epd-norway
Global Program Operator

# Environmental Product Declaration

In accordance with ISO 14025 and EN 15804 +A2

**Owner of the declaration:**
Norsk Wavin AS

**Program holder and publisher:**
The Norwegian EPD foundation

**Declaration number:**
NEPD-3589-2252-EN

**Registration Number:**
NEPD-3589-2252-EN

**Issue date:** 16.08.2022
**Valid to:** 16.08.2027

Ver2-101122

## PVC Sewage Pipe

PVC Sewage pipes are the traditional pipe system for draining rainwater and wastewater in uPVC

## Manufacturer

Nordisk Wavin A/S

wavin
An Orbia business.

The Norwegian
EPD Foundation

# General information

## Product:
PVC Sew. Pipe with or without socket; DN110, 125, 160, 200, 250, 315, 400, 500 and red (RD) or black (BK) color.

## Program Operator:
The Norwegian EPD Foundation
Post Box 5250 Majorstuen, 0303 Oslo, Norway
Tlf: +47 23 08 80 00
e-mail: post@epd-norge.no

## Declaration Number:
NEPD-3589-2252-EN

## This declaration is based on Product Category Rules:
CEN standard EN 15804:2012+A2:2019 serves as core PCR, supplied with NPCR Part A and NPCR Part B, Version 2.0.

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

## Declared unit:
1 kg PVC Sewage Pipe

## Declared unit with option:
A1,A2,A3,A4,A5,C1,C2,C3,C4,D

## Functional unit:
Not applicable.

## Verification:
Independent verification of the declaration and data, according to ISO14025:2010

internal ☐ external ☒

Harry van Ewijk, SGS Search
Independent verifier approved by EPD Norway

## Owner of the declaration:
Norsk Wavin AS
Contact person: Matteo Tagliaferri
Phone: +31 623193684
e-mail: matteo.tagliaferri@wavin.com

## Manufacturer:
Nordisk Wavin A/S
Wavinvej 1, 8450, Hammel, Denmark
Phone: +45 86 96 20 00
e-mail: salg.dk@wavin.com

## Place of production:
Wavinvej 1, 8450 Hammel, Denmark

## Management system:
EN ISO 9001:2015 and EN ISO 14001:2015

## Organisation no:
823355092

## Issue date:
16.08.2022

## Valid to:
16.08.2027

## Year of study:
2020

## Comparability:
EPDs from other programmes than the Norwegian EPD foundation may not be comparable.

## The EPD has been worked out by:
Lisa Overmars and Emma Thunnissen, Ecochain Technologies

Approved (Manager of EPD Norway)

# Product

## Product description:

When wastewater and rainwater are transported in a drainage system the pipes are exposed to chemical and mechanical load. It is therefore crucial that the pipes are corrosion-resistant and resistant to abrasion. Wavin PVC Sewage pipes have excellent properties in this context. PVC Sewage pipes are the traditional pipe system for draining rainwater and wastewater, produced in uPVC. An extraordinary feature of plastic pipes, especially pipes made of uPVC, is a smooth surface of the inner walls. As a result, any impurities are easily washed away and prevents sedimentation. Each pipe or fitting has a socket and spigot edge for easy connection. The sealing elements are either rubber or elastomeric sealings rings.

## Product specification:

A typical composition of the pipes, including packaging, covered by this EPD is as follows:

| Materials | % |
|---|---|
| PVC | 83,4% |
| Filler | 11,7% |
| Additives | 2,7% |
| Packaging | 2,2% |

The physical properties of the pipes covered in this EPD are:

- Density ~ 1410 kg/$m^3$
- E-Modul ~ 3000 Mpa
- Expansion linear ~ 0,7x $10^{-4}$ °$K^{-1}$
- Thermal Conductivity w / 23 °C: 0,15 W / mK

The colour of the pipe is red (RD) or black (BK).

## Technical data:

The declared unit of this EPD is 1 kg PVC Sewage Pipe. The results per kg are based on the product 'PVC Sew. Pipe RD 110 SN8 L=6' ('base product'). The number 110 in the product name refers to the diameter, which is equal to 110 mm. It follows that the pipe diameters can be derived from the product names by taking the number after the colour abbreviations.

The table below provides the products covered with this EPD. The selected base product is representative for all products described in this table; deviations of the LCA results of the other products compared to the base product are not more than 10%.

The list below provides the mass per 1 meter pipe (including packaging). These masses should be used to calculate the LCA results per 1 meter pipe, by multiplying the results of all modules, except 'A5 – installation only' presented on page 9-12, with the weight specified below. The LCA results of 'A5 – installation' should be calculated from the LCA results presented on pages 7-8 under 'additional technical information'.

| Product | Mass (kg/meter) | Product | Mass (kg/meter) |
|---|---|---|---|
| PVC Sew. Pipe RD 110 SN8 L=6 | 1,82 | PVC Sew. Pipe RD 250 SN8 L=1 | 12,41 |
| PVC Sew. Pipe BK 110 SN8 L=6 | 1,82 | PVC Sew. Pipe RD 250 SN8 L=2 | 10,64 |
| PVC Sew. Pipe RD 110 SN8 L=1 | 1,94 | PVC Sew. Pipe RD 250 SN8 L=3 W/Socket | 10,05 |
| PVC Sew. Pipe RD 110 SN8 L=2 | 1,85 | PVC Sew. Pipe RD 250 SN8 L=6 | 9,56 |
| PVC Sew. Pipe RD 110 SN8 L=3 | 1,81 | PVC Sew. Pipe BK 250 SN8 L=6 | 9,47 |
| PVC Sew. Pipe BK 125 SN8 L=6 | 2,44 | PVC Sew. Pipe RD 250 SN8 L=2,25 W/Socket | 10,44 |
| PVC Sew. Pipe RD 125 SN8 L=6 | 2,44 | PVC Sew. Pipe RD 315 SN8 L=1 | 17,97 |
| PVC Sew. Pipe RD 160 SN8 L=6 | 3,77 | PVC Sew. Pipe RD 315 SN8 L=2 | 16,00 |
| PVC Sew. Pipe BK 160 SN8 L=6 | 3,78 | PVC Sew. Pipe RD 315 SN8 L=3 | 15,42 |
| PVC Sew. Pipe RD 160 SN8 L=1 | 4,16 | PVC Sew. Pipe RD 315 SN8 L=6 | 14,76 |
| PVC Sew. Pipe RD 160 SN8 L=2 | 3,91 | PVC Sew. Pipe BK 315 SN8 L=6 | 14,62 |
| PVC Sew. Pipe RD 160 SN8 L=3 | 3,84 | PVC Sew. Pipe RD 400 SN8 L=1 | 32,00 |
| PVC Sew. Pipe RD 200 SN8 L=6 | 5,94 | PVC Sew. Pipe RD 400 SN8 L=3 | 25,82 |
| PVC Sew. Pipe BK 200 SN8 L=6 | 5,94 | PVC Sew. Pipe RD 400 SN8 L=6 | 24,45 |
| PVC Sew. Pipe RD 200 SN8 L=1 | 6,70 | PVC Sew. Pipe BK 400 SN8 L=6 | 24,45 |
| PVC Sew. Pipe RD 200 SN8 L=2 | 6,21 | PVC Sew. Pipe RD 500 SN8 L=3 | 39,74 |
| PVC Sew. Pipe RD 200 SN8 L=3 | 6,05 | PVC Sew. Pipe BK 500 SN8 L=6 | 37,53 |
| PVC Sew. Pipe RD 200 SN8 L=2,25 | 6,16 | | |

### Market:
Europe, but the EPD is specific for Nordic countries.

### Reference service life, product:
Lifetime on product calculated more than 100 year.

### Reference service life, building:

## LCA: Calculation rules

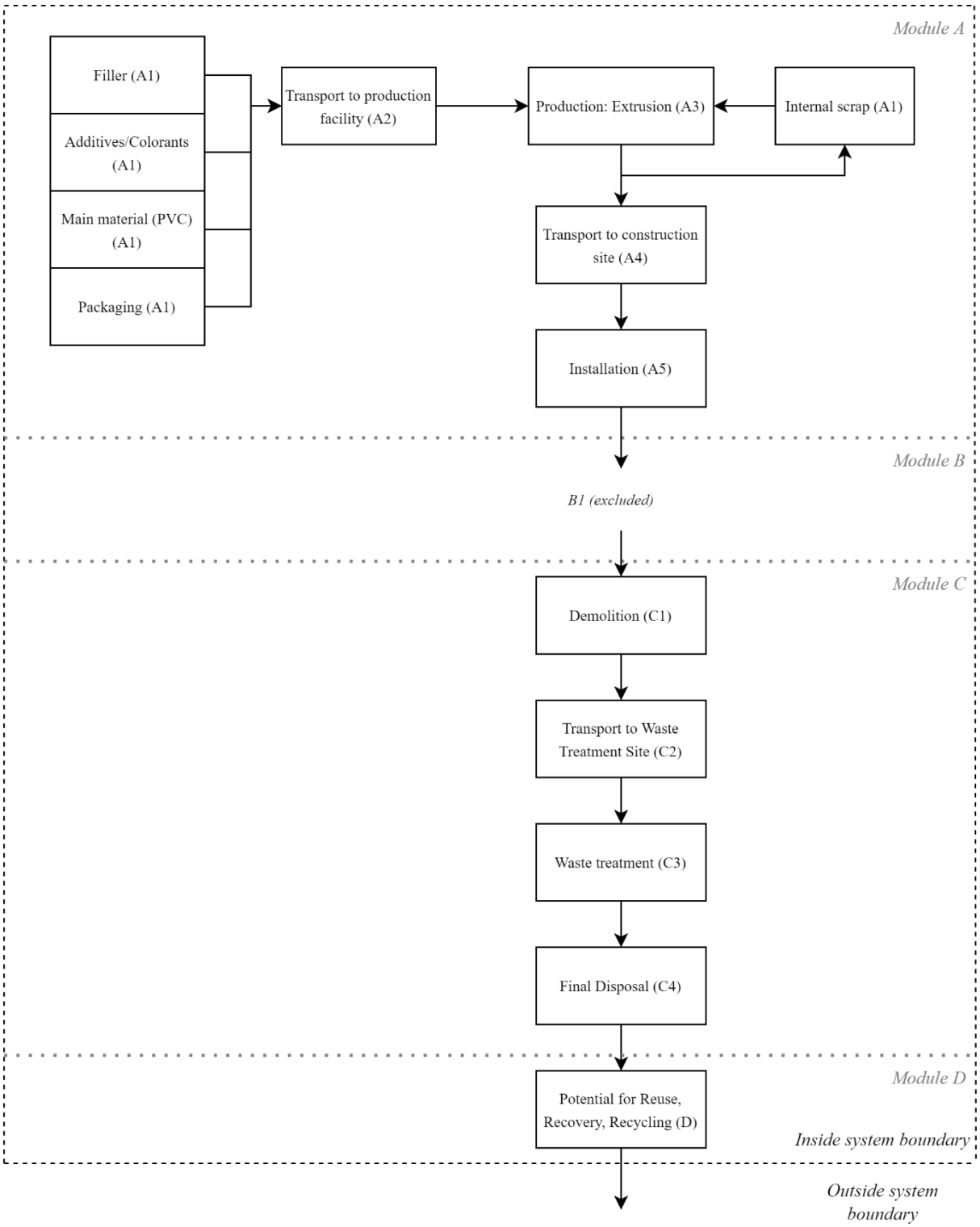
### Declared unit:
1 kg PVC Sewage Pipe

### Data quality:
For module A1, specific data for product compositions as provided by the manufacturer are used. For module A2, transportation data of the raw materials used to the production site was collected. For module A3, energy consumption and waste production data was collected for production year 2020. The used background processes are derived from Ecoinvent 3.6.

### Allocation:
Allocation was carried out in accordance with the povisions of the EN15804. All manufacturing inputs (energy and auxiliary materials) at production site level are allocated to different production processes, followed by allocation of the production processes to the products that are produced using these processes through mass allocation. No secondary materials have been used in the production process.

## System boundary:

Modules A1-A5 and C1-D are included. The figure below shows a (simplified) process tree.




## Cut-off criteria:

All relevant inputs and outputs - like emissions, energy and materials - have been taken into account in this LCA. In accordance with EN15804, the total neglected input flows per module does not exceed 5% of energy usage and mass.

# LCA: Scenarios and additional technical information

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

## Transport from production place to assembly/user (A4)

The transportation distance from Hammel to Oslo was considered.

| Type | Capacity utilisation (incl. return) % | Type of vehicle | Distance KM | Fuel/Energy consumption |
|---|---|---|---|---|
| Truck | 50% | Unspecified | 310 | 0,027 l diesel/tkm |
| Boat | 50% | Ferry | 163 | 0,0295 kg heavy fuel oil/tkm |

## Assembly (A5)

Product losses of 5% are considered. This product is used underground, therefore use of an excavator, soil transport, and a gravel foundation are necessary. For the foundation, gravel is used; this gravel is assumed to be transported for 150 km. The excavation of the soil is performed with a hydraulic digger. It is assumed that most of the soil is backfilled; however, the soil replaced by the gravel foundation and the pipe is assumed to be transported elsewhere (150 km). The compation of the soil is considered negligible. The dimensions of the trench are dependent on the diameter of the pipe; for this reason, three different scenarios were devised.

| | Unit | Value |
|---|---|---|
| Material loss | kg | 0,05 |
| Packaging waste | kg | 0,025 |

| | Unit | Installation <225 mm diameter pipe | Installation 225-355 mm diameter pipe | Installation 355-710 mm diameter pipe |
|---|---|---|---|---|
| Energy consumption of excavated volume | l/tonne excavated (diesel) | 0,07 | 0,07 | 0,07 |
| Excavated mass, total | kg | 853,13 | 1517,20 | 4454,19 |
| Excavated mass transported to deposited | kg | 267,02 | 454,46 | 1214,84 |
| Transport distance from construction site | km | 150,00 | 150,00 | 150,00 |
| Refilling mass (dirt + gravel foundation) | kg | 754,85 | 1293,59 | 3620,05 |
| Transport distance for refilling mass to construction site | km | 150,00 | 150,00 | 150,00 |
| Energy used for compaction | kWh or l/tonne compacted | - | - | - |

## End of Life (C1, C3, C4)

For the end-of life, it is assumed that the pipes are left in the ground after use. Therefore, there is no data input for the end-of-life (C1, C3, C4).

## Transport to waste processing (C2)

As it is assumed that the pipes are left in the ground after use, there is no transport to waste processing (C2).

## Benefits and loads beyond the system boundaries (D)

Module D contains the benefits and loads of energy recovery from incineration and recycling of the packaging materials and product losses. For the product losses, the considered waste treatment is 70% recycling, 20% incineration and 10% landfill. For the PVC and additives, 0,67 kg of saved virgin PVC was considered per kg material recycled. For the filler, 0,67 kg of saved virgin filler was considered per kg filler recycled. The benefits from exported energy were calculation from the energy efficiencies for Nothern countries reported by CEWEP, which is equal to an electrical efficiency of 11,0%, and a thermal efficiency of 72,6%. Substition of Norwegian electricity mix and district heating mix was assumed.

| | Unit | Value |
|---|---|---|
| Saving of virgin PVC | kg | 0,020 |
| Saving of virgin filler | kg | 0,003 |
| Substition of electric energy | MJ | 0,08 |
| Subsitition of thermal energy | MJ | 0,51 |

## Additional technical information

Although most of this EPD can be scaled with the weight of the pipe, this is not the case for module A5, which scales with the length and the diameter of the pipe. For each applicable diameter, a scenario for installation of 1 meter pipe was established. The results of these scenarios per meter pipe are described in the table below.

To calculate the results for a specific product, the masses of the pipes per meter as described on page 3-4 (under technical data) should be used to calculate the LCA results per 1 meter pipe, combined with the data in the tables below. This should be done by multiplying the LCA results presented on page 9-12 of all modules, except 'A5 – installation only' with the mass per meter. The LCA results of A5 – installation should be calculated from the LCA results presented in the tables below.

| Impact Category/Parameter | Installation <225 mm diameter | Installation 225-355 mm diameter | Installation 355-710 mm diameter |
|---|---|---|---|
| GWP-total | 6.40E+00 | 9.53E+00 | 1.98E+01 |
| GWP-fossil | 6.39E+00 | 9.51E+00 | 1.98E+01 |
| GWP-biogenic | 1.14E-02 | 1.60E-02 | 2.86E-02 |
| GWP-LULUC | 2.28E-03 | 3.35E-03 | 6.72E-03 |
| ODP | 1.44E-06 | 2.15E-06 | 4.47E-06 |
| AP | 3.97E-02 | 5.96E-02 | 1.26E-01 |
| EP-freshwater | 5.87E-05 | 8.62E-05 | 1.73E-04 |
| EP-marine | 1.45E-02 | 2.19E-02 | 4.71E-02 |
| EP-terrestial | 1.61E-01 | 2.43E-01 | 5.20E-01 |
| POCP | 4.55E-02 | 6.86E-02 | 1.47E-01 |
| ADP-M&M | 1.78E-04 | 2.60E-04 | 5.09E-04 |
| ADP-fossil | 9.79E+01 | 1.46E+02 | 3.01E+02 |
| WDP | 6.35E-01 | 9.01E-01 | 1.65E+00 |

| | | | |
|---|---|---|---|
| PM | 6.96E-07 | 1.06E-06 | 2.30E-06 |
| IRP | 4.60E-01 | 6.79E-01 | 1.39E+00 |
| ETP-fw | 8.06E+01 | 1.19E+02 | 2.44E+02 |
| HTP-c | 3.14E-09 | 4.65E-09 | 9.52E-09 |
| HTP-nc | 9.51E-08 | 1.41E-07 | 2.86E-07 |
| SQP | 8.49E+01 | 1.24E+02 | 2.47E+02 |
| RPEE | 3.01E+00 | 4.26E+00 | 7.82E+00 |
| RPEM | 0.00E+00 | 0.00E+00 | 0.00E+00 |
| TPE | 3.01E+00 | 4.26E+00 | 7.82E+00 |
| NRPE | 1.04E+02 | 1.54E+02 | 3.20E+02 |
| NRPM | 0.00E+00 | 0.00E+00 | 0.00E+00 |
| TRPE | 1.04E+02 | 1.54E+02 | 3.20E+02 |
| SM | 0.00E+00 | 0.00E+00 | 0.00E+00 |
| RSF | 0.00E+00 | 0.00E+00 | 0.00E+00 |
| NRSF | 0.00E+00 | 0.00E+00 | 0.00E+00 |
| W | 2.51E-01 | 3.44E-01 | 5.74E-01 |
| HW | 2.52E-04 | 3.75E-04 | 7.78E-04 |
| NHW | 5.33E+00 | 7.86E+00 | 1.59E+01 |
| RW | 6.74E-04 | 1.00E-03 | 2.07E-03 |
| CR | 0.00E+00 | 0.00E+00 | 0.00E+00 |
| MR | 0.00E+00 | 0.00E+00 | 0.00E+00 |
| MER | 0.00E+00 | 0.00E+00 | 0.00E+00 |
| EEE | 0.00E+00 | 0.00E+00 | 0.00E+00 |
| ETE | 0.00E+00 | 0.00E+00 | 0.00E+00 |

# LCA: Results

The LCA results are presented below for the declared unit defined on page 2 of the EPD document. Recalculation to results for pipes per meter should be done based on the technical data specified on pages 3-4, and the additional technical information specified on pages 7-8.

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

| Product stage | | | Assembly stage | | Use stage | | | | | | | End of life stage | | | | Benefits & loads beyond system boundary |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 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 | | | | | | | | X | X | X | X | X |

## Core environmental impact indicators

| Indicator | Unit | A1-A3 | A4 | A5, insta-llation | A5, other | C1 | C2 | C3 | C4 | D |
|---|---|---|---|---|---|---|---|---|---|---|
| GWP-total | kg CO2 eq. | 1,97E+00 | 5,87E-02 | 3,52E+00 | 1,50E-01 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | -4,76E-02 |
| GWP-fossil | kg CO2 eq. | 1,95E+00 | 5,87E-02 | 3,51E+00 | 1,49E-01 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | -4,76E-02 |
| GWP-biogenic | kg CO2 eq. | 1,88E-02 | 2,08E-05 | 6,26E-03 | 9,41E-04 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 1,30E-06 |
| GWP-LULUC | kg CO2 eq. | 1,46E-03 | 2,56E-05 | 1,26E-03 | 7,34E-05 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | -3,11E-07 |
| ODP | kg CFC11 eq. | 1,01E-06 | 1,30E-08 | 7,94E-07 | 5,08E-08 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | -5,69E-09 |
| AP | mol $H^+$ eq. | 9,01E-03 | 8,20E-04 | 2,18E-02 | 4,61E-04 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | -4,89E-05 |
| EP-freshwater | kg P eq. | 8,11E-05 | 4,04E-07 | 3,23E-05 | 4,07E-06 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | -1,79E-07 |
| EP-marine | kg N eq. | 1,66E-03 | 2,29E-04 | 8,00E-03 | 8,70E-05 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | -1,29E-05 |
| EP-terrestial | mol N eq. | 1,80E-02 | 2,54E-03 | 8,85E-02 | 9,44E-04 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | -1,43E-04 |
| POCP | kg NMVOC eq. | 6,09E-03 | 6,82E-04 | 2,50E-02 | 3,17E-04 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | -5,72E-05 |
| ADP-M&M | kg Sb eq. | 5,77E-05 | 1,18E-06 | 9,81E-05 | 2,91E-06 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | -2,67E-08 |
| ADP-fossil | MJ | 4,84E+01 | 8,55E-01 | 5,39E+01 | 2,43E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | -7,81E-01 |
| WDP | $m^3$ | 2,97E+00 | 2,22E-03 | 3,49E-01 | 1,49E-01 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | -3,42E-03 |

***GWP-total:*** *Global Warming Potential;* ***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; See "additional Norwegian requirements" for indicator given as PO4 eq.* ***EP-marine:*** *Eutrophication potential, fraction of nutrients reaching freshwater end compartment;* ***EP-terrestial:*** *Eutrophication potential, Accumulated Exceedance;* ***POCP****: Formation potential of tropospheric ozone;* ***ADP-M&M****: Abiotic depletion potential for non-fossil resources (minerals and metals);* ***ADP-fossil:*** *Abiotic depletion potential for fossil resources;* ***WDP:*** *Water deprivation potential, deprivation weighted water counsumption*

## Additional environmental impact indicators

| Indicator | Unit | A1-A3 | A4 | A5, insta-llation | A5, other | C1 | C2 | C3 | C4 | D |
|---|---|---|---|---|---|---|---|---|---|---|
| PM | Disease incidence | 6,82E-08 | 4,22E-09 | 3,83E-07 | 3,52E-09 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | -2,97E-10 |
| IRP | kBq U235 eq. | 1,05E-01 | 3,72E-03 | 2,53E-01 | 5,31E-03 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | -2,66E-04 |
| ETP-fw | CTUe | 3,31E+01 | 6,53E-01 | 4,43E+01 | 1,68E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | -1,30E-01 |
| HTP-c | CTUh | 1,33E-09 | 2,75E-11 | 1,73E-09 | 7,35E-11 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | -3,92E-12 |
| HTP-nc | CTUh | 4,19E-08 | 7,19E-10 | 5,23E-08 | 2,16E-09 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 4,32E-10 |
| SQP | Dimensionless | 1,06E+01 | 5,66E-01 | 4,67E+01 | 5,46E-01 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | -2,07E-02 |

***PM:*** *Particulate matter emissions;* ***IRP:*** *Ionising radiation, human health;* ***ETP-fw:*** *Ecotoxicity (freshwater);* ***ETP-c:*** *Human toxicity, cancer effects;* ***HTP-nc:*** *Human toxicity, non-cancer effects;* ***SQP:*** *Land use related impacts / soil quality*

## Classification of disclaimers to the declaration of core and additional environmental impact indicators

| ILCD classification | Indicator | Disclaimer |
|---|---|---|
| ILCD type / level 1 | Global warming potential (GWP) | None |
| | Depletion potential of the stratospheric ozone layer (ODP) | None |
| | Potential incidence of disease due to PM emissions (PM) | None |
| | Acidification potential, Accumulated Exceedance (AP) | None |
| | Eutrophication potential, Fraction of nutrients reaching freshwater end compartment (EP-freshwater) | None |
| ILCD type / level 2 | Eutrophication potential, Fraction of nutrients reaching marine end compartment (EP-marine) | None |
| | Eutrophication potential, Accumulated Exceedance (EP-terrestrial) | None |
| | Formation potential of tropospheric ozone (POCP) | None |
| | Potential Human exposure efficiency relative to U235 (IRP) | 1 |
| ILCD type / level 3 | Abiotic depletion potential for non-fossil resources (ADP-minerals&metals) | 2 |
| | Abiotic depletion potential for fossil resources (ADP-fossil) | 2 |
| | Water (user) deprivation potential, deprivation-weighted water consumption (WDP) | 2 |
| | Potential Comparative Toxic Unit for ecosystems (ETP-fw) | 2 |
| | Potential Comparative Toxic Unit for humans (HTP-c) | 2 |
| | Potential Comparative Toxic Unit for humans (HTP-nc) | 2 |
| | Potential Soil quality index (SQP) | 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

| Parameter | Unit | A1-A3 | A4 | A5, insta-llation | A5, other | C1 | C2 | C3 | C4 | D |
|---|---|---|---|---|---|---|---|---|---|---|
| RPEE | MJ | 4,13E+00 | 1,04E-02 | 1,65E+00 | 2,07E-01 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | -2,80E-03 |
| RPEM | MJ | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 |
| TPE | MJ | 4,13E+00 | 1,04E-02 | 1,65E+00 | 2,07E-01 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | -2,80E-03 |
| NRPE | MJ | 5,19E+01 | 9,08E-01 | 5,71E+01 | 2,61E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | -8,63E-01 |
| NRPM | MJ | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 |
| TRPE | MJ | 5,19E+01 | 9,08E-01 | 5,71E+01 | 2,61E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | -8,63E-01 |

| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| SM | kg | 5,60E+01 | 9,18E-01 | 5,88E+01 | 2,82E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | -8,66E-01 |
| RSF | MJ | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 |
| NRSF | MJ | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 |
| W | m³ | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 |

*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*

### End of life - Waste

| Parameter | Unit | A1-A3 | A4 | A5, insta-llation | A5, other | C1 | C2 | C3 | C4 | D |
|---|---|---|---|---|---|---|---|---|---|---|
| HW | KG | 4,19E-05 | 1,81E-06 | 1,39E-04 | 2,13E-06 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | -1,19E-06 |
| NHW | KG | 2,97E-01 | 3,93E-02 | 2,93E+00 | 1,77E-02 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | -5,52E-04 |
| RW | KG | 9,79E-05 | 5,86E-06 | 3,71E-04 | 4,96E-06 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | -3,99E-07 |

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

### End of life – output flow

| Parameter | Unit | A1-A3 | A4 | A5, insta-llation | A5, other | C1 | C2 | C3 | C4 | D |
|---|---|---|---|---|---|---|---|---|---|---|
| CR | kg | 0,00E+00 | 0,00E+00 | 0,00E+00 | 1,47E-09 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 |
| MR | kg | 0,00E+00 | 0,00E+00 | 0,00E+00 | 3,81E-02 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 |
| MER | kg | 0,00E+00 | 0,00E+00 | 0,00E+00 | 2,59E-02 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 |
| EEE | MJ | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 7,68E-02 |
| ETE | MJ | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 5,07E-01 |

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

### Information describing the biogenic carbon content at the factory gate

| Biogenic carbon content | Unit | Value |
|---|---|---|
| Biogenic carbon content in product | kg C | 0 |
| Biogenic carbon content in the accompanying packaging | kg C | 0 |

# Additional Norwegian requirements

### Greenhous gas emission 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 prosess(A3).

| National electricity grid | Unit | Value |
|---|---|---|
| Windelectricity, average (Ecoinvent 3.6) | kg CO2 -eq/kWh | 0,0263 |

## Additional environmental impact indicators required in NPCR Part A for construction products

In order to increase the transparency of biogenic carbon contribution to climate impact, the indicator for GWP has been sub-divided into the following:

GWP-IOBC Climate impacts calculated according to the principle of instantanious oxidation
GWP-BC Climate impacts from the net uptake and emission of biogenic carbon from each module.

| Indicator | Unit | A1-A3 | A4 | A5, insta-llation | A5, other | C1 | C2 | C3 | C4 | D |
|---|---|---|---|---|---|---|---|---|---|---|
| GWP-IOBC | kg CO2 eq. | 1,95E+00 | 5,87E-02 | 3,51E+00 | 1,49E-01 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | -4,76E-02 |
| GWP-BC | kg CO2 eq. | 1,88E-02 | 2,08E-05 | 6,26E-03 | 9,41E-04 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 1,30E-06 |
| GWP | kg CO2 eq. | 1,97E+00 | 5,87E-02 | 3,52E+00 | 1,50E-01 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | -4,76E-02 |

***GWP-IOBC*** *Global warming potential calculated according to the principle of instantanious oxidation.* ***GWP-BC*** *Global warming potential from net uptake and emissions of biogenic carbon from the materials in each module.* ***GWP*** *Global warming potential*

## Hazardous substances

The declaration is based upon reference to threshold values and/or test results and/or material safety data sheets provided to EPD verifiers. Documentation available upon request to EPD owner.

- ✓ The product contains no substances given by the REACH Candidate list or the Norwegian priority list.
- ☐ The product contains substances given by the REACH Candidate list or the Norwegian priority list that are less than 0,1 % by weight.
- ☐ The product contain dangerous substances, more then 0,1% by weight, given by the REACH Candidate List or the Norwegian Priority list, see table.
- ☐ The product contains no substances given by the REACH Candidate list or the Norwegian priority list. The product is classified as hazardous waste (Avfallsforskiften, Annex III), see table.

## Indoor environment

The product meets the requirements for low emissions.

## Carbon footprint

Carbon footprint has not been worked out for the product.

# 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+A2:2019 | Sustainability of construction works - Environmental product declaration - Core rules for the product category of construction products |
| ISO 21930:2007 | Sustainability in building construction – Environmental declaration of building products |
| NPCR Part A | Construction products and services. Ver. 2.0. March 2021, EPD-Norge |
| NPCR Part B | NPCR - Part B for piping systems for use in sewage and storm water systems (under gravity), the Norwegian EPD Foundation/EPD-Norge, version 2.0, dated 18-10-2018 |
| CEWEP | Results of Specific Data for Energy, R1 Plant Efficiency Factor and NCV of 314 European Waste-to-Energy (WtE) Plants, CEWEP Energy Report III (status 2007-2010), 2012, Reiman, D.O. |



| | | | |
|---|---|---|---|
| epd-norway Global Program Operator | **Program Operator** | tlf | +47 23 08 80 00 |
| | The Norwegian EPD Foundation | | |
| | Post Box 5250 Majorstuen, 0303 Oslo | e-post: | post@epd-norge.no |
| | Norway | web | www.epd-norge.no |
| epd-norway Global Program Operator | **Publisher** | tlf | +47 23 08 80 00 |
| | The Norwegian EPD Foundation | | |
| | Post Box 5250 Majorstuen, 0303 Oslo | e-post: | post@epd-norge.no |
| | Norway | web | www.epd-norge.no |
| wavin An Orbia business. | **Owner of the declaration** | tlf | +47 45190625 |
| | Norsk Wavin AS | Fax | |
| | Karihaugveien 89, 1086, Oslo | e-post: | Invoice.no@wavin.com |
| | Norway | web | www.wavin.com/nn-no |
| Ecochain | **Author of the life cycle assesment** | tlf | +31 (0)20 303 5777 |
| | Emma Thunnissen | Fax | |
| | H.J.E. Wenckebachweg 123, 1096 AM Amsterdam | e-post: | emma@ecochain.com |
| | The Netherlands | web | www.ecochain.com |

# EPD for the best environmental decision

Global
Program
Operator

The Norwegian EPD foundation
www.epd-norge.no

epd-norge