

ENVIRONMENTAL PRODUCT DECLARATION

in accordance with ISO 14025, ISO 21930 and EN 15804

| | |
|--------------------------------|--------------------------------|
| Owner of the declaration: | Leca International |
| Program operator: | The Norwegian EPD Foundation |
| Publisher: | The Norwegian EPD Foundation |
| Declaration number: | Viser til EN. NEPD-1742-715-EN |
| Registration number: | NA |
| ECO Platform reference number: | NA |
| Issue date: | 08.04.2019 |
| Valid to: | 08.04.2023 |

Leca® Lettklinker 10-20, levert Oslo

Leca International



www.epd-norge.no



General information

Product:

Leca® Lettklinker 10-20, levert Oslo

Program operator:

The Norwegian EPD Foundation
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Declaration number:

Viser til EN. NEPD-1742-715-EN

ECO Platform reference number:
This declaration is based on Product Category Rules:

CEN Standard EN 15804:2012+A1:2013 serves as core PCR
NPCR 012:2018 Part B for Thermal insulation products

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.

Declared unit:

1 m3 Leca® Lettklinker 10-20, levert Oslo

Declared unit with option:

A1,A2,A3,A4

Functional unit:
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



Senior Research Scientist, Anne Rønning

(Independent verifier approved by EPD Norway)

Owner of the declaration:

Leca International
Contact person: Tone Storbråten
Phone: +47 41 43 71 00
e-mail: info@leca.no

Manufacturer:

Leca International

Place of production:

Leca, Rælingen
Årnesvegen 1
N-2009 Nordby
Norway

Management system:

ISO 14001 ISO 9001

Organisation no:

918 799 141

Issue date:

08.04.2019

Valid to:

08.04.2023

Year of study:

2017

Comparability:

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

Author of the Life Cycle Assessment:

The declaration is developed using eEPD v3.0 from LCA.no
Approval:
Company specific data are:

Collected/registered by: Tone Storbråten

Internal verification by: Jan Szanser

Approved:

Sign

(Managing Director EPD-Norway)

Product

Product description:

Lightweight expanded clay aggregate is a granular ceramic material made from natural clay. The clay is mixed with organic material, dried and expanded to 3-4 times its original volume in rotary kilns at temperatures of about 1150 °C. The output lightweight expanded clay aggregate granules, in the range 0-32 mm, are sieved and blended into different grades of products and distributed in bulk or in bags.

Product specification

The EPD describes results for production of lightweight expanded clay aggregate, grading 8-20 mm, at Leca Rælingen. For calculations of environmental data for other types of Leca than ISO 10-20, densities from the table of different gradings should be used. The average annual production of lightweight expanded clay kiln material at Leca Rælingen has a weight of 0,30 ton/m³.

| Materials | % |
|-----------|----------|
| Clay | 97-100 % |
| Dolomite | 1-3 % |

Technical data:

The relevant technical properties for Leca® ISO 10-20 are provided below:

Technical property.....Test method.....Typical value
 Loose bulk density.....(NS-EN 1097-3).....245 kg/m³
 Grading.....(NS-EN 933-1).....8-20 mm
 Compressibility and confined compressive strength.....(NS-EN 13055-1)...0,8 MPa
 Thermal conductivity(NS-EN 14063-1)...0,107 W/mK,
 Reaction to fire.....(NS-EN 13820).....A1

Grading [mm]- Density [ton/m³]

0-32..... 0,28
 2-4..... 0,37
 4-10..... 0,29
 10-20..... 0,25
 Leca 800..... 0,80

Market:

Norway

Reference service life, product

Not relevant

Reference service life, building

Not relevant

LCA: Calculation rules

Declared unit:

1 m³ Leca® Lettklinker 10-20, levert Oslo

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.

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.

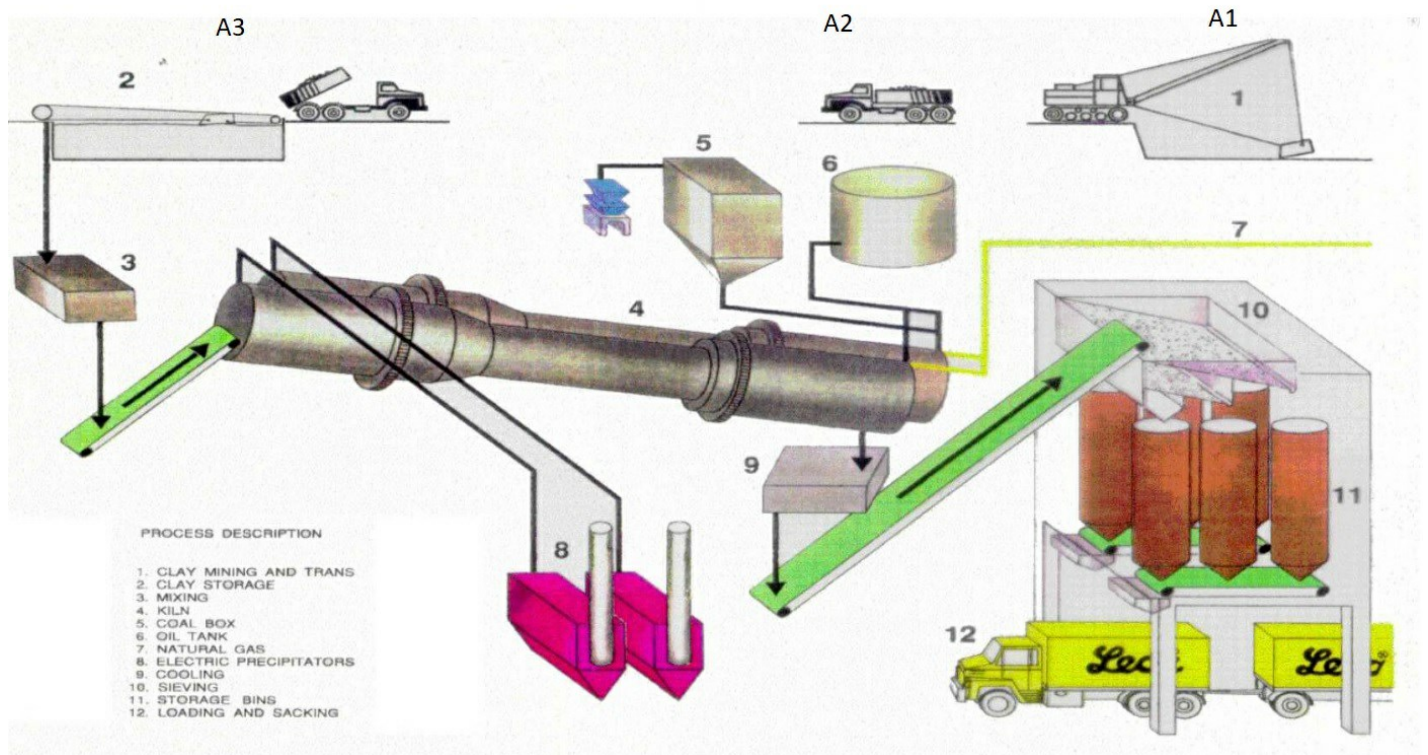
| Materials | Source | Data quality | Year |
|-----------|---------------|--------------|------|
| Dolomite | ecoinvent 3.4 | Database | 2017 |
| Oxygen | ecoinvent 3.4 | Database | 2017 |
| Clay | Specific data | Database | 2018 |

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.

System boundary:

The system boundary of the EPD follows the modular structure in line with EN 15804. This section describes the modules which are contained within the scope of this study. As the scope of the assessment is up to the point at which the lightweight clay aggregate is manufactured modules A1- A4 have been considered in this LCA



Additional technical information:

Leca® ISO 10-20 is a ceramic material with good resistance to frost, high temperatures and chemicals etc. Leca® ISO 10-20 has good insulation and drainage properties.

LCA: Scenarios and additional technical information

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

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 | 55,0 % | Truck, lorry over 32 tonnes, EURO 6 | 26 | 0,022606 | l/tkm | 0,59 |
| Railway | | | | | l/tkm | |
| Boat | | | | | l/tkm | |
| Other Transportation | | | | | l/tkm | |

| Assembly (A5) | | | Use (B1) | | |
|---------------------------------------|----------------|-------|----------|------|-------|
| . | Unit | Value | . | Unit | Value |
| Auxiliary | kg | | | | |
| Water consumption | m ³ | | | | |
| Electricity consumption | kWh | | | | |
| Other energy carriers | MJ | | | | |
| Material loss | kg | | | | |
| Output materials from waste treatment | kg | | | | |
| Dust in the air | kg | | | | |
| VOC emissions | kg | | | | |

| Maintenance (B2)/Repair (B3) | | | Replacement (B4)/Refurbishment (B5) | | |
|------------------------------|----------------|-------|-------------------------------------|------|-------|
| . | Unit | Value | . | Unit | Value |
| Maintenance cycle* | | | Replacement cycle* | | |
| Auxiliary | | | Electricity consumption | kWh | |
| Other resources | | | Replacement of worn parts | | |
| Water consumption | m ³ | | * Described above if relevant | | |
| Electricity consumption | kWh | | | | |
| Other energy carriers | MJ | | | | |
| Material loss | kg | | | | |
| VOC emissions | kg | | | | |

| Operational energy (B6) and water consumption (B7) | | | End of Life (C1, C2) | | |
|--|----------------|-------|---------------------------------------|------|-------|
| . | Unit | Value | . | Unit | Value |
| Water consumption | m ³ | | Hazardous waste disposed | kg | |
| Electricity consumption | kWh | | Collected as mixed construction waste | kg | |
| Other energy carriers | MJ | | Reuse | kg | |
| Power output of equipment | kW | | Recycling | | |
| | | | Energy recovery | | |
| | | | To landfill | kg | |

| 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 | |

Scenarios after A1-A4 are not included

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 boundaries |
|---------------|-----------|---------------|-----------|---------------------------------|------------|-------------|--------|-------------|---------------|------------------------|-----------------------|----------------------------|-------------------|------------------|----------|------------------------------------|------------------------------|
| 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 | A2 | A3 | A4 |
|-----------|--------------------------------------|----------|----------|----------|----------|
| GWP | kg CO ₂ -eq | 1,05E+00 | 4,48E-01 | 5,76E+01 | 5,27E-01 |
| ODP | kg CFC11 -eq | 1,05E-07 | 8,72E-08 | 4,47E-07 | 1,08E-07 |
| POCP | kg C ₂ H ₄ -eq | 2,11E-04 | 7,24E-05 | 1,06E-02 | 8,25E-05 |
| AP | kg SO ₂ -eq | 5,71E-03 | 1,46E-03 | 1,83E-01 | 1,36E-03 |
| EP | kg PO ₄ ³⁻ -eq | 3,48E-03 | 3,25E-04 | 4,05E-02 | 1,88E-04 |
| ADPM | kg Sb -eq | 1,54E-06 | 1,01E-06 | 7,95E-06 | 1,25E-06 |
| ADPE | MJ | 1,21E+01 | 7,02E+00 | 4,75E+02 | 8,65E+00 |

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

Resource use

| Parameter | Unit | A1 | A2 | A3 | A4 |
|-----------|----------------|----------|----------|----------|----------|
| RPEE | MJ | 3,84E+00 | 1,27E-01 | 6,19E+01 | 1,57E-01 |
| RPEM | MJ | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 |
| TPE | MJ | 3,84E+00 | 1,27E-01 | 6,19E+01 | 1,57E-01 |
| NRPE | MJ | 2,18E+01 | 7,24E+00 | 4,83E+02 | 8,93E+00 |
| NRPM | MJ | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 |
| TRPE | MJ | 2,18E+01 | 7,24E+00 | 4,83E+02 | 8,93E+00 |
| SM | kg | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 |
| RSF | MJ | 0,00E+00 | 0,00E+00 | 9,31E-03 | 0,00E+00 |
| NRSF | MJ | 0,00E+00 | 0,00E+00 | 3,42E+02 | 0,00E+00 |
| W | m ³ | 6,36E-03 | 1,71E-03 | 6,80E-02 | 2,11E-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 = $9,0 \cdot 10^{-3} = 0,009$

*INA Indicator Not Assessed

End of life - Waste

| Parameter | Unit | A1 | A2 | A3 | A4 |
|-----------|------|----------|----------|----------|----------|
| HW | kg | 2,43E-05 | 3,85E-06 | 3,66E-05 | 4,76E-06 |
| NHW | kg | 4,17E-01 | 6,57E-01 | 1,67E+01 | 8,16E-01 |
| RW | kg | INA* | INA* | INA* | INA* |

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

Reading example: 9,0 E-03 = $9,0 \cdot 10^{-3} = 0,009$

*INA Indicator Not Assessed

End of life - Output flow

| Parameter | Unit | A1 | A2 | A3 | A4 |
|-----------|------|----------|----------|----------|----------|
| CR | kg | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 |
| MR | kg | 0,00E+00 | 0,00E+00 | 3,10E-02 | 0,00E+00 |
| MER | kg | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 |
| EEE | MJ | INA* | INA* | INA* | INA* |
| ETE | MJ | INA* | INA* | 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 = $9,0 \cdot 10^{-3} = 0,009$

*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 |
|---------------------------|-------------------------|--------|---------------|
| Electricity, Norway (kWh) | ecoinvent 3.4 Alloc Rec | 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.

ecoinvent v3, Allocation, cut-off by classification, Swiss Centre of Life Cycle Inventories.

Iversen et al., (2018) eEPD v3.0 - Background information for EPD generator system. LCA.no rapportnummer 04.18.

NPCR 012:2018 Part B for Thermal insulation products

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