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The Norwegian EPD Foundation

# ENVIRONMENTAL PRODUCT DECLARATION

in accordance with ISO 14025, ISO 21930 and EN 15804

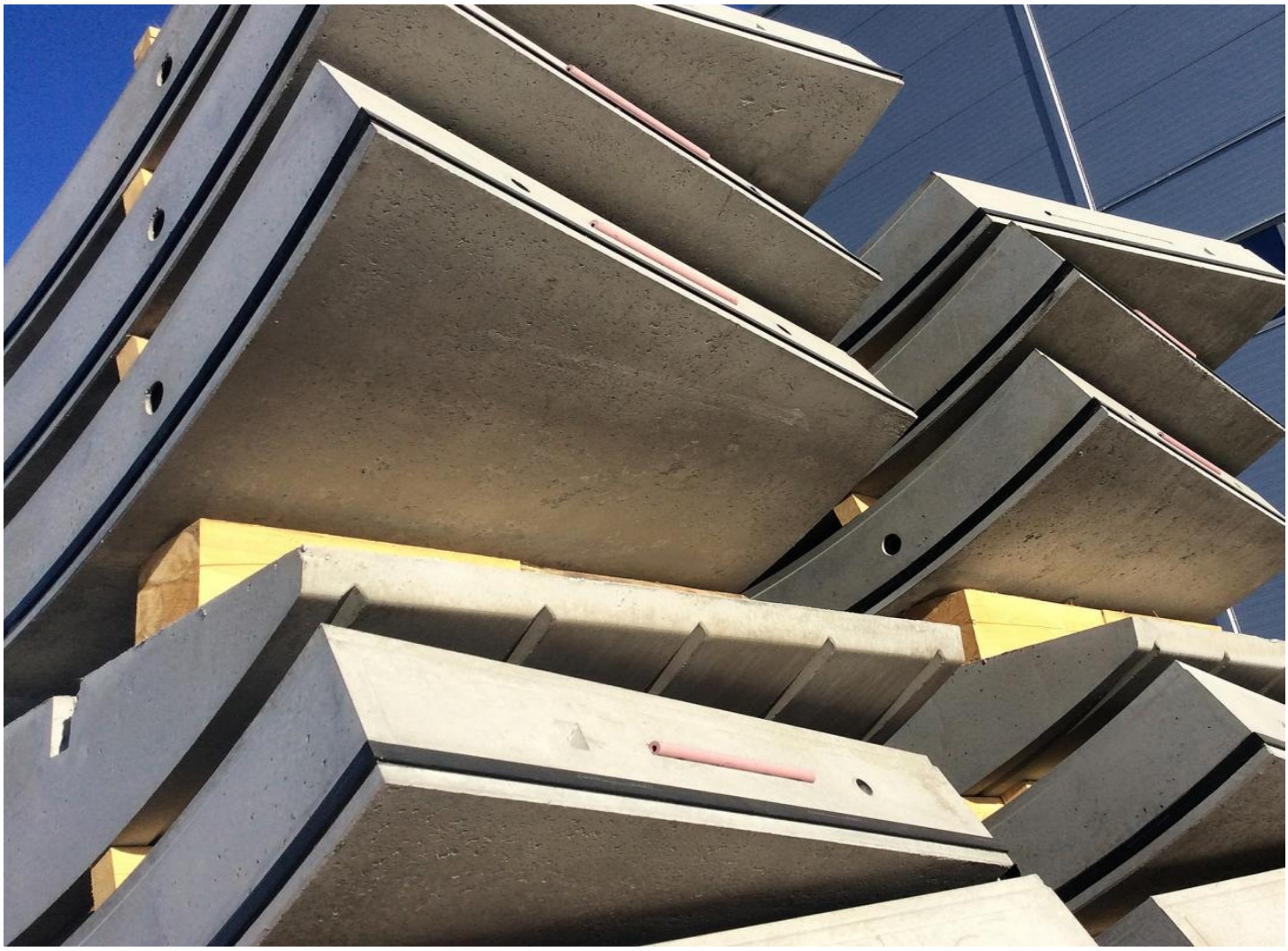
| | |
|---|---|
| Owner of the declaration: | Norcem AS |
| Program operator: | The Norwegian EPD Foundation |
| Publisher: | The Norwegian EPD Foundation |
| Declaration number: | NEPD-2336-1064-EN |
| Registration number: | NEPD-2336-1064-EN |
| ECO Platform reference number: | - |
| Issue date: | 25.08.2020 |
| Valid to: | 25.08.2025 |

# Norcem Standardsement FA justert, Brevik - CEM II/ B-M 42,5 R eng.

## Norcem AS

NORCEM
HEIDELBERGCEMENT Group

www.epd-norge.no



# General information

**Product:**

Norcem Standardsement FA justert, Brevik - CEM II/ B-M 42,5 R eng.

**Owner of the declaration:**

Norcem AS
Contact person: Petter Thyholdt
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**Program operator:**

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Phone: +47 23 08 80 00
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**Manufacturer:**

Norcem AS

**Declaration number:**

NEPD-2336-1064-EN

**Place of production:**

Norcem AS, Brevik

**ECO Platform reference number:**

**Management system:**

Miljøstyringssystem ISO 14001-sertifisert(S-007) Kvalitetssikriingssystem ISO 9001-sertifisert (S-006)

**This declaration is based on Product Category Rules:**

CEN Standard EN 15804:2012+A1:2013 serves as core PCR
EN 16908:2017 Cement and building lime

**Organisation no:**

934 949 145

**Statement of liability:**

The owner of the declaration shall be liable for the underlying information and evidence. EPD Norway shall not be liable with respect to manufacturer information, life cycle assessment data and evidences.

**Issue date:**

25.08.2020

**Valid to:**

25.08.2025

**Declared unit:**

1 tonne Norcem Standardsement FA justert, Brevik - CEM II/ B-M 42,5 R eng.

**Year of study:**

2020

**Declared unit with option:**

A1,A2,A3,A4

**Comparability:**

EPD of construction products may not be comparable if they not comply with EN 15804 and seen in a building context.

**Functional unit:**

**Author of the Life Cycle Assessment:**

The declaration is developed using eEPD v4.0 from LCA.no
Approval:
Company specific data are:

| | |
|---|---|
| Collected/registered by: | Sigrun Bremseth |
| Internal verification by: | Petter Thyholdt |

**Verification:**

Independent verification of data, other environmental information and the declaration according to ISO14025:2010, § 8.1.3 and § 8.1.4

External

Third party verifier:

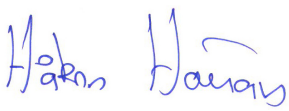
Sign

Ellen Soldal, Research Scientist

(Independent verifier approved by EPD Norway)

**Approved:**

Sign



(Managing Director EPD-Norway)

# Product

**Product description:**

Norcem Standardsement FA adjusted is produced for shorter periods due to challenging access to fly ash. Standardsement FA adjusted is produced with 13% fly ash and 9% limestone filler. The clinker content will be approximately the same as ordinary Standardsement FA. The cement can be used as an ordinary Standardsement FA except in the sulphate resistance classes SuR1 and SuR2 classes according to NS-EN206.

**Product specification**

Portland-composite cement

| Materials | % |
|---|---|
| Standard clinker | 72,9 |
| Fly ash | 13,8 |
| Limestone filler | 8,4 |
| Gypsum | 4,9 |

**Technical data:**

CEM II/B-M 42,5 R

**Market:**

**Reference service life, product**

Depending of area of use

**Reference service life, building**

# LCA: Calculation rules

**Declared unit:**

1 tonne Norcem Standardsement FA justert, Brevik - CEM II/ B-M 42,5 R eng.

**Cut-off criteria:**

All major raw materials and all the essential energy is included. The production processes for raw materials and energy flows with very small amounts (less than 1%) are not included. These cut-off criteria do not apply for hazardous materials and substances.

**Allocation:**

The allocation is made in accordance with the provisions of EN 15804. Incoming energy and water and waste production in-house is allocated equally among all products through mass allocation. Effects of primary production of recycled materials is allocated to the main product in which the material was used. The recycling process and transportation of the material is allocated to this analysis.

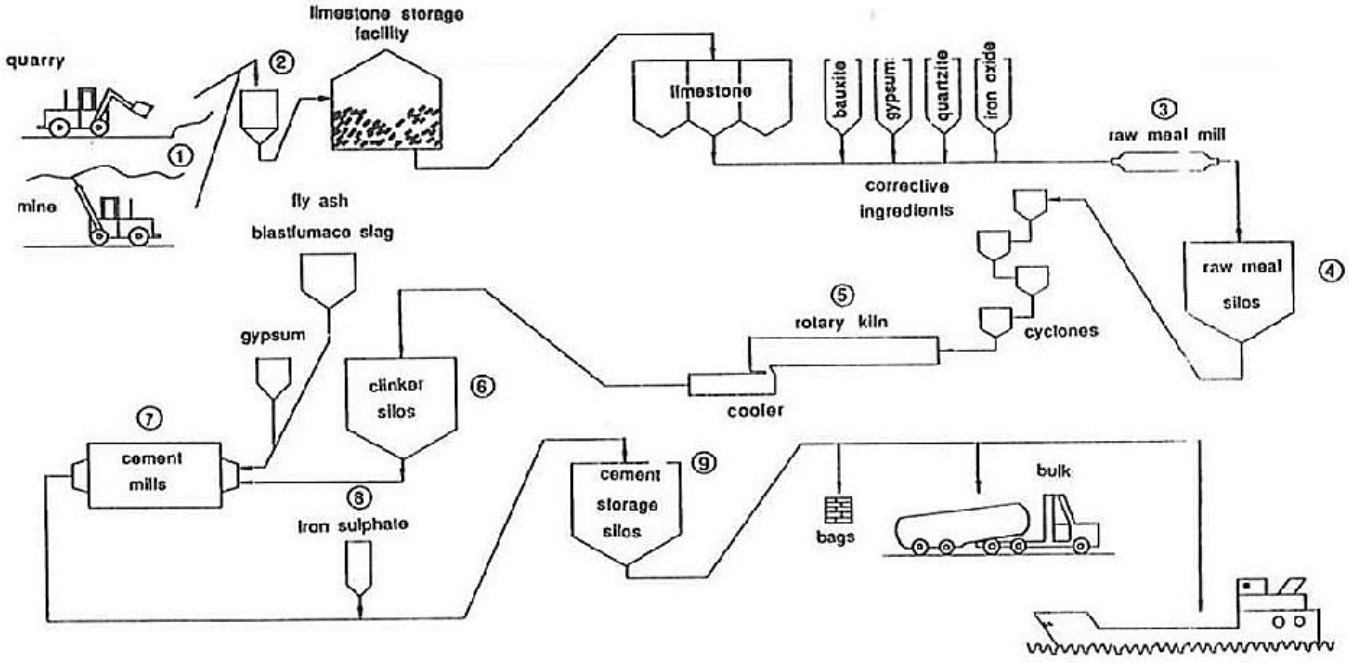
**Data quality:**

Specific data for the product composition are provided by the manufacturer. They represent the production of the declared product and were collected for EPD development in the year of study. Background data is based on registered EPDs according to EN 15804, Ostfold Research databases, ecoinvent and other LCA databases. The data quality of the raw materials in A1 is presented in the table below.

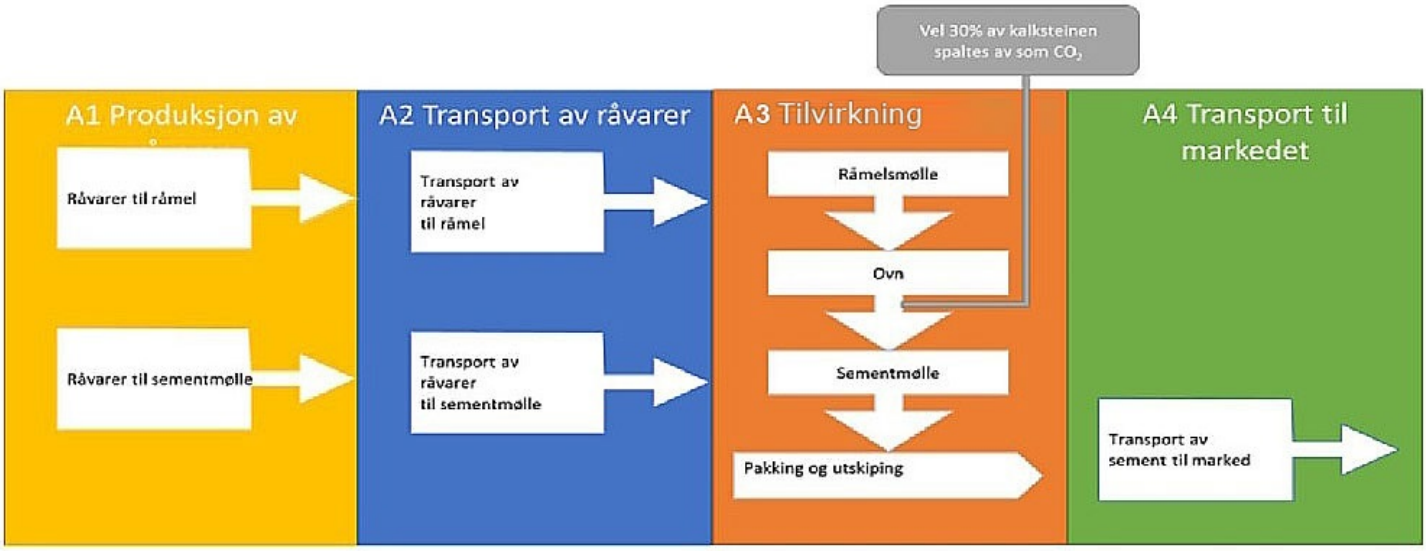
| Materials | Source | Data quality | Year |
|---|---|---|---|
| SCM | TI, Denmark | EPD | 2013 |
| Additives | ecoinvent 3.4 | Database | 2017 |
| Aggregate | ecoinvent 3.5 | Database | 2017 |
| Raw materials, Mineral | LCA.no | Database | 2018 |
| SCM | LCA.no | Database | 2019 |
| SCM | LCA.no estimate | Waste product, no impacts | 2020 |

**System boundary:**

From raw materials extraction to market.




1. Uttak av kalkstein fra gruve og dagbrudd
2. Knusing av kalkstein
3. Maling av kalkstein og tilsetningstoffer til råmel
4. Siloer for lagring og homogenisering
5. Brenning av klinker i roterende ovn der materialene når en temperatur på 1450°C
6. Siloer for lagring av klinker
7. Maling av klinker med gips og andre tilsetninger for produksjon av sement
8. Tilsetning av jernsulfat
9. Lagring og utsendelse av sementen




**Additional technical information:**

## LCA: Scenarios and additional technical information

The following information describe the scenarios in the different modules of the EPD.

Transport in the A4 is calculated per trip from Brevik to silo (including loading, unloading and empty return). The number of km to the silo is described in a separate table.

**Transport from production place to user (A4)**

| Type | Capacity utilisation (incl. return) % | Type of vehicle | Distance km | Fuel/Energy consumption | Unit | Value (l/t) |
|---|---|---|---|---|---|---|
| Truck | | | | | l/tkm | |
| Railway | | | | | l/tkm | |
| Boat | 50,0 % | Transport Norcem Brevik - silo Slemmestad, Kristiansand, Sjursøya, Vige | 1 | 0,005051 | l/tkm | 0,01 |
| Other Transportation | | | | | l/tkm | |

| Additional A4 information | Unit/Range | Value |
|---|---|---|
| Transport Norcem, Brevik - silo Slemmestad. Kristiansand, Sjursøya, Vige | km | 163 |

**Assembly (A5)**

| . | Unit | Value |
|---|---|---|
| Auxiliary | kg | |
| Water consumption | $m^3$ | |
| Electricity consumption | kWh | |
| Other energy carriers | MJ | |
| Material loss | kg | |
| Output materials fr ste treatment | kg | |
| Dust in the air | kg | |
| VOC emissions | kg | |

**Use (B1)**

| . | Unit | Value |
|---|---|---|
| | | |

**Maintenance (B2)/Repair (B3)**

| . | Unit | Value |
|---|---|---|
| Maintenance cycle* | | |
| Auxiliary | | |
| Other resources | | |
| Water consumption | $m^3$ | |
| Electricity consumption | kWh | |
| Other energy carriers | MJ | |
| Material loss | kg | |
| VOC emissions | kg | |

**Replacement (B4)/Refurbishment (B5)**

| . | Unit | Value |
|---|---|---|
| Replacement cycle* | | |
| Electricity consumption | kWh | |
| Replacement of worn parts | | |

* Described above if relevant

**Operational energy (B6) and water consumption (B7)**

| . | Unit | Value |
|---|---|---|
| Water consumption | $m^3$ | |
| Electricity consumption | kWh | |
| Other energy carriers | MJ | |
| Power output of equipment | kW | |

**End of Life (C1, C**

| . | Unit | Value |
|---|---|---|
| Hazardous waste disposed | kg | |
| Collected as mixed construction wa | kg | |
| Reuse | kg | |
| Recycling | | |
| Energy recovery | | |
| To landfill | kg | |

Scenarios after A1-A4 are not included

**Transport to waste processing (C2)**

| Type | Capacity utilisation (incl. return) % | Type of vehicle | Distance km | Fuel/Energy consumption | Unit | Value (l/t) |
|---|---|---|---|---|---|---|
| Truck | | | | | l/tkm | |
| Railway | | | | | l/tkm | |
| Boat | | | | | l/tkm | |
| Other Transportation | | | | | l/tkm | |

# LCA: Results

## System boundaries (X=included, MND=module not declared, MNR=module not relevant)

| Product stage | | | Construction installation stage | | User stage | | | | | | | End of life stage | | | | . | Beyond the system bondaries |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Raw materials | Transport | Manufacturing | Transport | Assembly | Use | Maintenance | Repair | Replacement | Refurbishment | Operational energy use | Operational water use | De-construction demolition | Transport | Waste processing | Disposal | | Reuse-Recovery-Recycling-potential |
| A1 | A2 | A3 | A4 | A5 | B1 | B2 | B3 | B4 | B5 | B6 | B7 | C1 | C2 | C3 | C4 | . | D |
| X | X | X | X | MND | MND | MND | MND | MND | MND | MND | MND | MND | MND | MND | MND | . | MND |

### Environmental impact

| Parameter | Unit | A1-A3 | A4 |
|---|---|---|---|
| GWP | kg $CO_2$ -eq | 5,81E+02 | 2,61E+00 |
| ODP | kg CFC11 -eq | 3,37E-06 | 4,88E-07 |
| POCP | kg $C_2H_4$-eq | 8,37E-03 | 5,25E-04 |
| AP | kg $SO_2$ -eq | 2,55E-01 | 1,97E-02 |
| EP | kg $PO_4^{3-}$ -eq | 6,12E-02 | 4,17E-03 |
| ADPM | kg Sb -eq | 7,77E-05 | 8,13E-07 |
| ADPE | MJ | 1,14E+03 | 3,75E+01 |

GWP Global warming potential; ODP Depletion potential of the stratospheric ozone layer; POCP Formation potential of tropospheric photochemical oxidants; AP Acidification potential of land and water; EP Eutrophication potential; ADPM Abiotic depletion potential for non fossil resources; ADPE Abiotic depletion potential for fossil resources

"Reading example: 9,0 E-03 = 9,0*10-3 = 0,009"
*INA Indicator Not Assessed

**Remarks to environmental impacts**

The GWP parameter (A1-A3) for the cement content includes 134.1 kg CO2-eq. from the combustion of alternative fossil 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 CO2 contribution from alternative fossil fuels has not been deducted. This makes it easier to compare calculated global warming of the cement regardless of the status of the waste in different countries.

## Resource use

| Parameter | Unit | A1-A3 | A4 |
|---|---|---|---|
| RPEE | MJ | 5,44E+02 | 2,06E-01 |
| RPEM | MJ | 0,00E+00 | 0,00E+00 |
| TPE | MJ | 5,44E+02 | 2,06E-01 |
| NRPE | MJ | 1,18E+03 | 3,78E+01 |
| NRPM | MJ | 0,00E+00 | 0,00E+00 |
| TRPE | MJ | 1,18E+03 | 3,78E+01 |
| SM | kg | 2,03E+02 | 0,00E+00 |
| RSF | MJ | 8,65E+02 | 0,00E+00 |
| NRSF | MJ | 1,08E+03 | 0,00E+00 |
| W | $m^3$ | 2,27E-01 | 3,42E-03 |

RPEE Renewable primary energy resources used as energy carrier; RPEM Renewable primary energy resources used as raw materials; TPE Total use of renewable primary energy resources; NRPE Non renewable primary energy resources used as energy carrier; NRPM Non renewable primary energy resources used as materials; TRPE Total use of non renewable primary energy resources; SM Use of secondary materials; RSF Use of renewable secondary fuels; NRSF Use of non renewable secondary fuels; W Use of net fresh water

"Reading example: 9,0 E-03 = 9,0*10-3 = 0,009"
*INA Indicator Not Assessed

## End of life - Waste

| Parameter | Unit | A1-A3 | A4 |
|---|---|---|---|
| HW | kg | 3,06E-04 | 1,58E-05 |
| NHW | kg | 5,02E+01 | 1,82E-01 |
| RW | kg | INA* | INA* |

HW Hazardous waste disposed; NHW Non hazardous waste disposed; RW Radioactive waste disposed

"Reading example: 9,0 E-03 = 9,0*10-3 = 0,009"
*INA Indicator Not Assessed

## End of life - Output flow

| Parameter | Unit | A1-A3 | A4 |
|---|---|---|---|
| CR | kg | 0,00E+00 | 0,00E+00 |
| MR | kg | 0,00E+00 | 0,00E+00 |
| MER | kg | 0,00E+00 | 0,00E+00 |
| EEE | MJ | INA* | INA* |
| ETE | MJ | INA* | INA* |

CR Components for reuse; MR Materials for recycling; MER Materials for energy recovery; EEE Exported electric energy; ETE Exported thermal energy

"Reading example: 9,0 E-03 = 9,0*10-3 = 0,009"
*INA Indicator Not Assessed

## Additional Norwegian requirements

**Greenhouse gas emissions from the use of electricity in the manufacturing phase**

National production mix from import, low voltage (production of transmission lines, in addition to direct emissions and losses in grid) of applied electricity for the manufacturing process (A3).

| Electricity mix | Data source | Amount | Unit |
|---|---|---|---|
| El-mix, Norway (kWh) | ecoinvent 3.4 | 31,04 | g CO2-ekv/kWh |

**Dangerous substances**

The product contains no substances given by the REACH Candidate list or the Norwegian priority list.

**Indoor environment**

## Bibliography

ISO 14025:2010 Environmental labels and declarations - Type III environmental declarations - Principles and procedures.
ISO 14044:2006 Environmental management - Life cycle assessment - Requirements and guidelines.
EN 15804:2012+A1:2013 Environmental product declaration - Core rules for the product category of construction products.
ISO 21930:2017 Sustainability in buildings and civil engineering works - Core rules for environmental product declarations of construction products.
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EN 16908:2017 Cement and building lime - Environmental product declarations - Product category rules complementary to NS-EN 15804

Environmental management system ISO 14001- certified (S-007) Quality management system ISO 9001- certified (S-006)

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|---|---|---|---|
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