LIFE STAGE				RESOURCE RECOVERY STAGE
	RAW MATERIAL SUPPLY	TRANSPORT	MANUFACTURING	TRANSPORT	CONSTRUCTION INSTALLATION	USE	MAINTENANCE	REPAIR	REPLACEMENT	REFURBISHMENT	OPERATIONAL ENERGY USE	OPERATIONAL WATER USE	DE-CONSTRUCTION DEMOLITION	TRANSPORT	WASTE PROCESSING	DISPOSAL	REUSE RECOVERY RECYCLING POTENTIAL
MODULE	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	EG	EG	EG	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Specific data used	>95%			-	-	-	-	-	-	-	-	-	-	-	-	-	-
Variation – products	0%			-	-	-	-	-	-	-	-	-	-	-	-	-	-
Variation – sites	0%			-	-	-	-	-	-	-	-	-	-	-	-	-	-

More information: X= Module Declared, MND = module not declared.

White cement production is a specialized process that begins with carefully selected raw materials, mainly limestone and kaolin, which are low in iron and other coloring oxides. These materials are finely ground into a raw meal and then heated in a rotary kiln at temperatures of about 1500°C–1700°C, where they undergo chemical transformations and form white clinker. The clinker is rapidly cooled to preserve its bright color, then ground into a fine powder in a cement mill and blended with gypsum and, in some cases, small amounts of limestone or other additives. The result is white cement, distinguished by its strength, high whiteness, and smooth finish.



ENVIRONMENTAL INFORMATION

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

POTENTIAL ENVIRONMENTAL IMPACT – MANDATORY INDICATORS ACCORDING TO EN 15804 RESULTS PER TONNE OF CEMENT

INDICATOR	A1-A3 (TOTAL)	UNIT
Global warming potential (GWP-GHG)	1.27E+03	kg CO_2 eq.
Global warming potential - total (GWP-total)	1.27E+03	kg CO_2 eq.
Global warming potential - fossil fuels (GWP-fossil)	1.27E+03	kg CO_2 eq.
Global warming potential - biogenic (GWP-biogenic)	5.31E-01	kg CO_2 eq.
Global warming potential - land use and land use change (GWP-luluc)	1.35E-01	kg CO_2 eq.
Depletion potential of the stratospheric ozone layer (ODP)	1.11E-05	kg CFC 11 eq.
Acidification potential, Accumulated Exceedance	2.33E+00	mol H+ eq.
Eutrophication potential - freshwater (EP-freshwater)	1.25E-02	kg P eq.
Eutrophication potential - marine (EP-marine)	2.75E-01	kg N eq.
Eutrophication potential - terrestrial (EP-terrestrial)	4.63E+00	mol N eq.
Photochemical ozone creation potential (POCP)	1.88E+00	kg NMVOC eq.
Abiotic depletion potential - non-fossil resources (ADPE)	3.17E-03	kg Sb eq.
Abiotic depletion potential - fossil resources (ADP	8.68E+03	MJ, net calorific value
Water (user) deprivation potential (WDP)	8.72E+01	m^3 world eq. deprived

Notes:

1. According to the polluter pays principle (EN 15804) the system that generates the waste is responsible for declaring the impacts of waste processing until the end of waste stage is reached. The indicated value (net value) therefore does not include the CO_2 emissions from waste incineration. The use of imported energy from the waste within "use of secondary fuel" as a more appropriate indicator does not currently exist. This indicator is not mandatory by EN 15804.
2. This indicator accounts for all greenhouse gases except biogenic carbon dioxide uptake and emissions and biogenic carbon stored in the product. As such, the indicator is identical to GWP-total except that the CF for biogenic CO_2 is set to zero.
3. The results of this environmental impact indicator shall be used with care as the uncertainties on these results are high or as there is limited experienced with the indicator

ADDITIONAL ENVIRONMENTAL IMPACT INDICATORS

RESULTS PER TON OF CEMENT		
INDICATOR	**A1-A3 (TOTAL)**	**UNIT**
Potential incidence of disease due to PM emissions	3.24E-05	Disease incidence
Potential Human exposure efficiency relative to U235	6.72E+00	kBq U235 eq.
Potential Comparative Toxic Unit for ecosystems	1.80E+03	CTUe
Potential Comparative Toxic Unit for humans - cancer	1.00E-02	CTUh
Potential Comparative Toxic Unit for humans - non-cancer	6.65E-05	CTUh
Potential soil quality index	1.44E+03	Dimensionless

PARAMETERS DESCRIBING RESOURCE USE

RESULTS PER TON OF CEMENT		
INDICATOR	**A1-A3 (TOTAL)**	**UNIT**
PERE	1.78E+02	MJ, net calorific value
PERM	0.00E+00	MJ, net calorific value
PERT	1.78E+02	MJ, net calorific value
PENRE	8.68E+03	MJ, net calorific value
PENRM	0.00E+00	MJ, net calorific value
PENRT	8.68E+03	MJ, net calorific value
SM	0.00E+00	kg
RSF	0.00E+00	MJ, net calorific value
NRSF	1.23E+02	MJ, net calorific value
FW	3.20E+00	m^3

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; FW = Use of net fresh water

WASTE PRODUCTION

RESULTS PER TON OF CEMENT		
INDICATOR	**A1-A3 (TOTAL)**	**UNIT**
HWD	9.72E-03	kg
NHWD	1.18E-02	kg
RWD	1.66E-03	kg

Acronyms:

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

OUTPUT FLOWS

RESULTS PER TON OF CEMENT		
INDICATOR	**A1-A3 (TOTAL)**	**UNIT**
CRU	0.00E+00	kg
MFR	0.00E+00	kg
MER	0.00E+00	kg
EE	0.00E+00	MJ per energy carrier

Acronyms:

CRU = Components for re-use; MFR = Materials for recycling; MER = Materials for energy recovery; EE = Exported energy, electricity.

ADDITIONAL INFORMATION

Royal El Minya Cement Co. hereby declares that all cement products are in compliance with the REACH Regulation (EC) No1907/2006, concerning the Registration, Evaluation, Authorization and Restriction of Chemicals. Cement does not contain any Substances of Very High Concern (SVHC) currently on the candidate list. REACH SVHC list is not static and is updated frequently, thus the company will continue to evaluate, research and review to fulfil the demands of the regulation.

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.

VERSION HISTORY

Original version of the EPD.

LIST OF ABBREVIATION

TERM	ABBREVIATION
EPD	Environmental Product Declaration
LCA	Life Cycle Assessment
PCR	Product Category Rule
GWP	Global Warming Potential

REFERENCES

ISO 14025:2010 Environmental labels and declarations – Type III environmental declarations. Principles and procedures.
ISO 14040:2006 Environmental management. Life cycle assessment. Principles and frameworks.
ISO 14044:2006 Environmental management. Life cycle assessment. Requirements and guidelines.
Ecoinvent database (V 3.10).
EN 15804:2012+A2:2019 Sustainability in construction works – Environmental product declarations – Core rules for the product category of construction products.
Int'l EPD System PCR 2019:14 Construction products, version 2.0.1 EPD.
General Programme Instructions of the international EPD® system. Version 5.0.1
EN 197-1/2011: Cement - Part 1: Composition, specifications and conformity criteria for common cements.
EN 16908: Cement and building lime - Environmental product declarations - Product category rules complementary to EN.

CONTACT INFORMATION

EPD OWNER

Royal El Minya Cement Co.
8 Khaled Ben El Waleed ST., Complex 1136,
Sheraton Residence, Nozha, Cairo.

EPD AUTHOR

Dr.Mahmoud Abo elenien, Eng. Kholoud Mohsen
Sustainability Sector - Royal Cement group

PROGRAM OPERATOR

EPD International AB, Box 210 60, SE-100 31
Stockholm, Sweden, Email: info@environdec.com

VERIFIER

Callum Hill, JCH Industrial Ecology Ltd.
www.jchie.uk