

Environmental product declaration

in accordance with ISO 14025 and EN 15804+A2

Robust Forankring



The Norwegian EPD Foundation

Owner of the declaration:

Marlon Tørmørtel A/S

Product:

Robust Forankring

Declared unit:

1 kg

This declaration is based on Product Category Rules:

CEN Standard EN 15804:2012+A2:2019 serves as core PCR

NPCR 009:2021 Part B for Technical - Chemical products for building and construction industry

Program operator:

The Norwegian EPD Foundation

Declaration number:

NEPD-6344-5603-EN

Registration number:

NEPD-6344-5603-EN

Issue date: 03.04.2024

Valid to: 03.04.2029

EPD software:

LCAno EPD generator ID: 283843

General information

Product

Robust Forankring

Program operator:

Post Box 5250 Majorstuen, 0303 Oslo, Norway
The Norwegian EPD Foundation
Phone: +47 23 08 80 00
web: post@epd-norge.no

Declaration number:

NEPD-6344-5603-EN

This declaration is based on Product Category Rules:

CEN Standard EN 15804:2012+A2:2019 serves as core PCR
NPCR 009:2021 Part B for Technical - Chemical products for building
and construction industry

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 kg Robust Forankring

Declared unit with option:

A1-A3,A4,A5,C1,C2,C3,C4,D

Functional unit:

No functional unit declared

General information on verification of EPD from EPD tools:

Independent verification of data, other environmental information
and the declaration according to ISO 14025:2010, § 8.1.3 and § 8.1.4.
Verification of each EPD is made according to EPD-Norway's
guidelines for verification and approval requiring that tools are i)
integrated into the company's environmental management system, ii)
the procedures for use of the EPD tool are approved by EPD-Norway,
and iii) the process is reviewed annually by an independent third
party verifier. See Appendix G of EPD-Norway's General Programme
Instructions for further information on EPD tools

Verification of EPD tool:

Independent third party verification of the EPD tool, background data
and test-EPD in accordance with EPDNorway's procedures and
guidelines for verification and approval of EPD tools. NEPD73

Third party verifier:

Linda Høiby, Life Cycle Assessment Consulting

(no signature required)

Owner of the declaration:

Marlon Tørmørtel A/S
Contact person: Bente Vesterager
Phone: +45 7575 4300
e-mail: marlon@marlon.dk

Manufacturer:

Marlon Tørmørtel A/S

Place of production:

Marlon Tørmørtel A/S
Virkelyst 20
8740 Brædstrup, Denmark

Management system:

ISO 9001

Organisation no:

DK13254079

Issue date:

03.04.2024

Valid to:

03.04.2029

Year of study:

2022

Comparability:

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

Development and verification of EPD:

The declaration is created using EPD tool lca.tools ver EPD2022.03,
developed by LCA.no. The EPD tool is integrated in the company's
management system, and has been approved by EPD Norway.

Developer of EPD: Bente Vesterager

Reviewer of company-specific input data and EPD: Maria Hosbjerg
Christensen

Approved:



Håkon Hauan, CEO EPD-Norge

Product

Product description:

Expanding floating mortar that has very good flow and adhesion properties for anchoring and fixing metal objects in concrete and rocks, and for undercasting machines, rails, columns, etc.

Product specification

| Materials | Value | Unit |
|--------------------|-------|------|
| Fillers/Aggregates | 45-65 | % |
| Additives | 1-3 | % |
| Binders | 35-50 | % |
| Packaging | 2-3 | % |

Technical data:

Robust Forankring is declared according to DS/EN 1504-3.

Compressive strength, 28 days: > 80 MPa

Market:

Norway

Reference service life, product

> 50 years

Reference service life, building

> 50 years

LCA: Calculation rules

Declared unit:

1 kg Robust Forankring

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. The data represent the production of the declared product and were collected for EPD development in the year of study. Background data is based on EPDs according to EN 15804 and different LCA databases. The data quality of the raw materials in A1 is presented in the table below.

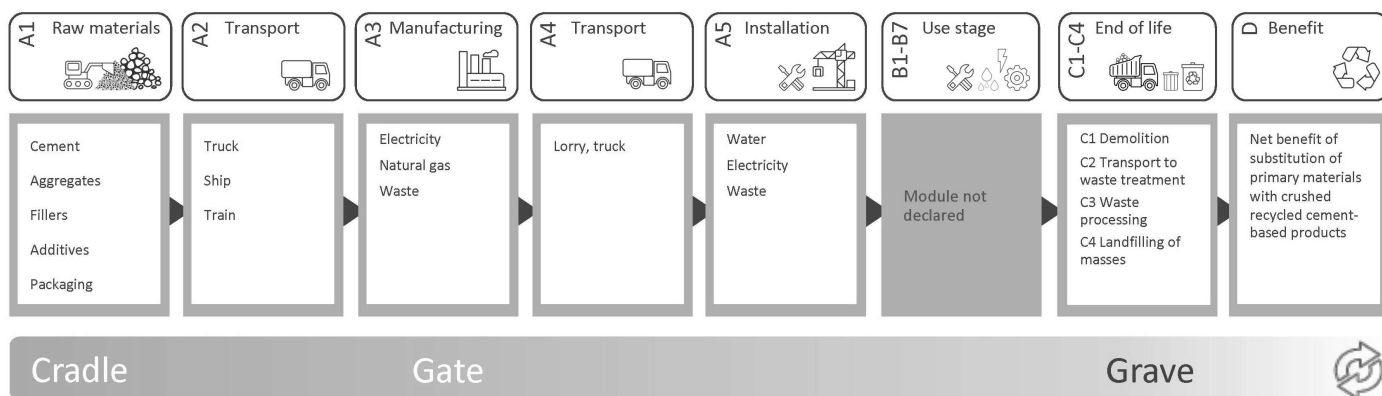
| Materials | Source | Data quality | Year |
|-----------------------|------------------------|--------------|------|
| Additives | ecoinvent 3.6 | Database | 2019 |
| Cement | ecoinvent 3.6 | Database | 2019 |
| Chemical | ecoinvent 3.6 | Database | 2019 |
| Defoamer | ecoinvent 3.6 | Database | 2019 |
| Fillers | ecoinvent 3.6 | Database | 2019 |
| Limestone | ecoinvent 3.6 | Database | 2019 |
| Packaging - Cardboard | Modified ecoinvent 3.6 | Database | 2019 |
| Packaging - Pallet | Modified ecoinvent 3.6 | Database | 2019 |
| Packaging - Plastic | ecoinvent 3.6 | Database | 2019 |
| Quartz sand | ecoinvent 3.6 | Database | 2019 |
| Rheology modifier | ecoinvent 3.6 | Database | 2019 |

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

| Product stage | | | Construction installation stage | | Use 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 | X | MND | MND | MND | MND | MND | MND | MND | X | X | X | X | X |

System boundary:

All processes from raw material extraction, to production, transport to the construction site and assembly, are included in the analysis as well as end of life stage and phases beyond the system boundary.



Additional technical information:

The product is delivered in 20 Kg plastic bags.





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) | Capacity utilisation (incl. return) % | Distance (km) | Fuel/Energy Consumption | Unit | Value (Liter/tonne) | |
|---|---------------------------------------|---------------------------------------|-------------------------|-------------------------|---------------------|---------------------|
| Ship, Ferry, Sea (km) | 50,0 % | 170 | 0,034 | l/tkm | 5,78 | |
| Truck, 16-32 tonnes, EURO 6 (km) - Europe | 36,7 % | 400 | 0,043 | l/tkm | 17,20 | |
| Assembly (A5) | | Unit | Value | | | |
| Electricity, Norway (kWh) | kWh/DU | 0,01 | | | | |
| Waste, concrete, to landfill (kg) | kg/DU | 0,02 | | | | |
| Waste, packaging, corrugated board box, to average treatment (kg) - A5, inkl. 85 km transp. | kg/DU | 0,00 | | | | |
| Waste, packaging, pallet, EUR wooden pallet, reusable, average treatment (kg) - A5, inkl. 85 km transp. | kg | 0,02 | | | | |
| Waste, packaging, plastic film/bags (LDPE), to average treatment (kg) - A5, inkl. 85 km transp. | kg/DU | 0,00 | | | | |
| Water, tap water (kg) | kg/DU | 0,14 | | | | |
| De-construction demolition (C1) | | Unit | Value | | | |
| Demolition of building per kg of cement-based product, C1 (kg) | kg/DU | 1,00 | | | | |
| Transport to waste processing (C2) | | Capacity utilisation (incl. return) % | Distance (km) | Fuel/Energy Consumption | Unit | Value (Liter/tonne) |
| Truck, 16-32 tonnes, EURO 5 (km) - Europe | 36,7 % | 50 | 0,044 | l/tkm | 2,20 | |
| Waste processing (C3) | | Unit | Value | | | |
| Waste treatment of cement-based product after demolition, C3 (kg) | kg | 0,90 | | | | |
| Disposal (C4) | | Unit | Value | | | |
| Disposal of cement-based product in landfill (kg) | kg | 0,10 | | | | |
| Benefits and loads beyond the system boundaries (D) | | Unit | Value | | | |
| Substitution of primary aggregates with crushed recycled cement-based products (kg) | kg | 0,90 | | | | |

LCA: Results

The LCA results are presented below for the declared unit defined on page 2 of the EPD document.

| Environmental impact | | | | | | | | | | |
|--|------------------------|-----------|----------|----------|----------|----------|----------|----------|-----------|--|
| Indicator | Unit | A1-A3 | A4 | A5 | C1 | C2 | C3 | C4 | D | |
|  GWP-total | kg CO ₂ -eq | 3,90E-01 | 8,61E-02 | 3,53E-02 | 4,00E-03 | 8,54E-03 | 6,48E-04 | 8,22E-04 | -2,10E-03 | |
|  GWP-fossil | kg CO ₂ -eq | 4,24E-01 | 8,60E-02 | 6,61E-04 | 4,00E-03 | 8,53E-03 | 6,39E-04 | 8,20E-04 | -2,06E-03 | |
|  GWP-biogenic | kg CO ₂ -eq | -3,42E-02 | 3,26E-05 | 3,46E-02 | 7,50E-07 | 3,48E-06 | 5,52E-06 | 9,58E-07 | -4,11E-05 | |
|  GWP-luluc | kg CO ₂ -eq | 1,38E-04 | 3,57E-05 | 9,22E-07 | 3,15E-07 | 2,98E-06 | 8,84E-07 | 2,02E-07 | -1,39E-06 | |
|  ODP | kg CFC11 -eq | 2,39E-08 | 1,90E-08 | 1,29E-10 | 8,64E-10 | 1,95E-09 | 1,26E-10 | 3,11E-10 | -3,75E-10 | |
|  AP | mol H+ -eq | 1,61E-03 | 8,19E-04 | 3,53E-06 | 4,19E-05 | 3,49E-05 | 5,17E-06 | 7,30E-06 | -1,85E-05 | |
|  EP-FreshWater | kg P -eq | 5,70E-06 | 6,07E-07 | 1,79E-08 | 1,46E-08 | 6,70E-08 | 4,04E-08 | 9,30E-09 | -5,48E-08 | |
|  EP-Marine | kg N -eq | 3,92E-04 | 1,94E-04 | 8,29E-07 | 1,85E-05 | 1,03E-05 | 1,52E-06 | 2,71E-06 | -6,43E-06 | |
|  EP-Terrestrial | mol N -eq | 4,51E-03 | 2,16E-03 | 8,95E-06 | 2,00E-04 | 1,14E-04 | 1,75E-05 | 2,99E-05 | -7,56E-05 | |
|  POCP | kg NMVOC -eq | 1,21E-03 | 6,12E-04 | 2,68E-06 | 5,57E-05 | 3,50E-05 | 4,68E-06 | 8,56E-06 | -2,00E-05 | |
|  ADP-minerals&metals ¹ | kg Sb-eq | 1,92E-06 | 1,98E-06 | 2,44E-08 | 6,14E-09 | 2,31E-07 | 8,11E-09 | 7,39E-09 | -1,83E-07 | |
|  ADP-fossil ¹ | MJ | 2,64E+00 | 1,26E+00 | 1,06E-02 | 5,51E-02 | 1,29E-01 | 1,98E-02 | 2,26E-02 | -3,49E-02 | |
|  WDP ¹ | m ³ | 1,27E+01 | 1,03E+00 | 5,03E-01 | 1,17E-02 | 1,23E-01 | 2,19E+00 | 1,39E-01 | -1,63E+00 | |







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 Exceedance; 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 Exceedance; POCP = Formation potential of tropospheric ozone; ADP-minerals&metals = Abiotic depletion potential for non-fossil resources; ADP-fossil = Abiotic depletion for fossil resources potential; WDP = Water (user) deprivation potential, deprivation-weighted water consumption

"Reading example: 9,0 E-03 = 9,0*10⁻³ = 0,009"

*INA Indicator Not Assessed

1. 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

Remarks to environmental impacts











| Additional environmental impact indicators | | | | | | | | | | |
|---|-------------------|----------|----------|----------|----------|----------|----------|----------|-----------|--|
| Indicator | Unit | A1-A3 | A4 | A5 | C1 | C2 | C3 | C4 | D | |
|  PM | Disease incidence | 8,95E-09 | 4,62E-09 | 5,00E-11 | 5,07E-09 | 6,14E-10 | 8,30E-11 | 1,56E-10 | -3,95E-10 | |
|  IRP ² | kgBq U235 -eq | 1,04E-02 | 5,47E-03 | 8,55E-05 | 2,40E-04 | 5,62E-04 | 3,33E-04 | 1,03E-04 | -3,20E-04 | |
|  ETP-fw ¹ | CTUe | 3,50E+00 | 8,89E-01 | 1,72E-02 | 3,01E-02 | 9,47E-02 | 1,41E-02 | 1,23E-02 | -3,59E-02 | |
|  HTP-c ¹ | CTUh | 8,90E-11 | 0,00E+00 | 1,00E-12 | 1,00E-12 | 0,00E+00 | 1,00E-12 | 1,00E-12 | -2,00E-12 | |
|  HTP-nc ¹ | CTUh | 3,89E-09 | 9,93E-10 | 2,00E-11 | 2,80E-11 | 1,02E-10 | 1,30E-11 | 9,00E-12 | -4,40E-11 | |
|  SQP ¹ | dimensionless | 1,73E+00 | 7,38E-01 | 1,51E-02 | 6,69E-03 | 8,87E-02 | 1,12E-02 | 8,69E-02 | 7,91E-02 | |

PM = Particulate Matter emissions; IRP = Ionizing radiation – human health; ETP-fw = Eco toxicity – freshwater; HTP-c = Human toxicity – cancer effects; HTP-nc = Human toxicity – non cancer effects; SQP = Potential Soil Quality Index (dimensionless)

"Reading example: 9,0 E-03 = 9,0*10⁻³ = 0,009"

*INA Indicator Not Assessed




1. 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
2. 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.

| Resource use | | | | | | | | | | |
|---|----------------|----------|----------|-----------|----------|----------|----------|----------|-----------|--|
| Indicator | Unit | A1-A3 | A4 | A5 | C1 | C2 | C3 | C4 | D | |
|  PERE | MJ | 2,86E-01 | 1,60E-02 | 3,33E-02 | 3,00E-04 | 1,82E-03 | 1,02E-02 | 8,08E-04 | -8,16E-03 | |
|  PERM | MJ | 3,17E-01 | 0,00E+00 | -3,16E-01 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | |
|  PERT | MJ | 6,03E-01 | 1,60E-02 | 1,67E-02 | 3,00E-04 | 1,82E-03 | 1,02E-02 | 8,08E-04 | -8,16E-03 | |
|  PENRE | MJ | 2,35E+00 | 1,26E+00 | 1,06E-02 | 5,51E-02 | 1,29E-01 | 1,99E-02 | 2,26E-02 | -3,68E-02 | |
|  PENRM | MJ | 3,31E-01 | 0,00E+00 | -3,41E-02 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | |
|  PENRT | MJ | 2,68E+00 | 1,26E+00 | -2,35E-02 | 5,51E-02 | 1,29E-01 | 1,99E-02 | 2,26E-02 | -3,68E-02 | |
|  SM | kg | 2,52E-02 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | |
|  RSF | MJ | 8,98E-03 | 5,57E-04 | 3,37E-05 | 0,00E+00 | 6,50E-05 | 0,00E+00 | 1,68E-05 | -1,67E-04 | |
|  NRSF | MJ | 2,70E-03 | 1,85E-03 | 8,04E-05 | 0,00E+00 | 2,32E-04 | 0,00E+00 | 3,62E-05 | -1,71E-04 | |
|  FW | m ³ | 2,68E-03 | 1,20E-04 | 3,92E-04 | 2,83E-06 | 1,35E-05 | 3,40E-05 | 2,78E-05 | -1,28E-03 | |

PERE = Use of renewable primary energy excluding renewable primary energy resources used as raw materials; PERM = Use of renewable primary energy resources used as raw materials; PERT = Total use of renewable primary energy resources; PENRE = Use of non renewable primary energy excluding non-renewable primary 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 = Net use of fresh water

"Reading example: 9,0 E-03 = 9,0*10⁻³ = 0,009"






*INA Indicator Not Assessed

| End of life - Waste | | | | | | | | | | |
|--|------|----------|----------|----------|----------|----------|----------|----------|-----------|--|
| Indicator | Unit | A1-A3 | A4 | A5 | C1 | C2 | C3 | C4 | D | |
|  HWD | kg | 3,64E-04 | 6,20E-05 | 1,76E-06 | 1,62E-06 | 6,56E-06 | 1,98E-06 | 0,00E+00 | -8,40E-06 | |
|  NHWD | kg | 2,95E-02 | 4,97E-02 | 2,22E-02 | 6,52E-05 | 6,15E-03 | 6,26E-05 | 1,00E-01 | -2,55E-04 | |
|  RWD | kg | 1,27E-05 | 8,59E-06 | 2,67E-08 | 3,82E-07 | 8,77E-07 | 2,10E-07 | 0,00E+00 | -2,76E-07 | |

HWD = Hazardous waste disposed; NHWD = Non-hazardous waste disposed; RWD = Radioactive waste disposed

"Reading example: 9,0 E-03 = 9,0*10⁻³ = 0,009"

*INA Indicator Not Assessed

| End of life - Output flow | | | | | | | | | | |
|---|------|----------|----------|----------|----------|----------|----------|----------|----------|--|
| Indicator | Unit | A1-A3 | A4 | A5 | C1 | C2 | C3 | C4 | D | |
|  CRU | kg | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | |
|  MFR | kg | 7,53E-06 | 0,00E+00 | 9,19E-04 | 0,00E+00 | 0,00E+00 | 9,00E-01 | 0,00E+00 | 0,00E+00 | |
|  MER | kg | 4,00E-09 | 0,00E+00 | 7,35E-06 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | |
|  EEE | MJ | 4,06E-04 | 0,00E+00 | 4,99E-04 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | |
|  EET | MJ | 6,14E-03 | 0,00E+00 | 7,54E-03 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | |

CRU = Components for re-use; MFR = Materials for recycling; MER = Materials for energy recovery; EEE = Exported energy electrical; EET = Exported energy thermal

"Reading example: 9,0 E-03 = 9,0*10⁻³ = 0,009"

*INA Indicator Not Assessed

| Biogenic Carbon Content | | |
|---|------|---------------------|
| Indicator | Unit | At the factory gate |
| Biogenic carbon content in product | kg C | 4,84E-05 |
| Biogenic carbon content in accompanying packaging | kg C | 9,40E-03 |

Note: 1 kg biogenic carbon is equivalent to 44/12 kg CO₂

Additional 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, Denmark (kWh) | ecoinvent 3.6 | 338,20 | g CO ₂ -eq/kWh |

Dangerous substances

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

Indoor environment






Additional Environmental Information

| Additional environmental impact indicators required in NPCR Part A for construction products | | | | | | | | | |
|--|------------------------|----------|----------|----------|----------|----------|----------|----------|-----------|
| Indicator | Unit | A1-A3 | A4 | A5 | C1 | C2 | C3 | C4 | D |
| GWPIOBC | kg CO ₂ -eq | 4,30E-01 | 8,61E-02 | 2,08E-04 | 4,00E-03 | 8,54E-03 | 1,19E-03 | 0,00E+00 | -2,20E-03 |

GWPIOBC: Global warming potential calculated according to the principle of instantaneous oxidation. In order to increase the transparency of biogenic carbon contribution to climate impact, the indicator GWP-IOBC is required as it declares climate impacts calculated according to the principle of instantaneous oxidation. GWP-IOBC is also referred to as GWP-GHG in context to Swedish public procurement legislation.

Bibliography

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 EN 15804:2012+A2:2019 Environmental product declaration - Core rules for the product category of construction products.
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 NPCR 009 Part B for Technical - Chemical products for building and construction industry, Ver. 3.0, 06.10.2021, EPD Norway.

| | | |
|--|--|---|
|  epd-norge <small>Global program operator</small> | Program operator and publisher The Norwegian EPD Foundation Post Box 5250 Majorstuen, 0303 Oslo, Norway | Phone: +47 23 08 80 00 e-mail: post@epd-norge.no web: www.epd-norge.no |
|  | Owner of the declaration: Marlon Tørmørtel A/S Virkelyst 20, 8740 Brædstrup | Phone: +45 7575 4300 e-mail: marlon@marlon.dk web: https://marlon.dk/ |
|  | Author of the Life Cycle Assessment LCA.no AS Dokka 6B, 1671 | Phone: +47 916 50 916 e-mail: post@lca.no web: www.lca.no |
|  | Developer of EPD generator LCA.no AS Dokka 6B,1671 Kråkerøy | Phone: +47 916 50 916 e-mail: post@lca.no web: www.lca.no |
|  | ECO Platform ECO Portal | web: www.eco-platform.org web: ECO Portal |