

# ENVIRONMENTAL PRODUCT DECLARATION

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

**GRÅ CEMENT 42,5**

**AALBORG PORTLAND A/S, CEMENTIR HOLDING**

Programme: The  
International EPD® System,  
[www.environdec.com](http://www.environdec.com)

Programme operator:  
**EPD International AB**

EPD  
registration  
number:  
S-P-08673

Publication  
date:  
2023-03-15

Valid until:  
2028-03-13

Geographical  
scope:  
**Denmark**

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](http://www.environdec.com).



## GENERAL INFORMATION

### MANUFACTURER INFORMATION

|                        |                                                                          |
|------------------------|--------------------------------------------------------------------------|
| <b>Manufacturer</b>    | Aalborg Portland A/S, Cementir Holding                                   |
| <b>Address</b>         | Aalborg Portland A/S, Rørdalsvej 44, 9220 Aalborg, Denmark               |
| <b>Contact details</b> | <a href="mailto:cement@aalborgportland.dk">cement@aalborgportland.dk</a> |
| <b>Website</b>         | <a href="http://www.aalborgportland.dk">www.aalborgportland.dk</a>       |

### PRODUCT IDENTIFICATION

|                                   |                    |
|-----------------------------------|--------------------|
| <b>Product name</b>               | GRÅ CEMENT 42,5    |
| <b>Additional label(s)</b>        | CEM II/A-LL 42,5 R |
| <b>Product number / reference</b> | 0615-CPR-9806.1    |
| <b>Place(s) of production</b>     | Aalborg, Denmark   |
| <b>CPC code</b>                   | 3744               |

#### 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

|                               |                                                                                                                                                                                               |
|-------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>EPD program operator</b>   | The International EPD System                                                                                                                                                                  |
| <b>EPD standards</b>          | This EPD is in accordance with EN 15804+A2 and ISO 14025 standards.                                                                                                                           |
| <b>Product category rules</b> | 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.<br>c-PCR 001 Cement & building lime |
| <b>EPD author</b>             | Stefan Emil Danielsson, Research and Quality Center, Cementir Holding S.p.A Aalborg, Denmark                                                                                                  |
| <b>EPD verification</b>       | Independent verification of this EPD and data, according to ISO 14025:<br><input type="checkbox"/> Internal certification <input checked="" type="checkbox"/> External verification           |
| <b>Verification date</b>      | 13.03.2023                                                                                                                                                                                    |
| <b>EPD verifier</b>           | Silvia Vilčeková, Silcert, s.r.o.                                                                                                                                                             |
| <b>EPD number</b>             | S-P-08673                                                                                                                                                                                     |
| <b>ECO Platform nr.</b>       |                                                                                                                                                                                               |
| <b>Publishing date</b>        | 2023-03-25                                                                                                                                                                                    |
| <b>Revision date</b>          | 2024-01-19                                                                                                                                                                                    |
| <b>EPD valid until</b>        | 2028-03-13                                                                                                                                                                                    |

## PRODUCT INFORMATION

### PRODUCT DESCRIPTION

The GRÅ CEMENT 42,5 is a CEM II/A-LL 42,5 R reaching a 28-day strength of above 42,5 MPa.

### PRODUCT APPLICATION

Products are intended for preparation of concrete, mortar, grout and other mixes for construction and for the manufacture of construction products.

### TECHNICAL SPECIFICATIONS AND PHYSICAL PROPERTIES OF THE PRODUCT

Product sheet for the cement can be retrieved here:

<https://www.aalborgportland.dk/downloads/ydeevnedeklarationer/>

Further information can be found at [www.aalborgportland.dk](http://www.aalborgportland.dk)

### PRODUCT STANDARDS

The GRÅ CEMENT 42,5 is manufactured according to the requirements in the European standard [DS/EN 197-1](#).

### PRODUCT RAW MATERIAL COMPOSITION

| Product and Packaging Material | Weight, kg | Post-consumer % | Renewable % | Country Region of origin |
|--------------------------------|------------|-----------------|-------------|--------------------------|
| Clinker                        | 800 - 940  | 0               | 0           | Denmark, Europe          |
| Limestone                      | 60 - 200   | 0               | 0           | Denmark                  |
| Other constituents             | 0 - 50     | 0               | 0           | Denmark                  |

### PRODUCT RAW MATERIAL MAIN COMPOSITION

| Raw material category | Amount, mass- % | Material origin |
|-----------------------|-----------------|-----------------|
| Metals                | <0,1            | Europe, World   |
| Minerals              | 97              | Denmark         |
| Fossil materials      | 3               | Denmark, Europe |
| Bio-based materials   | 0               | -               |

### 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)

Portland cement is made by heating, in a cement kiln, a mixture of raw materials (mainly limestone or chalk) to a calcining temperature of above 600°C and then a fusion temperature, which is about 1450°C to sinter the materials into grey clinker. The production process is a so-called wet process due to the wet limestone used. To achieve the desired setting qualities in the finished product, a quantity of gypsum or anhydrite is added to the clinker and the mixture is finely ground. Finally, the cement is packed in laminated 25 kg paper bags. This process is considered negligible for the overall environmental impact.

### TRANSPORT AND INSTALLATION (A4-A5)

Only distribution to end customers is considered (A4). Transportation happens in Denmark, partly by truck regionally, and partly by ship from silo to silo from where it is distributed by truck to local customers. The last mile truck distribution is not included. The transport impact is partitioned according to flow volume and distances and displayed in the table at the “Scenario documentation” of this EPD.

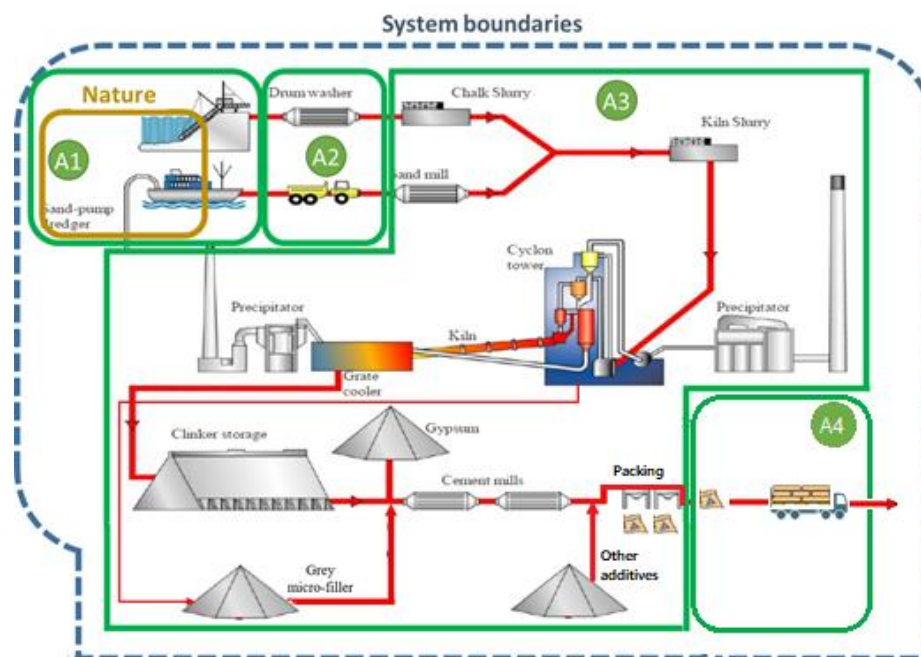
### PRODUCT USE AND MAINTENANCE (B1-B7)

As cement is an intermediate product, no other lifecycle phases are relevant to cover. Air, soil and water impacts during the use phase have not been studied. As such 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.

## MANUFACTURING PROCESS



# LIFE-CYCLE ASSESSMENT

## LIFE-CYCLE ASSESSMENT INFORMATION

|                        |                         |
|------------------------|-------------------------|
| Period for data        | 2020                    |
| Declared unit          | 1000 kg GRÅ CEMENT 42,5 |
| Mass per declared unit | 1000 kg                 |

## BIOGENIC CARBON CONTENT

The product does not have biogenic carbon content, only the packaging which is foiled paper bag. The packaging is excluded from the LCA scope.

## SYSTEM BOUNDARY

This EPD covers cradle-to-gate with options scope with following modules; A1 (Raw material supply), A2 (Transport) and A3 (Manufacturing). As cement is an intermediate product, no other lifecycle phases are relevant to cover. Only A4 is also included as per the recommendation in EN 15804+A2.

Modules not declared = MND. Modules not relevant = MNR.

| 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       |
| 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 |

## CUT-OFF CRITERIA

All major raw materials and essential energy flows are included. The 1% cut-off rule does not apply for hazardous materials and substances: as such, all flows with environmental significance are included. All solid waste emissions, including those that weight less than 1% of the sum of the masses of the inputs, are reported in the end-results.

## 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 is made in accordance with the provisions of EN 15804+A2 and the PCR. According to the “polluter pays principle” burdens from alternative fuels are excluded. However, the burden from its incineration is voluntarily added to the GWP category in A3 to be directly comparable with most other EPD’s.

The data quality is generally high as most are retrieved directly from the Manufacturer and are well below the cut-off criteria. Additional background processes such as transportation and electricity consumption have been modelled using Ecoinvent v.3.6 LCI database, all with less than 2 years old data.

## AVERAGES AND VARIABILITY

Essentially, for this EPD, minor inputs such as electricity, internal transport, and waste have been averaged over the entire cement and clinker production of Aalborg Portland.

### 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 | 95 % |
| Variation in GWP-GHG between products  | n/a  |
| Variation in GWP-GHG between sites     | n/a  |

# ENVIRONMENTAL IMPACT DATA

**NOTE: ENVIRONMENTAL IMPACTS - EN 15804+A1, CML / ISO 21930 ARE PRESENTED IN ANNEX.**

## 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   |
|---------------------------------------|--------------------------|----------|----------|----------|----------|----------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| Climate change – total                | kg CO <sub>2</sub> -eq   | 1,05E+01 | 1,43E+01 | 6,76E+02 | 7,01E+02 | 4,38E+01 | MND | MND | MND | MND | MND | MND | MND | MND | MND | MND | MND | MND | MND |
| Climate change – fossil               | kg CO <sub>2</sub> -eq   | 1,05E+01 | 1,43E+01 | 6,73E+02 | 6,98E+02 | 4,42E+01 | MND | MND | MND | MND | MND | MND | MND | MND | MND | MND | MND | MND | MND |
| Climate change – biogenic             | kg CO <sub>2</sub> -eq   | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | MND | MND | MND | MND | MND | MND | MND | MND | MND | MND | MND | MND | MND |
| Climate change – LULUC                | kg CO <sub>2</sub> -eq   | 1,19E-02 | 7,66E-03 | 5,52E-02 | 7,48E-02 | 1,57E-02 | MND | MND | MND | MND | MND | MND | MND | MND | MND | MND | MND | MND | MND |
| Ozone depletion                       | kg CFC11 <sub>-eq</sub>  | 2,42E-06 | 2,97E-06 | 6,16E-06 | 1,16E-05 | 1,00E-05 | MND | MND | MND | MND | MND | MND | MND | MND | MND | MND | MND | MND | MND |
| Acidification                         | mol H <sup>+</sup> -eq   | 9,42E-02 | 1,80E-01 | 1,61E+00 | 1,89E+00 | 1,80E-01 | MND | MND | MND | MND | MND | MND | MND | MND | MND | MND | MND | MND | MND |
| Eutrophication, aquatic freshwater    | kg PO <sub>4</sub> -eq   | 1,21E-03 | 1,32E-04 | 9,15E-03 | 1,05E-02 | 3,70E-04 | MND | MND | MND | MND | MND | MND | MND | MND | MND | MND | MND | MND | MND |
| Eutrophication, aquatic marine        | kg N <sub>-eq</sub>      | 1,96E-02 | 4,80E-02 | 2,09E-01 | 2,76E-01 | 5,36E-02 | MND | MND | MND | MND | MND | MND | MND | MND | MND | MND | MND | MND | MND |
| Eutrophication, terrestrial           | mol N <sub>-eq</sub>     | 2,59E-01 | 5,33E-01 | 2,39E+00 | 3,18E+00 | 5,92E-01 | MND | MND | MND | MND | MND | MND | MND | MND | MND | MND | MND | MND | MND |
| Photochemical ozone formation         | kg NMVOC <sub>-eq</sub>  | 5,93E-02 | 1,46E-01 | 8,49E-01 | 1,05E+00 | 1,81E-01 | MND | MND | MND | MND | MND | MND | MND | MND | MND | MND | MND | MND | MND |
| Abiotic depletion, minerals & metals  | kg Sb <sub>-eq</sub>     | 1,20E-03 | 2,56E-04 | 2,24E-04 | 1,68E-03 | 1,19E-03 | MND | MND | MND | MND | MND | MND | MND | MND | MND | MND | MND | MND | MND |
| Abiotic depletion of fossil resources | MJ                       | 2,20E+02 | 2,00E+02 | 1,86E+03 | 2,29E+03 | 6,66E+02 | MND | MND | MND | MND | MND | MND | MND | MND | MND | MND | MND | MND | MND |
| Water use                             | m <sup>3</sup> -eq depr. | 1,31E+01 | 7,74E-01 | 8,61E+00 | 2,24E+01 | 2,14E+00 | MND | MND | MND | MND | MND | MND | MND | MND | MND | MND | MND | MND | MND |

EN 15804+A2 disclaimer for Abiotic depletion and Water use indicators and all 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.

The Climate change parameter (A1-A3) for the cement content includes 67,2 kg CO<sub>2</sub>-eq. from the combustion of fossil part of alternative fuels during clinker production. In accordance with the "polluter pays" principle / EN 15804 /, the emissions will be added to the production system that caused the waste. In this EPD, the fossil CO<sub>2</sub> contribution from alternative fuels has not been deducted. This makes it easier to compare calculated climate change potential of the cement regardless of the status of the waste in different countries. The net total Climate change potential (without alternative fuel contribution) is 634 kg CO<sub>2</sub>-eq per ton cement.

## ADDITIONAL (OPTIONAL) 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   |
|---------------------------------------|------------------------|----------|----------|----------|----------|----------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| Particulate matter                    | Incidence              | 1,01E-06 | 8,98E-07 | 1,82E-05 | 2,01E-05 | 3,21E-07 | MND | MND | MND | MND | MND | MND | MND | MND | MND | MND | MND | MND | MND |
| Ionizing radiation, human health      | kBq U235 <sub>eq</sub> | 6,75E-01 | 8,62E-01 | 3,19E+00 | 4,72E+00 | 3,30E-01 | MND | MND | MND | MND | MND | MND | MND | MND | MND | MND | MND | MND | MND |
| Eco-toxicity (freshwater)             | CTU <sub>eq</sub>      | 1,60E+03 | 1,59E+02 | 5,55E+03 | 7,32E+03 | 5,69E+01 | MND | MND | MND | MND | MND | MND | MND | MND | MND | MND | MND | MND | MND |
| Human toxicity, cancer effects        | CTUh                   | 1,02E-08 | 7,44E-09 | 4,87E-07 | 5,05E-07 | 2,07E-09 | MND | MND | MND | MND | MND | MND | MND | MND | MND | MND | MND | MND | MND |
| Human toxicity, non-cancer effects    | CTUh                   | 1,84E-07 | 1,70E-07 | 2,01E-06 | 2,37E-06 | 6,21E-08 | MND | MND | MND | MND | MND | MND | MND | MND | MND | MND | MND | MND | MND |
| Land use related impacts/soil quality | -                      | 1,11E+02 | 1,15E+02 | 2,30E+02 | 4,55E+02 | 5,27E+01 | MND | MND | MND | MND | MND | MND | MND | MND | MND | MND | MND | MND | MND |

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.

## 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   |
|-----------------------------------|------|----------|----------|----------|----------|----------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| Renewable PER used as energy      | MJ   | 7,20E+00 | 3,13E+00 | 3,26E+02 | 3,36E+02 | 9,87E-01 | MND | MND | MND | MND | MND | MND | MND | MND | MND | MND | MND | MND | MND |
| Renewable PER used as materials   | MJ   | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | MND | MND | MND | MND | MND | MND | MND | MND | MND | MND | MND | MND | MND |
| Total use of renewable PER        | MJ   | 7,20E+00 | 3,13E+00 | 3,26E+02 | 3,36E+02 | 9,87E-01 | MND | MND | MND | MND | MND | MND | MND | MND | MND | MND | MND | MND | MND |
| Non-renew. PER used as energy     | MJ   | 2,20E+02 | 2,00E+02 | 1,86E+03 | 2,29E+03 | 7,57E+01 | MND | MND | MND | MND | MND | MND | MND | MND | MND | MND | MND | MND | MND |
| Non-renew. PER used as materials  | MJ   | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | MND | MND | MND | MND | MND | MND | MND | MND | MND | MND | MND | MND | MND |
| Total use of non-renewable PER    | MJ   | 2,20E+02 | 2,00E+02 | 1,86E+03 | 2,29E+03 | 7,57E+01 | MND | MND | MND | MND | MND | MND | MND | MND | MND | MND | MND | MND | MND |
| Use of secondary materials        | kg   | 4,44E-02 | 0,00E+00 | 7,68E-04 | 4,51E-02 | 0,00E+00 | MND | MND | MND | MND | MND | MND | MND | MND | MND | MND | MND | MND | MND |
| Use of renewable secondary fuels  | MJ   | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | MND | MND | MND | MND | MND | MND | MND | MND | MND | MND | MND | MND | MND |
| Use of non-renew. secondary fuels | MJ   | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | MND | MND | MND | MND | MND | MND | MND | MND | MND | MND | MND | MND | MND |
| Use of net fresh water            | m³   | 1,92E-01 | 3,50E-02 | 3,32E-01 | 5,58E-01 | 1,21E-02 | MND | MND | MND | MND | MND | MND | MND | MND | MND | MND | MND | MND | MND |

PER abbreviation stands for 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   | 9,13E-01 | 3,08E-01 | 1,76E+01 | 1,89E+01 | 8,13E-02 | MND | MND | MND | MND | MND | MND | MND | MND | MND | MND | MND | MND | MND |
| Non-hazardous waste | kg   | 1,01E+01 | 1,11E+01 | 3,81E+02 | 4,03E+02 | 4,60E+00 | MND | MND | MND | MND | MND | MND | MND | MND | MND | MND | MND | MND | MND |
| Radioactive waste   | kg   | 9,11E-04 | 1,35E-03 | 2,83E-03 | 5,10E-03 | 5,21E-04 | 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 reuse          | kg   | 0,00E+00 | 0,00E+00 | 2,05E+01 | 2,05E+01 | 0,00E+00 | MND | MND | MND | MND | MND | MND | MND | MND | MND | MND | MND | MND | MND |
| Materials for recycling       | kg   | 9,16E-04 | 0,00E+00 | 4,32E+00 | 4,32E+00 | 0,00E+00 | MND | MND | MND | MND | MND | MND | MND | MND | MND | MND | MND | MND | MND |
| Materials for energy recovery | kg   | 0,00E+00 | 0,00E+00 | 2,21E+00 | 2,21E+00 | 0,00E+00 | MND | MND | MND | MND | MND | MND | MND | MND | MND | MND | MND | MND | MND |
| Exported energy               | MJ   | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | MND | MND | MND | MND | MND | MND | MND | MND | MND | MND | MND | MND | MND |

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

| Impact category | Unit                   | A1       | A2       | A3       | A1-A3    | A4       | A5  | B1  | B2  | B3  | B4  | B5  | B6  | B7  | C1  | C2  | C3  | C4  | D   |
|-----------------|------------------------|----------|----------|----------|----------|----------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| GWP-GHG         | kg CO <sub>2</sub> -eq | 1,05E+01 | 1,43E+01 | 6,73E+02 | 6,98E+02 | 4,42E+01 | MND | MND | MND | MND | MND | MND | MND | MND | MND | MND | MND | MND | MND |

8) 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. The fossil contribution of 67,2 kg CO<sub>2eq</sub> from alternative fuel in A3 is included.

## SCENARIO DOCUMENTATION

### Manufacturing energy scenario documentation

| Scenario parameter                         | Value                                                           |
|--------------------------------------------|-----------------------------------------------------------------|
| Electricity data source and quality        | Ecoinvent v.3.6 data has been applied as the only valid dataset |
| Electricity CO <sub>2</sub> -eq / kWh      | 0,32                                                            |
| District heating data source and quality   | n/a                                                             |
| District heating CO <sub>2</sub> -eq / kWh | n/a                                                             |

### Transport scenario documentation

| Scenario parameter                                                                | Value  |
|-----------------------------------------------------------------------------------|--------|
| Transport, freight, lorry 16-32 tonnes, EURO 5, kg CO <sub>2</sub> -eq / t-km     | 0,1668 |
| A4 average transport CO <sub>2</sub> -eq emissions, kg CO <sub>2</sub> -eq / t-km | 0,1668 |
| A4 average transport distance, km                                                 | 265    |
| Transport capacity utilization, %                                                 | 36%    |
| Bulk density of transported products, kg/m <sup>3</sup>                           | -      |
| Volume capacity utilization factor for nested package products, %                 | 100    |

### End of life scenario documentation

| Scenario parameter                                 | Value |
|----------------------------------------------------|-------|
| Collection process – kg collected separately       | n/a   |
| Collection process – kg collected with mixed waste | n/a   |
| Recovery process – kg for re-use                   | n/a   |
| Recovery process – kg for recycling                | n/a   |
| Recovery process – kg for energy recovery          | n/a   |
| Disposal (total) – kg for final deposition         | n/a   |
| Scenario assumptions e.g. transportation           | n/a   |

## 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 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.

IES EPD System PCR 2019:14 Construction products, version 1.11 (05.02.2021) is used. c-PCR 001 Cement & building lime

## CHANGES VERSUS PREVIOUS VERSIONS

Declared +A2 impact for “Climate change – fossil” corrected in module A3 and (A1-A3). Changed from 613 to 673. No changes to any other impacts or modules.

## ABOUT THE MANUFACTURER

Aalborg Portland is the only cement factory in Denmark. The past 130 years it has been producing a wide variety of grey cements in its kiln and premium white cement in its six white cement kilns, where the main clinker raw material, limestone and sand, is sourced locally. Since 2004 it is owned by Cementir Group along with 10 other cement factories globally. The annual cement production is 2,4 million tons and the markets are both domestic, regional and global, and the domestic infrastructure is supported by seven Aalborg Portland owned silos across Denmark. In its Research and Quality Centre cements from all factories across the Group are being tested, and the development of low carbon cements is taking place, the latest one FUTURECEM™ launched in 2020 – a calcined clay cement with a 30% lower CO<sub>2</sub> footprint compared to traditional cements.

## EPD AUTHOR AND CONTRIBUTORS

|                             |                                                                                                            |
|-----------------------------|------------------------------------------------------------------------------------------------------------|
| <b>Manufacturer</b>         | Aalborg Portland, Cementir Holding                                                                         |
| <b>EPD author</b>           | Stefan Emil Danielsson, Research and Quality Center, Cementir Holding S.p.A Aalborg, Denmark               |
| <b>EPD verifier</b>         | Silvia Vilčeková, Silcert, s.r.o.                                                                          |
| <b>EPD program operator</b> | The International EPD System                                                                               |
| <b>Background data</b>      | This EPD is based on Ecoinvent 3.6 (cut-off) and One Click LCA databases.                                  |
| <b>LCA software</b>         | The LCA and EPD have been created using One Click LCA Pre-Verified EPD Generator for Cementitious Products |

## 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      | Silvia Vilčková, Silcert, s.r.o. |
| EPD verification started on   | 2023-03-08                       |
| EPD verification completed on | 2023-03-13                       |
| Supply-chain specific data %  | 95%                              |
| Approver of the EPD verifier  | The International EPD System     |

| Author & tool verification     | Answer                                  |
|--------------------------------|-----------------------------------------|
| EPD author                     | Stefan Emil Danielsson                  |
| EPD author training completion | 2020-10-09                              |
| EPD Generator module           | Cement, cement mixes & building lime    |
| Independent software verifier  | Ugo Pretato, Studio Fieschi & soci Srl. |
| Software verification date     | 2021-05-11                              |

### 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.



Silvia Vilčková, Silcert, s.r.o.

## 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 <a href="http://www.environdec.com/TC">www.environdec.com/TC</a> for a list of members. Review chair: Claudia A. Peña, University of Concepción, Chile. The review panel may be contacted via the Secretariat <a href="http://www.environdec.com/contact">www.environdec.com/contact</a> . |
| 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><input type="checkbox"/> Internal certification <input checked="" type="checkbox"/> External verification                                                                                                                                                                      |
| Third party verifier                                                                             | Silvia Vilčeková, Silcert, s.r.o.                                                                                                                                                                                                                                                                                                                        |
|                                                                                                  | 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                                                                                                                                                                                                                                                                                      |



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## ANNEX

### 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 potential              | kg CO <sub>2</sub> -eq               | 1,04E+01 | 1,42E+01 | 6,66E+02 | 6,91E+02 | 4,34E+01 | MND | MND | MND | MND | MND | MND | MND | MND | MND | MND | MND | MND | MND |
| Depletion of stratospheric ozone      | kg CFC-11-eq                         | 1,94E-06 | 2,37E-06 | 5,60E-06 | 9,90E-06 | 7,91E-06 | MND | MND | MND | MND | MND | MND | MND | MND | MND | MND | MND | MND | MND |
| Acidification                         | kg SO <sub>2</sub> -eq               | 6,21E-02 | 1,30E-01 | 1,39E+00 | 1,57E+00 | 8,77E-02 | MND | MND | MND | MND | MND | MND | MND | MND | MND | MND | MND | MND | MND |
| Eutrophication                        | kg PO <sub>4</sub> -eq               | 1,91E-02 | 1,78E-02 | 2,98E-01 | 3,35E-01 | 1,80E-02 | MND | MND | MND | MND | MND | MND | MND | MND | MND | MND | MND | MND | MND |
| Photochemical ozone formation         | kg C <sub>2</sub> H <sub>4</sub> -eq | 2,60E-03 | 4,33E-03 | 7,15E-02 | 7,84E-02 | 5,77E-03 | MND | MND | MND | MND | MND | MND | MND | MND | MND | MND | MND | MND | MND |
| Abiotic depletion of non-fossil res.  | kg Sb-eq                             | 1,20E-03 | 2,56E-04 | 2,24E-04 | 1,68E-03 | 1,18E-03 | MND | MND | MND | MND | MND | MND | MND | MND | MND | MND | MND | MND | MND |
| Abiotic depletion of fossil resources | MJ                                   | 2,20E+02 | 2,00E+02 | 1,86E+03 | 2,29E+03 | 6,59E+02 | MND | MND | MND | MND | MND | MND | MND | MND | MND | MND | MND | MND | MND |

The GWP parameter (A1-A3) for the cement content includes 67,2 kg CO<sub>2</sub>-eq. from the combustion of fossil part of alternative fuels during clinker production. In accordance with the "polluter pays" principle / EN 15804 /, the emissions will be added to the production system that caused the waste. In this EPD, the fossil CO<sub>2</sub> contribution from alternative fuels has not been deducted. This makes it easier to compare calculated global warming potential of the cement regardless of the status of the waste in different countries. The net total GWP (without alternative fuel contribution) is 624 kg CO<sub>2</sub>-eq per ton cement.