

Environmental Product Declaration

according to ISO 14025 and EN 15804



This declaration is for:

Spenner CEM II/C-M (S-LL) 42,5 N (na)

Provided by:

Spenner GmbH & Co. KG

spenner



program operator

Stichting MRPI®

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Nationale

Milieu DATABASE





COMPANY INFORMATION

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PRODUCT

Spenner CEM II/C-M (S-LL) 42,5 N (na)

DECLARED UNIT/FUNCTIONAL UNIT

The production of 1 metric ton of cement

DESCRIPTION OF PRODUCT

Portland limestone cement

VISUAL PRODUCT



MRPI® REGISTRATION

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MORE INFORMATION

<https://spenner-zement.de/produkte/zement/portlandkomoportzement-cem-ii-c-m-s-ll-425-n-na/>

SCOPE OF DECLARATION

This MRPI®-EPD certificate is verified by **Niels Jonkers , PLUK sustainability.**

The LCA study has been done by **Ruben van Gaalen, EcoReview B.V. .**

The certificate is based on an LCA-dossier according to ISO14025 and EN15804+A2/Bepalingsmethode. It is verified according to the 'MRPI®-EPD verification protocol November 2020.v4.0'. EPDs of construction products may not be comparable if they do not comply with EN15804+A2/Bepalingsmethode. Declaration of SVHC that are listed on the 'Candidate List of Substances of Very High Concern for authorisation' when content exceeds the limits for registration with ECHA.

PROGRAM OPERATOR

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ir. J-P den Hollander, Managing director MRPI®

DEMONSTRATION OF VERIFICATION

CEN standard EN15804 serves as the core PCR[a]

Independent verification of the declaration and data,

according to EN ISO 14025:2010:

internal: external: X

Third party verifier:

Niels Jonkers , PLUK sustainability

[a] PCR = Product Category Rules

DETAILED PRODUCT DESCRIPTION

Product name: Spenner CEM II/C-M (S-LL) 42,5 N (na)

Portland cement combined with ground limestone and blastfurnace slag, sold in bulk quantities. The production processes needed to come to this product are grinding and mixing. The clinker that is used as the main ingredient is self produced. For this, mining, transport, breaking, drying and calcination has been performed.

This product is an intermediate product for making cementitious-bound materials.

| COMPONENT (> 1%) | [kg / %] |
|-------------------|----------|
| Clinker | 50% |
| Blastfurnace slag | 28% |
| Limestone | 18% |
| Gypsum/Anhydrite | 4 |

(*) > 1% of total mass

SCOPE AND TYPE

This product is produced in Erwitte (Germany). It is applied as an intermediate product for cementitious-bound materials.

As it is an intermediate product end-of-life scenarios are therefore not clear. The specific EPD only covers A1-A3.

The LCA is compiled using the "NMD Bepalingsmethode Milieuprestatie Bouwwerken v1.0" as PCR, Ecoinvent v3.6 for background processes, Ecochain 3.5.15 LCA software. The main impact categories have been calculated with the characterization factors in "EN 15804 +A2 Method V1.00 / EF 3.0 normalization and weighting set" and "NMD Bepalingsmethode 1.0, jul 2020 (NMD 3.3) V3.04 / MKI-SBK single-score".

| PRODUCT STAGE | CONSTRUCTION | | | | | USE STAGE | | | | | | | END OF LIFE | | | BENEFITS AND |
|---------------------|--------------|---------------|------------------------|----------|-----|-------------|--------|-------------|---------------|------------------------|-----------------------|----------------------------|-------------|------------------|----------|------------------------------------|
| | PROCESS | | | | | | | | | | | | STAGE | | | LOADS BEYOND THE |
| | STAGE | | | | | | | | | | | | | | | SYSTEM BOUNDARIES |
| Raw material supply | Transport | Manufacturing | Transport gate to site | 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 | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND |

X = Modules Assessed

ND = Not Declared

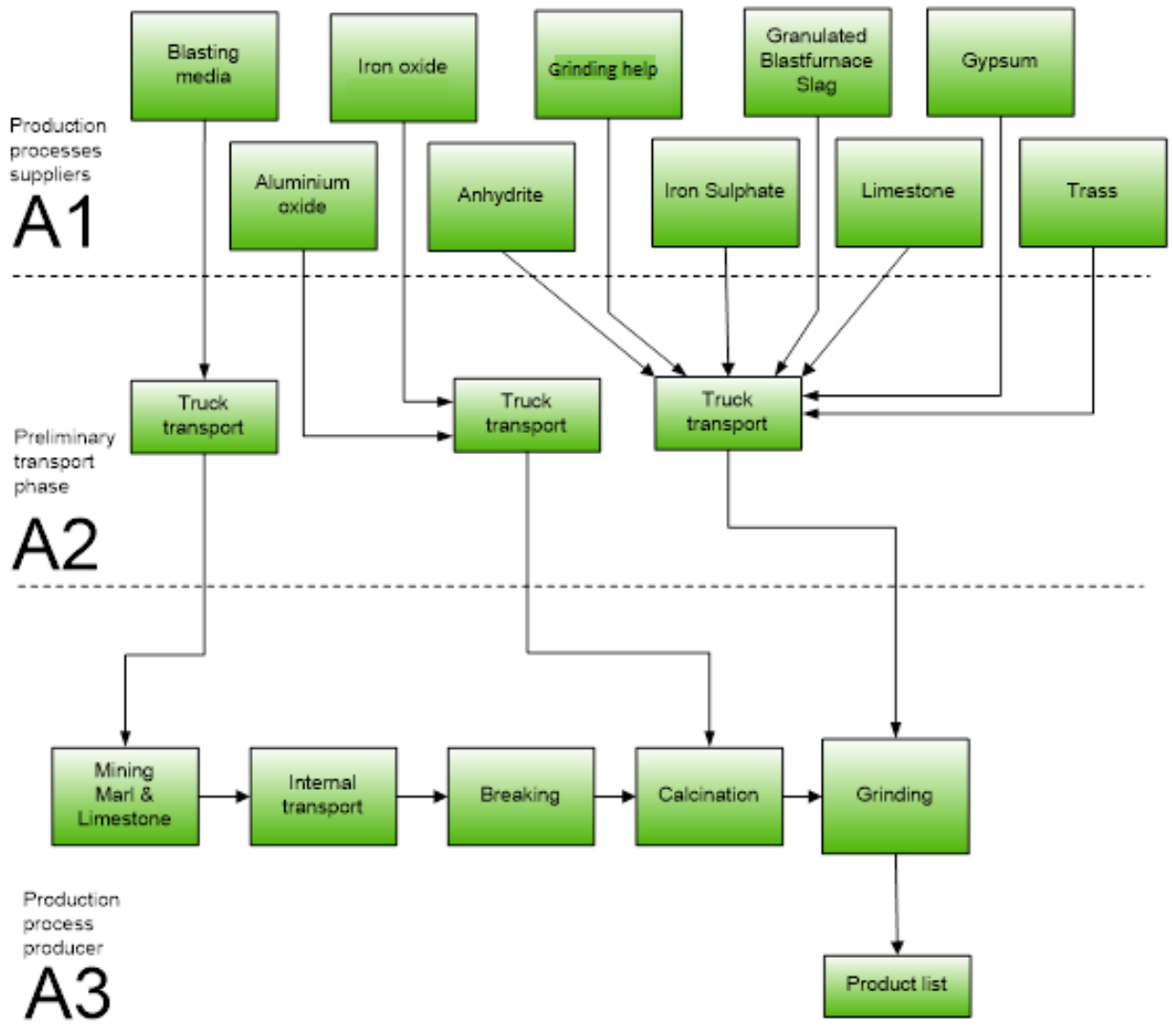


Figure: LCA process diagram according to EN 15804 (7.2.1)



REPRESENTATIVENESS

This EPD is representative for products produced and sold in the EU. The cement is produced in one production site of Spenner in Erwitte.

ENVIRONMENTAL IMPACT per functional unit or declared unit (indicators A1)

| | UNIT | A1 | A2 | A3 | A1-A3 |
|------|----------------------------|---------|---------|---------|---------|
| ADPE | kg Sb eq. | 9.85E-5 | 1.24E-4 | 4.22E-7 | 2.23E-4 |
| ADPF | MJ | 2.41E+3 | 7.44E+1 | 2.91E+2 | 2.78E+3 |
| GWP | kg CO2 eq. | 4.34E+2 | 4.87E+0 | 1.90E+1 | 4.58E+2 |
| ODP | kg CFC11 eq. | 2.78E-6 | 8.64E-7 | 1.50E-6 | 5.15E-6 |
| POCP | kg ethene eq. | 5.55E-2 | 2.94E-3 | 3.49E-3 | 6.19E-2 |
| AP | kg SO2 eq. | 4.87E-1 | 2.14E-2 | 4.53E-2 | 5.54E-1 |
| EP | kg (PO4) ³⁻ eq. | 1.74E-1 | 4.21E-3 | 5.97E-3 | 1.84E-1 |

Toxicity indicators for Dutch market

| | | | | | |
|-------|------------|---------|---------|---------|---------|
| HTP | kg DCB eq. | 1.64E+1 | 2.05E+0 | 2.88E+0 | 2.13E+1 |
| FAETP | kg DCB eq. | 5.19E-1 | 5.99E-2 | 6.38E-2 | 6.43E-1 |
| MAETP | kg DCB eq. | 2.02E+3 | 2.15E+2 | 2.88E+2 | 2.52E+3 |
| TETP | kg DCB eq. | 2.29E-1 | 7.25E-3 | 1.24E-1 | 3.60E-1 |
| ECI | Euro | 2.72E+1 | 5.90E-1 | 1.51E+0 | 2.93E+1 |
| ADPF | kg Sb. eq. | 1.16E+0 | 3.58E-2 | 1.40E-1 | 1.34E+0 |

ADPE = Abiotic Depletion Potential for non-fossil resources
 ADPF = Abiotic Depletion Potential for fossil resources
 GWP = Global Warming Potential
 ODP = Depletion potential of the stratospheric ozone layer
 POCP = Formation potential of tropospheric ozone photochemical oxidants
 AP = Acidification Potential of land and water
 EP = Eutrophication Potential
 HTP = Human Toxicity Potential
 FAETP = Fresh water aquatic ecotoxicity potential
 MAETP = Marine aquatic ecotoxicity potential
 TETP = Terrestrial ecotoxicity potential
 ECI = Environmental Cost Indicator
 ADPF = Abiotic Depletion Potential for fossil resources expressed in [kg Sb-eq.]

ENVIRONMENTAL IMPACT per functional unit or declared unit (core indicators A2)

| | UNIT | A1 | A2 | A3 | A1-A3 |
|-----------------------|-------------------------|---------|---------|---------|---------|
| GWP-total | kg CO2 eq. | 4.55E+2 | 4.91E+0 | 1.97E+1 | 4.80E+2 |
| GWP-fossil | kg CO2 eq. | 4.37E+2 | 4.91E+0 | 1.89E+1 | 4.60E+2 |
| GWP-biogenic | kg CO2 eq. | 1.86E+1 | 2.27E-3 | 6.17E-1 | 1.93E+1 |
| GWP-luluc | kg CO2 eq. | 1.81E-1 | 1.80E-3 | 2.08E-1 | 3.91E-1 |
| ODP | kg CFC11 eq. | 3.03E-6 | 1.08E-6 | 1.17E-6 | 5.28E-6 |
| AP | mol H+ eq. | 6.70E-1 | 2.85E-2 | 5.85E-2 | 7.57E-1 |
| EP-freshwater | kg PO4 eq. | 3.16E-2 | 4.95E-5 | 2.21E-4 | 3.19E-2 |
| EP-marine | kg N eq. | 1.94E-1 | 1.00E-2 | 1.24E-2 | 2.17E-1 |
| EP-terrestrial | mol N eq. | 2.54E+0 | 1.11E-1 | 1.60E-1 | 2.81E+0 |
| POCP | kg NMVOC eq. | 5.26E-1 | 3.16E-2 | 3.66E-2 | 5.94E-1 |
| ADP-minerals & metals | kg Sb eq. | 9.85E-5 | 1.24E-4 | 1.06E-4 | 3.29E-4 |
| ADP-fossil | MJ, net calorific value | 1.68E+3 | 7.41E+1 | 3.28E+2 | 2.08E+3 |
| WDP | m3 world eq. deprived | 2.21E+1 | 2.65E-1 | 1.61E+1 | 3.84E+1 |

GWP-total = Global Warming Potential total

GWP-fossil = Global Warming Potential fossil fuels

GWP-biogenic = Global Warming Potential biogenic

GWP-luluc = Global Warming Potential land use and land use change

ODP = Depletion potential of the stratospheric ozone layer

AP = Acidification Potential, Accumulated Exceedence

EP-freshwater = Eutrophication Potential, fraction of nutrients reaching freshwater end compartment

EP-marine = Eutrophication Potential, fraction of nutrients reaching marine end compartment

EP-terrestrial = Eutrophication Potential, Accumulated Exceedence

POCP = Formation potential of tropospheric ozone photochemical oxidants

ADP-minerals&metals = Abiotic Depletion Potential for non fossil resources [2]

ADP-fossil = Abiotic Depletion for fossil resources potential [2]

WDP = Water (user) deprivation potential, deprivation-weighted water consumption [2]

Disclaimer [2]

- The results of this environmental impact indicator shall be used with care as the uncertainties on these results are high or as there is limited experienced with the indicator.

ENVIRONMENTAL IMPACT per functional unit or declared unit (additional indicators A2)

| | UNIT | A1 | A2 | A3 | A1-A3 |
|--------|-------------------|---------|---------|---------|---------|
| PM | Disease incidence | 3.72E-6 | 4.41E-7 | 2.94E-7 | 4.46E-6 |
| IRP | kBq U235 eq. | 2.75E+0 | 3.10E-1 | 1.08E+0 | 4.14E+0 |
| ETP-fw | CTUe | 2.40E+4 | 6.60E+1 | 3.42E+2 | 2.44E+4 |
| HTP-c | CTUh | 2.17E-8 | 2.14E-9 | 4.78E-9 | 2.86E-8 |
| HTP-nc | CTUh | 1.28E-6 | 7.22E-8 | 2.20E-7 | 1.57E-6 |
| SQP | --- | 2.02E+2 | 6.43E+1 | 6.94E+1 | 3.36E+2 |

PM = Potential incidence of disease due to PM emissions
 IRP = Potential Human exposure efficiency relative to U235 [1]
 ETP-fw = Potential Comparative Toxic Unit for ecosystems [2]
 HTP-c = Potential Comparative Toxic Unit for humans [2]
 HTP-nc = Potential Comparative Toxic Unit for humans, non-cancer [2]
 SQP = Potential soil quality index [2]

Disclaimer [1]

- 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.

Disclaimer [2]

- The results of this environmental impact indicator shall be used with care as the uncertainties on these results are high or as there is limited experienced with the indicator.

RESOURCE USE per functional unit or declared unit (A1 / A2)

| | UNIT | A1 | A2 | A3 | A1-A3 |
|-------|------|---------|---------|---------|---------|
| PERE | MJ | 1.33E+2 | 9.27E-1 | 1.56E+2 | 2.90E+2 |
| PERM | MJ | 0.00 | 0.00 | 0.00 | 0.00 |
| PERT | MJ | 1.33E+2 | 9.27E-1 | 1.56E+2 | 2.90E+2 |
| PENRE | MJ | 1.86E+3 | 7.86E+1 | 3.41E+2 | 2.28E+3 |
| PENRM | MJ | 0.00 | 0.00 | 0.00 | 0.00 |
| PENRT | MJ | 1.86E+3 | 7.86E+1 | 3.41E+2 | 2.28E+3 |
| SM | MJ | 0.00 | 0.00 | 0.00 | 0.00 |
| RSF | MJ | 0.00 | 0.00 | 0.00 | 0.00 |
| NRSF | MJ | 0.00 | 0.00 | 0.00 | 0.00 |
| FW | m3 | 1.70E-1 | 9.02E-3 | 4.12E-1 | 5.91E-1 |

PERE = Use of renewable energy excluding renewable primary energy resources

PERM = Use of renewable energy resources used as raw materials

PERT = Total use of renewable primary energy resources

PENRE = Use of non-renewable primary energy resources excluding non-renewable energy resources used as raw materials

PENRM = Use of non-renewable primary energy resources used as raw materials

PENRT = Total use of non-renewable primary energy resources

SM = Use of secondary materials

RSF = Use of renewable secondary fuels

NRSF = Use of non renewable secondary fuels

FW = Use of net fresh water

OUTPUT FLOWS AND WASTE CATEGORIES per functional unit or declared unit (A1 / A2)

| | UNIT | A1 | A2 | A3 | A1-A3 |
|------|------|---------|---------|---------|---------|
| HWD | kg | 7.87E-4 | 1.88E-4 | 1.29E-4 | 1.10E-3 |
| NHWD | kg | 3.24E+0 | 4.70E+0 | 9.66E-2 | 8.03E+0 |
| RWD | kg | 2.39E+0 | 4.86E-4 | 1.34E-3 | 2.39E+0 |
| CRU | kg | 0.00 | 0.00 | 0.00 | 0.00 |
| MFR | kg | 0.00 | 0.00 | 0.00 | 0.00 |
| MER | kg | 0.00 | 0.00 | 0.00 | 0.00 |
| EEE | MJ | 0.00 | 0.00 | 0.00 | 0.00 |
| ETE | MJ | 0.00 | 0.00 | 0.00 | 0.00 |

HWD = Hazardous Waste Disposed

RWD = Radioactive Waste Disposed

MFR = Materials for recycling

EEE = Exported Electrical Energy

NHWD = Non Hazardous Waste Disposed

CRU = Components for reuse

MER = Materials for energy recovery

ETE = Exported Thermal Energy

BIOGENIC CARBON CONTENT per functional unit or declared unit (A1 / A2)

| | UNIT | A1 | A2 | A3 | A1-A3 |
|-------|------|------|------|------|-------|
| BCCpr | kg C | 0.00 | 0.00 | 0.00 | 0.00 |
| BCCpa | kg C | 0.00 | 0.00 | 0.00 | 0.00 |

BCCpr = Biogenic carbon content in product

BCCpa = Biogenic carbon content in packaging

CALCULATION RULES

Data quality

Data flows have been modeled as realistically as possible. Data quality assessment is based on the principle that the primary data used for processes occurring at the production site is selected in the first instance. Where this is not available, other reference data is selected from appropriate sources.

Data collection period

The dataset is representative for the production processes used in 2019.

Methodology and reproducibility

The process descriptions and quantities in this study are reproducible in accordance to the reference standards that have been used. The references of all sources, both primary and public sources and literature, have been documented. In addition, to facilitate the reproducibility of this LCA, a full set of data records has been generated.

SCENARIOS AND ADDITIONAL TECHNICAL INFORMATION

A1. Raw materials supply

For all purchased materials, relevant EcolInvent records have been selected.

For modelling reasons, the clinker produced by Spenner and used to make the various types of cement is used as an input product in the LCA of the cement products. Therefore, all impacts allocated to the clinker (purchased materials, incoming transport and processes) are allocated to the A1 section of the cement products.

A2. Transport of raw materials to manufacturer

All incoming transports of the purchased materials are done by truck. Truck transport from the Erwitte production facility to the Duisburg production facility and vice versa are modelled as one-way transports, since these trucks always carry full loads from one plant to the other.

A3. Manufacturing

This module covers the manufacturing of the cement product and includes all processes linked to production such as grinding and internal transportation. Use of electricity, fuels and auxiliary materials related to these processes are properly allocated.



DECLARATION OF SVHC

None of the substances contained in the product are listed in the "Candidate List of Substances of Very High Concern for authorisation", or they do not exceed the threshold with the European Chemicals Agency.

REFERENCES

- EN 15804: Sustainability of construction works - Environmental product declarations - Core rules for the product category of construction products', I.S. EN 15804:2012+A2:2019.

- ISO 14040/14044 on Life Cycle Assessments.

- CEN/TC 51 PCR for cement and building lime, 2015

REMARKS

EPD of construction products may not be comparable if they do not comply with EN15804