Suez Cement
HEIDELBERGCEMENT Group

# CEM III/A 42.5N

# Environmental Product Declaration

## SUEZ CEMENT

HEIDELBERGCEMENT Group

Programme: The International EPD® System, www.environdec.com
Programme operator: EPD International AB
EPD registration number: S-P-05700
Publication date: 2022-08-04
Valid until: 2027-08-04
Geographical scope: World

*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

## Manufacturer Information

| | |
|---|---|
| **Manufacturer EPD** | Suez Cement Group of Companies (SCGC) |
| **Address** | K70 Maadi/Ain Sokhna Road, Suez, Egypt |
| **Contact details** | a.arafa@suezcem.com |
| **Website** | https://www.suezcement.com.eg/en |

## Product Identification

| | |
|---|---|
| **Product name** | CEM III/A 42.5N |
| **Place(s) of production** | Suez, Egypt |
| **UN 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 SystemEPD |
| **EPD standards** | This EPD is in accordance with EN 15804+A2 and ISO 14025 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 1.11 (05.02.2021) is used. |
| **EPD author** | Dr. Nasser Ayoub, DCarbon Egypt<br>Ashrakat Osama, DCarbon Egypt |
| **EPD verification** | Independent verification of this EPD and data, according to ISO 14025:<br>☐ Internal certification ☑ External verification |
| **Verification date** | 2022-08-04 |
| **EPD verifier** | Elisabet Amat |
| **EPD number** | S-P-05700 |
| **Publishing date** | 2022-08-04 |
| **EPD valid until** | 2027-08-04 |

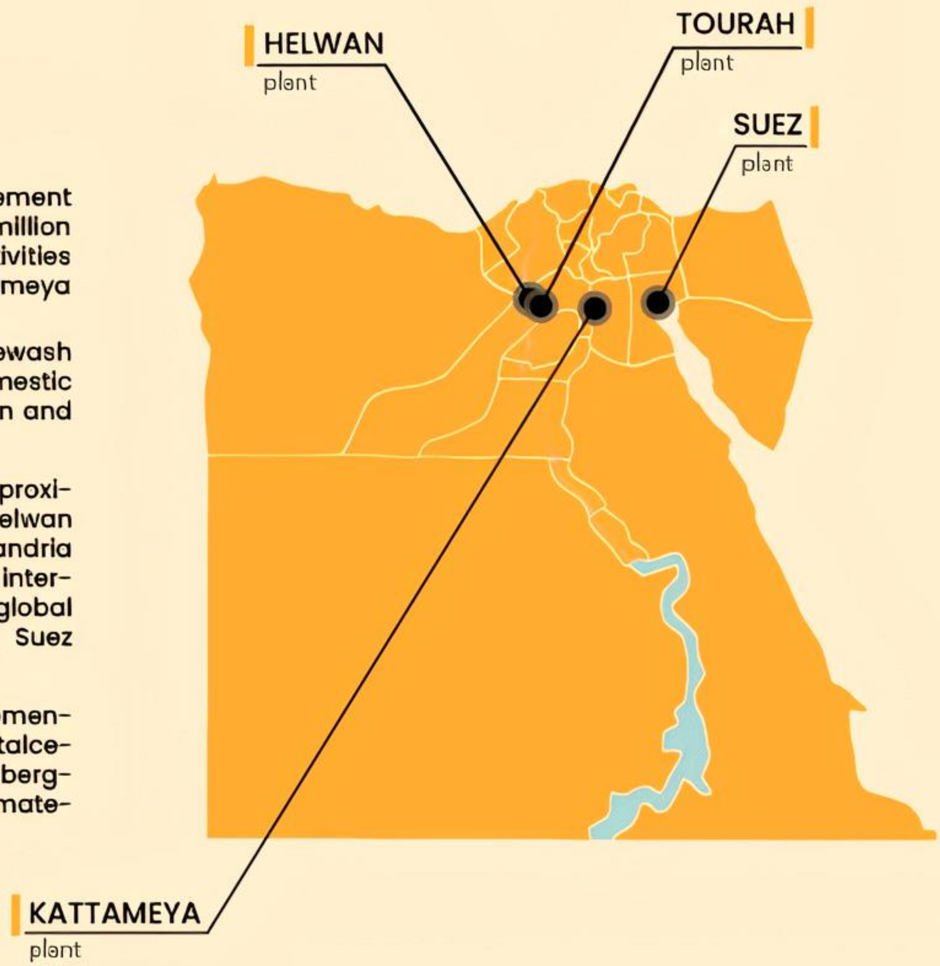
# ABOUT SUEZ CEMENT

Established in 1977, Suez Cement is the largest grey cement producer in Egypt with a production capacity of four million tons of cement per year. The company started its activities by building its first plant in Suez followed by its Kattameya plant with total investments of about L.E. 1.7 billion.

Both plants operate using the dry method with whitewash and primary heating. The company serves the domestic market and also exports its products to Arab, African and European markets.

In August 2005, Suez Cement Company acquired approximately 99% of ASEC Cement Company (currently Helwan Cement Company), listed on the Cairo and Alexandria Stock Exchange, in collaboration with other local and international partners. The acquisition took place with a global investment of around USD 605 million, allowing Suez Cement to strengthen its leadership in Egypt.

In July 2016, Heidelberg Cement acquired 45% of Italcementi, a subsidiary of Italmobiliare. Suez Cement, in which Italcementi owned a 55% stake, therefore joined the Heidelberg-Cement Group as one of the world's leading building materials producers.



## Sustainability Commitments

SCGC strives to be an environmentally- conscious organization, mindful of the harm it may cause to its surroundings. It has continuously invested towards a better Egypt and a cleaner environment and has made a long-term commitment towards being environmentally responsible. Suez Cement dedicates a substantial part of its industrial investments to the implementation of a comprehensive environmental policy.

For SCFC, the development of EPD is a vital step towards its commitment to environmental and social responsibility. With the issuing of EPD, we thrive to pursue the highest levels of:

Product Quality

Environmentally friendly process operations

Customer satisfaction quality

Innovation and business opportunity


To learn more about Suez Cement's sustainability commitment, visit https://www.suezcement.com.eg/en/sustainability-commitments-2030

# Product Information

## Product Description

*CEM III/A* 42,5N is a specially formulated blend of traditional cement and a minimum of 50% Ground Granulated Blast furnace Slag (GGBS) that is EN 197-1 certified CEM III/A 42.5N cement.


## Product Application

CEM III/A 42,5N is primarily used in the production of ready-mix concrete to create concrete that is resistant to sulfur-attach, resistant to thermal cracking, good strength and other advantages.

## Chemical Properties of the product

Test method EN-196-2

Table 1 Chemical properties of the product

| Chemical Requirements | Unit | Value |
|---|---|---|
| Loss of ignition | % | 0.98 |
| Insoluble Residue | % | 1.51 |
| Sulfur Trioxide | % | 2.34 |
| Chloride ($Cl^-$) | % | 0.03 |
| Total Alkalies (As $Na_2O$) | % | 0.53 |
| C3A (in Clinker) | % | 3.80 |

## Physical properties of the product

Table 2 Physical properties of the product

| Chemical Requirements | Unit | Value | Test method |
|---|---|---|---|
| Specific Surface (Blaine) | $cm^2/gm$ | 4368 | EN-196-2 |
| Heat of Hydration (7 day) | J/gm | 189 | EN-196-2 |
| 2 days compressive strength | $N/mm^2$ | 15.05 | EN-196-6 |
| 7 days compressive strength | $N/mm^2$ | 26.10 | EN-196-8 |

| | | | |
|---|---|---|---|
| 28 days compressive strength | N/mm$^2$ | 47.22 | EN-196-1 |
| Initial Setting Time | min | 164 | EN-196-1 |
| Final Setting Time | min | 268 | EN-196-1 |
| Soundness (Le Chatelier) | mm | 1 | EN-196-3 |

Contents of the Products are presented in the tables below.

Table 3 Materials of Products

| Material | Weight, kg | % Weight | Post-consumer % | Renewable % | Country / Region of origin |
|---|---|---|---|---|---|
| Limestone | 510.204 | 51.020% | - | - | Egypt |
| Clay | 118.585 | 11.858% | - | - | Egypt |
| Iron ore | 11.506 | 1.151% | - | - | Egypt |
| Gypsum | 30.190 | 3.019% | - | - | Egypt |
| Blast furnace slag | 329.515 | 32.951% | - | - | Turkey |
| | Packaging Material | | | | |
| Wooden Pallet | 29.620 | - | - | - | Egypt |
| Steel drums | 0.003 | - | - | - | Egypt |

The CEM III/A 42.5 is used an alternative to sulfate-resisting Portland cement in most aggressive ground conditions and is transported to industries that produce ready-mix concrete in bulk truck capacity – not packaged.

## 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

## MANUFACTURING AND PACKAGING (A1-A3)

### *Raw material supply: A1*

The environmental impacts of raw material supply include emissions generated when raw materials are taken from nature, transported to industrial units for processing and processed, along with waste handling from the various production processes. All major upstream processes are taken into consideration. This stage includes all raw materials which end up in the final products. The main raw material for CEM III/A 42.5N is Limestone, Clay and Blast furnace slag. All raw materials as well as ancillary materials were considered in this study

### *Transport: A2*

The considered transportation impacts include exhaust emissions resulting from transportation of raw materials from suppliers to manufacturing facilities as well as the environmental impacts of the production of the diesel used. The manufacturing, maintenance, and disposal of the vehicles as well as tire and road wear during transportation have also been included in the databases. The transportation distances were calculated based on information provided by the Manufacturer.

### *Manufacturing: A3*

The environmental impacts considered for the production stage cover all materials including packaging materials and ancillary materials. Also, 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 study considers also the losses occurring during the manufacturing processes.

Limestone and clay, two naturally occurring raw materials, are extracted from quarries usually located near the cement plants, limestone and clay undergo local primary crushing to have their size reduced and to facilitate transportation to the manufacturing plants. The blast furnace is obtained from the iron/steel industries.

The first step in the processing of raw materials into cement is grinding and drying. The raw materials, adequately proportioned and possibly incorporating additives, are ground into a very fine powder, called raw meal, which is then transported to blending silos and finally sent to storage. The raw meal is then fed to the kilns and is heated up to 1450°C in order to obtain clinker, whose components impart hydraulic properties to cement. The clinker is then removed from the kiln, rapidly cooled, and then stored. The final step of the cement manufacturing process consists of grinding clinker blended with gypsum and other secondary constituents. This technique results in the production of most types of finalized cement. The cement is then stored in specially devised silos.

# TRANSPORT (A4) – Optional Scenario

## Transportation to use site: A4

Transportation impacts occurred from final products delivery to construction material production facilities site (A4) cover fuel direct exhaust emissions, environmental impacts of fuel production, as well as related infrastructure emissions. The transportation of CEM III/A 42.5N from Suez Cement facility to customers as optional scenario.

Vehicle capacity utilization volume factor is assumed to be 100 which means full load. In reality, it may vary but as role of transportation emissions in total results is small, the variety in load is assumed to be negligible. Empty returns are not taken into account as it is assumed that return trip is used by the transportation company to serve the needs of other clients. Transportation does not cause losses as product are packaged properly. Also, volume capacity utilization factor is assumed to be 100 for the nested packaged products.

# Technical Flowchart

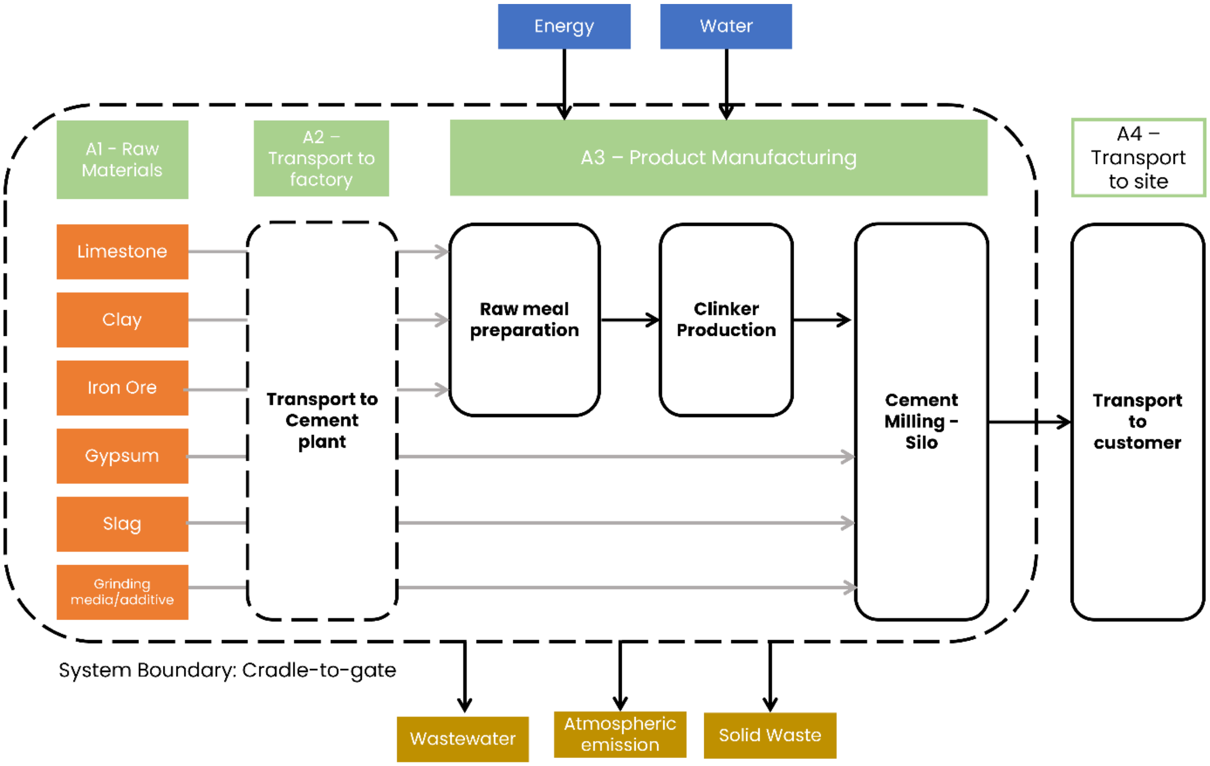



Figure 1 The process diagram

# LIFE-CYCLE ASSESSMENT

## LIFE-CYCLE ASSESSMENT INFORMATION

| | |
|---|---|
| **Period for data** | Jan 2021 – Nov 2021 |

## DECLARED UNIT

| | |
|---|---|
| **Declared unit** | 1 metric ton of CEM III/A 42.5N |
| **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

This EPD covers the *cradle to gate with options* scope with following modules; A1 (Raw material supply), A2 (Transport) and A3 (Manufacturing), A4 (Transport), A5 (Assembly).

| 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 | MND | MND | MND | MND | MND | MND | MND | 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.  x= module is included in the study

## 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 are included in the calculation. There is no neglected unit process more than 1% of total mass and energy flows. The are no excluded input and output flows. The production of capital equipment, construction activities, and infrastructure, maintenance and operation of capital equipment, personnel-related activities, energy and water use related to company management and sales activities are excluded

## 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.

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. Allocation was based on the mass of the CEM III/A 42.5N product. The Suez Cement facility produces more than one cement product, so raw materials have been modelled based on product composition. Energy use and process emissions for clinker production was based on mass of product composition.

# ENVIRONMENTAL IMPACT DATA

Note: additional environmental impact data may be presented in annexes.

## CORE ENVIRONMENTAL IMPACT INDICATORS – EN 15804+A2

| Impact category | Unit | A1 | A2 | A3 | A1-A3 | A4 |
|---|---|---|---|---|---|---|
| GWP – total | kg $CO_2$e | 5,7E0 | 1,51E1 | 6,34E2 | 6,54E2 | 1,93E1 |
| GWP – fossil | kg $CO_2$e | 5,69E0 | 1,51E1 | 6,32E2 | 6,53E2 | 1,95E1 |
| GWP – biogenic | kg $CO_2$e | 6,14E-4 | 7,17E-3 | 1,49E0 | 1,5E0 | 1,42E-2 |
| GWP – LULUC | kg $CO_2$e | 4,19E-3 | 5,95E-3 | 5,57E-2 | 6,58E-2 | 5,87E-3 |
| Ozone depletion pot. | kg $CFC^{-11}$e | 8,87E-7 | 3,42E-6 | 1,59E-5 | 2,02E-5 | 4,58E-6 |
| Acidification potential | mol $H^+$e | 6,97E-2 | 1,67E-1 | 2,49E0 | 2,73E0 | 8,19E-2 |
| EP-freshwater[3)] | kg Pe | 1,5E-4 | 1,1E-4 | 1,15E-2 | 1,18E-2 | 1,59E-4 |
| EP-marine | kg Ne | 2,25E-2 | 4,38E-2 | 3,05E-1 | 3,71E-1 | 2,47E-2 |
| EP-terrestrial | mol Ne | 2,98E-1 | 4,86E-1 | 3,34E0 | 4,12E0 | 2,73E-1 |
| POCP ("smog") | kg NMVOCe | 6,88E-2 | 1,36E-1 | 1,62E0 | 1,82E0 | 8,76E-2 |
| ADP-minerals & metals | kg Sbe | 1,71E-3 | 2,23E-4 | 3,31E-4 | 2,27E-3 | 3,33E-4 |
| ADP-fossil resources | MJ | 7,47E1 | 2,25E2 | 3,4E3 | 3,7E3 | 3,03E2 |
| Water use2) | $m^3$e depr. | 1,02E1 | 7,6E-1 | 3,21E1 | 4,31E1 | 1,13E0 |

GWP = Global Warming Potential; EP = Eutrophication potential; POCP = Photochemical ozone formation; ADP = Abiotic depletion potential. 2) 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. 3) Required characterisation method and data are in kg P-eq. Multiply by 3,07 to get $PO_4$

## ADDITIONAL (OPTIONAL) ENVIRONMENTAL IMPACT INDICATORS – EN 15804+A2

| Impact category | Unit | A1 | A2 | A3 | A1-A3 | A4 |
|---|---|---|---|---|---|---|
| Particulate matter | Incidence | 1,02E-6 | 1,15E-6 | 3,17E-5 | 3,38E-5 | 1,76E-6 |

| | | | | | | |
|---|---|---|---|---|---|---|
| Ionizing radiation[4)] | kBq U235e | 3,08E-1 | 9,78E-1 | 2,69E0 | 3,97E0 | 1,33E0 |
| Ecotoxicity (freshwater) | CTUe | 1,77E3 | 1,65E2 | 9,51E3 | 1,14E4 | 2,32E2 |
| Human toxicity, cancer | CTUh | 5,84E-9 | 5,56E-9 | 1,62E-6 | 1,63E-6 | 5,93E-9 |
| Human tox. non-cancer | CTUh | 1,44E-7 | 1,85E-7 | 3,34E-6 | 3,66E-6 | 2,75E-7 |
| SQP[5)] | - | 5,08E1 | 2,69E2 | 4,02E2 | 7,22E2 | 4,58E2 |

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 | A2 | A3 | A1-A3 | A4 |
|---|---|---|---|---|---|---|
| Renew. PER as energy | MJ | 3,66E0 | 2,55E0 | 1,99E2 | 2,05E2 | 3,82E0 |
| Renew. PER as material | MJ | 0E0 | 0E0 | 4,7E2 | 4,7E2 | 0E0 |
| Total use of renew. PER | MJ | 3,66E0 | 2,55E0 | 6,69E2 | 6,75E2 | 3,82E0 |
| Non-re. PER as energy | MJ | 7,47E1 | 2,25E2 | 3,4E3 | 3,7E3 | 3,03E2 |
| Non-re. PER as material | MJ | 0E0 | 0E0 | 0E0 | 0E0 | 0E0 |
| Total use of non-re. PER | MJ | 7,47E1 | 2,25E2 | 3,4E3 | 3,7E3 | 3,03E2 |
| Secondary materials | kg | 0E0 | 0E0 | 4,03E-3 | 4,03E-3 | 0E0 |
| Renew. secondary fuels | MJ | 0E0 | 0E0 | 0E0 | 0E0 | 0E0 |
| Non-ren. secondary fuels | MJ | 0E0 | 0E0 | 2,14E2 | 2,14E2 | 0E0 |
| Use of net fresh water | $m^3$ | 5,24E-1 | 4,14E-2 | 8,67E-1 | 1,43E0 | 6,31E-2 |

PER = Primary energy resources

## END OF LIFE – WASTE

| Impact category | Unit | A1 | A2 | A3 | A1-A3 | A4 |
|---|---|---|---|---|---|---|
| Hazardous waste | kg | 3,25E-1 | 2,28E-1 | 1,97E1 | 2,02E1 | 2,95E-1 |
| Non-hazardous waste | kg | 8,72E0 | 1,98E1 | 4,99E2 | 5,28E2 | 3,26E1 |
| Radioactive waste | kg | 4,15E-4 | 1,55E-3 | 3,46E-3 | 5,42E-3 | 2,08E-3 |

## ENVIRONMENTAL IMPACTS – GWP-GHG - THE INTERNATIONAL EPD SYSTEM

| Impact category | Unit | A1 | A2 | A3 | A1-A3 | A4 |
|---|---|---|---|---|---|---|
| GWP-GHG | kg CO2e | 5,69E0 | 1,51E1 | 6,32E2 | 6,53E2 | 1,95E1 |

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.

## SCENARIO DOCUMENTATION

Manufacturing energy scenario documentation

| Scenario parameter | Value |
|---|---|
| Electricity data source and quality | Electricity grid mix profile based on BUR, Egypt. 2018 |
| Electricity $CO_2e$ / kWh | 0.6 |
| District heating data source and quality | - |
| District heating $CO_2e$ / kWh | - |

## 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.

Egypt's first Biennial Update Report for to the UNFCC. Cairo: Ministry of Environment, Egyptian Environmental Affairs Agency. (2018)

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 1.11 (05.02.2021)

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

CEM III/A 42.5N LCA background report

# EPD AUTHOR AND CONTRIBUTORS

| | |
|---|---|
| Manufacturer | Suez Cement Group of Companies (SCGC) |
| EPD author | Dr. Nasser Ayoub, DCarbon Egypt |
| EPD verifier | Elisabet Amat |
| 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. |

# 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 |
| EPD verification started on | 2022-06-27 |
| EPD verification completed on | 2022-08-04 |
| Supply-chain specific data % | 100% |
| Approver of the EPD verifier | The International EPD System |

| Author | Answer |
|---|---|
| EPD author | Dr. Nasser Ayoub, DCarbon Egypt<br>Ashrakat Osama, DCarbon Egypt |
| EPD author training | 2021-10-26 |

## 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

Elisabet Amat

# 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 1.11 |
| 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:<br>☐ Internal certification ☑ External verification |
| Third party verifier | Elisabet Amat |
| | Approved by: The International EPD® System Technical Committee, supported by the Secretariat |
| Procedure for follow-up during EPD validity involves third party verifier | ☐ yes ☑ no |

EPD®
THE INTERNATIONAL EPD® SYSTEM

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

# ANNEX 1 : Environmental impacts – En 15804+A1, CML/ ISO 21930

| Impact category | Unit | A1 | A2 | A3 | A1-A3 | A4 |
|---|---|---|---|---|---|---|
| Global Warming Pot. | kg $CO_2$e | 5,6E0 | 1,5E1 | 6,2E2 | 6,4E2 | 1,93E1 |
| Ozone depletion Pot. | kg $CFC^{-11}$e | 7,46E-7 | 2,72E-6 | 1,39E-5 | 1,74E-5 | 3,64E-6 |
| Acidification | kg $SO_2$e | 3,13E-2 | 1,19E-1 | 2,21E0 | 2,36E0 | 3,97E-2 |
| Eutrophication | kg $PO_4^3$e | 9,42E-3 | 1,53E-2 | 4,79E-1 | 5,04E-1 | 8,01E-3 |
| POCP (“smog”) | kg $C_2H_4$e | 1,54E-3 | 3,95E-3 | 1,4E-1 | 1,46E-1 | 2,51E-3 |
| ADP-elements | kg Sbe | 1,71E-3 | 2,23E-4 | 3,31E-4 | 2,27E-3 | 3,33E-4 |
| ADP-fossil | MJ | 7,47E1 | 2,25E2 | 3,4E3 | 3,7E3 | 3,03E2 |

End of Document