

ENVIRONMENTAL PRODUCT DECLARATION

CEM III 42.5 N

AMREYAH CEMENT COMPANY

IN ACCORDANCE WITH EN 15804+A2:2019/AC:2021 & ISO
14025 / ISO 21930



Programme: The International EPD® System, www.environdec.com

Programme operator: EPD International AB

EPD registration number: S-P-07664

Publication date: 2024.05.17

Valid until: 2029.05.16

Geographical scope: Worldwide

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.

EGYPT **EPD**
THE INTERNATIONAL EPD SYSTEM

EPD®
THE INTERNATIONAL EPD® SYSTEM

DCARBON
Driving Sustainable Transition

ECO PLATFORM
EPD
VERIFIED

General Information

Manufacturer Information

Manufacturer	Amreyah Cement Company
Address	Al Arbaneyat, Borg El Arab, Alexandria, Egypt
Contact details	m.abouelenien@royalcement.com
Website	http://www.amreyahcement.com/

Product Identification

Product name	CEM III 42.5 N
Place(s) of production	Alexandria, Egypt
CPC code	374 – Plaster, lime and cement

The International EPD System

EPDs within the same product category but from different programmes may not be comparable.

EPD Information

The EPD owner has the sole ownership, liability, and responsibility for the EPD. Construction products EPDs may not be comparable if they do not comply with EN 15804 and if they are not compared in a building context.

EPD program operator	The International EPD System
EPD standards	This EPD is in accordance with EN 15804+A2 and ISO 14025/ISO 21930 standards.
Product category rules	The CEN standard EN 15804 serves as the core PCR. In addition, the Int'l EPD System PCR 2019:14 Construction products, version 1.3.2 and c-PCR-001 Cement and building lime (EN 16908) (2022-05-18) are used.
EPD author	Dr. Nasser Ayoub, Ashrakat Osama, and Asmaa El Maghraby 
EPD verification	Independent verification of this EPD and data, according to ISO 14025: <input type="checkbox"/> Internal certification <input checked="" type="checkbox"/> External verification
Verification date	From 2023.12.14 to 2024.04.17
EPD verifier	Elisabet Amat, GREENIZE Projects
EPD number	S-P-07664
ECO Platform nr.	-
Publishing date	2024.05.17
EPD valid until	2029.05.16

Amreyah Cement

Founded in 1987, Amreyah Cement Company has been a cornerstone and a key player in the region for over 30 years. Our plant is strategically located on Matrouh North Coast Road, 55 km from Alexandria, achieving a production capacity of 5.5 million tons per annum (mtpa) through three production lines. As a major player in the national cement market, Amreyah Cement is committed to delivering high-quality and reliable cement using state-of-the-art technology.

With a long-standing history in the market, our cement has proudly built many of Egypt's most iconic landmarks, particularly in the beautiful Mediterranean city of Alexandria. Despite our established reputation, we continue to innovate and introduce new products to meet the evolving needs of the market.

Our top priority is the well-being of our community, driven by a relentless focus on innovation and continuous improvement to build a sustainable future. Amreyah Cement is home to a dedicated team of both white and blue-collar workers who benefit from continuous training and development.

At Amreyah Cement, we are committed to excellence and sustainability, ensuring our products and practices contribute positively to the community and the environment.



Product Information

Product Description

CEM III 42.5 N is one of the cement types that has high clinker proportion that is mixed with specific portions of basalt, gypsum, slag, limestone, granulated blast furnace, and pozzolan. This type of cement has a strength class of 42.5 MPa (indicating that the characteristic strength at 28 days is a minimum of 42.5 MPa) and it gains normal early strength.

Product Application

Due to the high compressive strength and suitable initial setting time of CEM III 42.5N of Amreyah, it is considered as multi-purpose cement that could be used in all construction applications especially the heavy-duty constructions. Moreover, it is also recommended to be used in columns, slabs, and reinforced concrete applications.

Technical Specifications

CEM III 42.5N	EN 197-1/2011	
Mechanical properties	2 days compressive strength (N/mm ²)	16.12
	28 days compressive strength (N/mm ²)	46.72
Chemical properties	Loss of ignition (%)	1.82
	Sulfur Trioxide (%)	2.95
	Chloride (Cl ⁻) (%)	0.04
	Chromium hexavalent (Cr ⁺⁶) (ppm)	1.2
Physical properties	Initial Setting Time (min)	235
	Soundness (Le Chatelier) (mm)	1.09

Product Raw Material Composition

This cement product is certified as CEM III 42.5N according to the requirements of EN 197-1 where its composition is determined as following.

Product and Packaging Material	Weight, kg	Post-consumer material, weight-%	Biogenic material, weight-% and kg C/kg	Country Region of origin
Limestone	548.52	0	0 resp. 0	Egypt
Clay	39.17	0	0 resp. 0	Egypt
Iron Ore	2.02	0	0 resp. 0	Egypt
Marl	14.78	0	0 resp. 0	Egypt
Basalt	24.38	0	0 resp. 0	Egypt
Arc Slag	5.24	0	0 resp. 0	Egypt
Gypsum	36.05	0	0 resp. 0	Egypt
Cement Clinker	52.44	0	0 resp. 0	Egypt
Granulated Blast Furnace	275.72	0	0 resp. 0	Turkey
Pozzolan	1.69	0	0 resp. 0	Egypt
Total	1000	0	0 resp. 0	-

The product does not contain any REACH SVHC substances in amounts greater than 0,1 % (1000 ppm).

Product Lifecycle

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. Transport concerns the delivery of raw materials from the supplier to the gate of the manufacturing plant. 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.

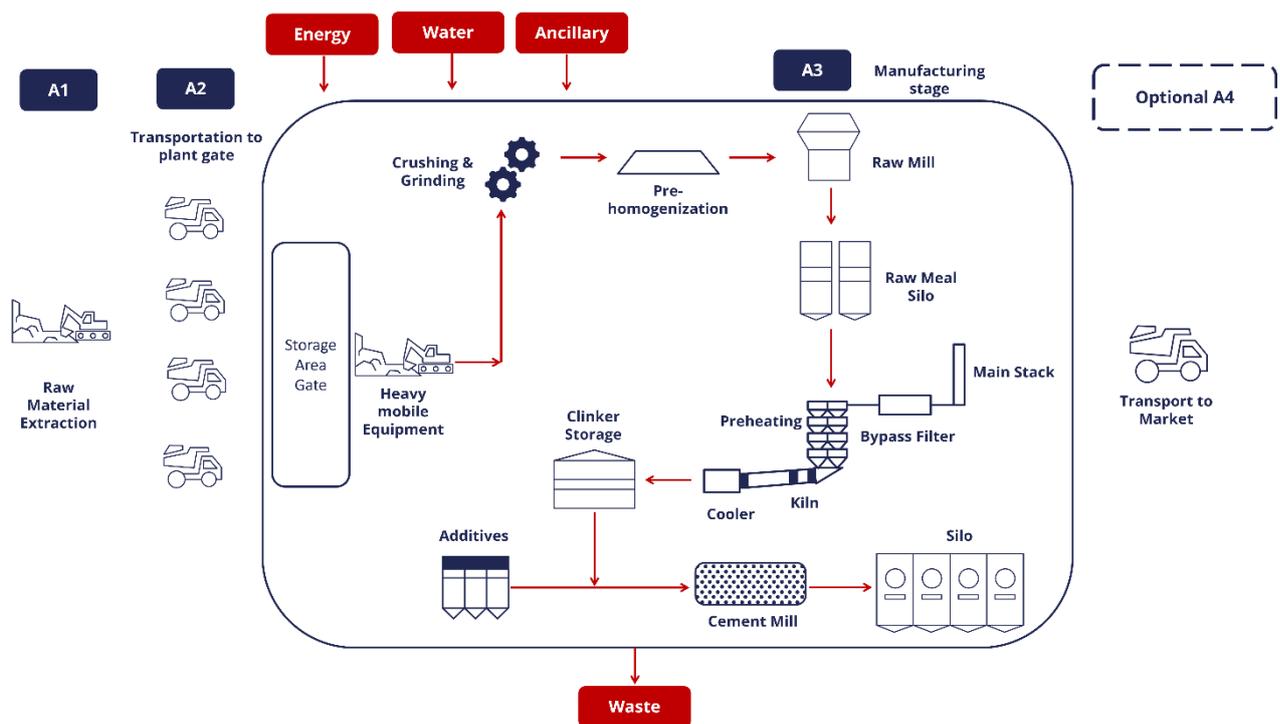
Cement manufacturing starts with crushing and grinding the raw materials until they are ground. The raw materials are then heated to 100°C to evaporate any moisture content. This results in the formation of a raw materials homogeneous stockpile. This stockpile contains mainly limestone, clay, and iron ore with additional materials in smaller proportions like gypsum, basalt, and steel slag. The stockpile is reclaimed, regularly analyzed, and adjusted by correctives addition to fulfill the raw mix design requirements in terms of chemistry.

The materials then move towards the raw mill for grinding where a fine powder, called raw meal, is produced. Then, it is fed to the pre-heater the materials where the bypass dust is reclaimed. From the pre-heater, the materials are fed to the rotary kiln for sintering where the temperature rises at around 1450°C by fuels burning and clinkerization reactions take place.

At the end of the kiln, the sintered material is rapidly cooled, and clinker is formed. Finally, cement is produced in the cement mills where clinker is ground with gypsum and other additives and then stored into silos. Portions of bypass dust exiting from the pre-heater are also used in the cement mills to help fulfill the composition standard of the final cement product.

Transport (A4)

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. Only distribution to end customers is considered (A4). Transportation happens by truck to client in Alexandria, Egypt. The CEM III is delivered in bulk.



Product Use and Maintenance (B1-B7)

As cement is an intermediate product, no other lifecycle phases are relevant to cover. Hence, the use and maintenance have not been studied. So, they are marked as “Modules Not Relevant”.

Product end of Life (C1-C4, D)

The end-of-life modules (C1-C4, and D) are omitted as the material fulfils the exemption criteria based on EN 15804+A2.

Life-Cycle Assessment

Life-Cycle Assessment Information

Period for data	Sep 2021 - Aug 2022
-----------------	---------------------

Declared and Functional Unit

Declared unit	1 tonnes
Mass per declared unit	1000 kg

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

System Boundary

According to EN 15804 Section 5.2, this EPD is a type e) Cradle to gate with options (A1–A3 and additional modules A4 and A5). The omission of other modules met the following conditions:

- the product is physically integrated with other products during installation so it cannot be physically separated from them at the end-of-life,
- it is no longer identifiable at the end-of-life as a result of a physical transformation processes (e.g., mixing with other aggregates and building material components), and
- it does not contain biogenic carbon.

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	D	D
x	x	x	x	MND	MNR	MNR	MNR	MNR	MNR	MNR	MNR	MND	MND	MND	MND	MND	MND	MND
Geography, by two-letter ISO country code or regions. The International EPD System only.																		
EG	EG	EG	EG	EG	-	-	-	-	-	-	-	-	-	-	-	-	-	-
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.

Cut-Off Criteria

The study does not exclude any modules or processes which are stated mandatory in the EN 15804:2012+A2:2019 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.

In this study, as per EN 15804, allocation is conducted in the following order.

1. Allocation should be avoided.
2. Allocation should be based on physical properties (e.g. mass, volume) when the difference in revenue is small.
3. Allocation should be based on economic values.

The allocation could not be avoided for raw, ancillary material, energy consumption and waste production as some information was only measured on a factory level and in other cases some unit processes have more than one output flow. The inputs were physically allocated to the studied product based on annual production volume. 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.

Averages and Variability

The International EPD System additional data requirements

Data specificity and GWP-GHG variability for GWP-GHG for A1-A3.

Supply-chain specific data for GWP-GHG	>90%
Variation in GWP-GHG between products	- %
Variation in GWP-GHG between sites	- %

Environmental Impact Data

Core Environmental Impact Indicators – EN 15804+A2, PEF

Impact category	Unit	A1-A3	A4
GWP – total	kg CO ₂ e	8,10E+02	5,17E+00
GWP – fossil	kg CO ₂ e	8,09E+02	5,16E+00
GWP – biogenic	kg CO ₂ e	2,69E-01	2,00E-03
GWP – LULUC	kg CO ₂ e	2,12E-01	1,90E-03
Ozone depletion pot.	kg CFC-11e	8,72E-05	1,19E-06
Acidification potential	mol H ⁺ e	2,41E+00	2,19E-02
EP-freshwater ²⁾	kg Pe	4,34E-03	4,23E-05
EP-marine	kg Ne	5,46E-01	6,50E-03
EP-terrestrial	mol Ne	6,00E+00	7,17E-02
POCP (“smog”)	kg NMVOCe	1,72E+00	2,29E-02
ADP-minerals & metals ³⁾	kg Sbe	3,11E-03	1,21E-05
ADP-fossil resources ³⁾	MJ	6,55E+03	7,75E+01
Water use ³⁾	m ³ e depr.	4,20E+01	3,47E-01

1) GWP = Global Warming Potential; EP = Eutrophication potential; POCP = Photochemical ozone formation; ADP = Abiotic depletion potential. 2) Required characterisation method and data are in kg P-eq. Multiply by 3,07 to get PO4e. 3) 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 experienced with the indicator.

Additional (Optional) Environmental Impact Indicators – EN 15804+A2,PEF

Impact category	Unit	A1-A3	A4
Particulate matter	Incidence	2,63E-05	5,95E-07
Ionizing radiation ⁴⁾	kBq U235e	2,98E+01	3,69E-01
Ecotoxicity (freshwater)	CTUe	8,65E+03	6,97E+01
Human toxicity, cancer	CTUh	2,83E-05	1,71E-09
Human tox. non-cancer	CTUh	5,04E-06	6,90E-08
SQP ⁵⁾	-	2,65E+03	8,93E+01

4) 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. 5) SQP = Land use related impacts/soil quality.

Use of Natural Resources

Impact category	Unit	A1-A3	A4
Renew. PER ⁵⁾ as energy	MJ	1,49E+02	8,73E-01
Renew. PER as material	MJ	5,66E-01	0,00E+00
Total use of renew. PER	MJ	1,50E+02	8,73E-01
Non-re. PER as energy	MJ	4,52E+03	7,75E+01
Non-re. PER as material	MJ	2,03E+03	0,00E+00
Total use of non-re. PER	MJ	6,55E+03	7,75E+01
Secondary materials	kg	1,29E+00	2,15E-02

Renew. secondary fuels	MJ	3,97E+02	2,17E-04
Non-ren. secondary fuels	MJ	2,65E-01	0,00E+00
Use of net fresh water	m ³	1,11E+00	1,00E-02

5) PER = Primary energy resources

End of Life – Waste

Impact category	Unit	A1-A3	A4
Hazardous waste	kg	7,44E+00	1,03E-01
Non-hazardous waste	kg	2,01E+02	1,69E+00
Radioactive waste	kg	3,71E-02	5,19E-04

End of Life – Output Flows

Impact category	Unit	A1-A3	A4
Components for re-use	kg	0,00E+00	0,00E+00
Materials for recycling	kg	0,00E+00	0,00E+00
Materials for energy rec	kg	0,00E+00	0,00E+00
Exported energy	MJ	0,00E+00	0,00E+00

Environmental Impacts – GWP-GHG - The International EPD System

Impact category	Unit	A1-A3	A4
GWP-GHG ⁶⁾	kg CO ₂ e	8,09E+02	5,16E+00

6) 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) This indicator is almost equal to the GWP indicator originally defined in EN 15804:2012+A1:2013.

Environmental Impacts – EN15804+A1, CML / ISO 21930

Impact category	Unit	A1-A3	A4
Global Warming Pot.	kg CO ₂ e	8,11E+02	5,11E+00
Ozone depletion Pot.	kg CFC-11e	6,94E-05	9,40E-07
Acidification	kg SO ₂ e	3,00E+00	1,70E-02
Eutrophication	kg PO ₄ ³ e	3,90E-01	3,87E-03
POCP ("smog")	kg C ₂ H ₄ e	1,18E-01	6,63E-04
ADP-elements	kg Sbe	1,26E-03	1,17E-05
ADP-fossil	MJ	6,55E+03	7,75E+01

Scenario Documentation

Manufacturing energy scenario documentation

Scenario parameter	Value
Electricity data source and quality	Market for electricity, high voltage (Ecoinvent 3.6) based on Egypt BUR
Electricity CO₂e / kWh	0.6

Bibliography

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 v3.6 (2019) and One Click LCA database.

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 1.3.2

EPD. General Programme Instructions of the international EPD® system. Version 4.0

CEM III 42.5 N LCA background report 23.01.2023

EPD Author and Contributors

Manufacturer	Amreyah Cement Company
EPD author	Dr. Nasser Ayoub, Ashrakat Osama, and Asmaa El Maghraby 
EPD verifier	Elisabet Amat, GREENIZE Projects
EPD program operator	The International EPD System
Background data	This EPD is based on Ecoinvent 3.6 (cut-off) and One Click LCA databases.
LCA software	The LCA and EPD have been created using One Click LCA Flexible EPD Generator Tool

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 EN 15804, 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 background report (project report) for this EPD

Why does verification transparency matter? [Read more online.](#)

Verification Overview

Following independent third party has verified this specific EPD:

EPD verification information	Answer
Independent EPD verifier	Elisabet Amat, GREENIZE Projects
EPD verification started on	2023.12.14
EPD verification completed on	2024.04.21
Supply-chain specific data %	>90%
Approver of the EPD verifier	The International EPD System

Author & tool verification	Answer
EPD author	Dr. Nasser Ayoub, Ashrakat Osama, and Asmaa El Maghraby 
EPD Generator module	One Click LCA Pre-Verified EPD Generator
Software verification date	17 January 2021

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 EN 15804:2012+A2:2019.

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.

Signature

A handwritten signature in black ink, appearing to be a stylized name or set of initials.

Verification and Registration (Environdec)

ISO STANDARD ISO 21930 AND CEN STANDARD EN 15804 SERVES AS THE CORE PRODUCT CATEGORY RULES (PCR)	
PCR	PCR 2019:14 Construction products, version 1.3.2 c-PCR-001 Cement and building lime (EN 16908) (2022-05-18)
PCR review was conducted by:	The Technical Committee of the International EPD® System. See www.environdec.com/TC 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:	Independent verification of this EPD and data, according to ISO 14025: <input type="checkbox"/> INTERNAL CERTIFICATION <input checked="" type="checkbox"/> EXTERNAL VERIFICATION
Third party verifier	Elisabet Amat, GREENIZE Projects
	Approved by: The International EPD® System Technical Committee, supported by the Secretariat
Procedure for follow-up during EPD validity involves third party verifier	<input type="checkbox"/> YES <input checked="" type="checkbox"/> NO



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



AMREYAH CEMENT
أسمنت العامرية

