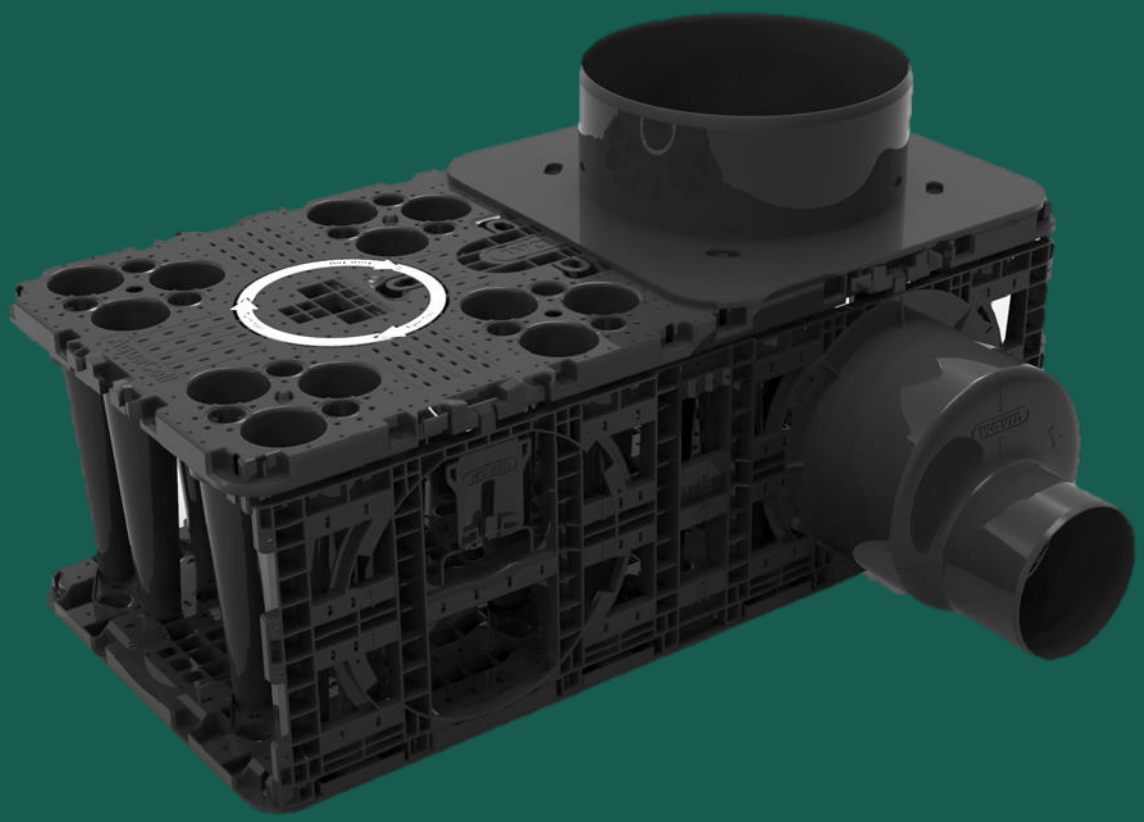
epd-norway
Global Program Operator

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-3766-2675-EN

Registration number:
NEPD-3766-2675-EN

Issue date: 03.10.2022
Valid to: 03.10.2027

Ver2-101122

AquaCell

The AquaCell is a below ground (rain)water storage system made with recycled material which can be used in two different applications: Infiltration system or Attenuation system. Wavin's AquaCell rainwater units are made from 100% recycled and 100% recyclable plastic (PP).

Manufacturer

Wavin Polska S.A.

wavin
An Orbia business.

The Norwegian
EPD Foundation

General information

Product:
AquaCell infiltration system 100 m3

Program Operator:
The Norwegian EPD Foundation
Post Box 5250 Majorstuen, 0303 Oslo, Norway
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Declaration number:
NEPD-3766-2675-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, 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:
100 m3 AquaCell infiltration system

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:
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Place of production:
Dobieżyńska 43, 64-320 Buk, Poland

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

Organisation no:
823355092

Issue date:
03.10.2022

Valid to:
03.10.2027

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:

Wavin's AquaCell rainwater units are made from 100% recycled and 100% recyclable plastic (PP) – closing the loop of circularity. The new generation units' stackable design means up to 4 times more product in every truck; therefore, a significant reduction of CO2 emissions, less space required on the building site and fewer deliveries. The pushfit installation with integrated connectors further helps to speed up installation. It is composed of:

- Base Unit
- Bottom Plate
- Side Plate

Product specification:

A typical composition of the AquaCell infiltration system, including packaging, is as follows:

Materials	%
Recycled PP	84,0%
Additives	4,7%
Calcium carbonate	0,1%
Packaging	11,2%

The characteristics of the individual components the AquaCell infiltration system is composed of are:

Characteristic components AquaCell infiltration system	Value
Dimensions per Base Unit (nominal) (L x W x H) (mm)	1200 x 600 x 420
Gross volume per Base Unit (m3)	0,288
Net volume per Base Unit (m3)	0,275
Porosity (void ratio) (%)	95%
Weight Base Unit (kg)	11,4
Weight Base Unit (kg), including packaging	12,5
Weight Bottom Plate (kg)	3,6
Weight Bottom Plate (kg), including packaging	4,4
Weight Side Plate (kg)	2,3
Weight Side Plate (kg), including packaging	3,2

Technical data:

For this EPD, a double-layered AquaCell infiltration system of 100 m3 is considered. The specifications of this system are:

Characteristic 100 m3 AquaCell infiltration system	Value
Total weight system (kg)	4927
Total weight system (kg), including packaging	5698
Base units (pieces)	360
Bottom plates (pieces)	180
Side plates (pieces)	76
Net volume (m3)	101,8
Gros volume (m3)	106,9
Tank surface area (m2)	296,8
Surface area of bottom (m2)	129,6
Surface area of sides (m2)	37,6
Actual installation depth (m)	1,625
Excavation volume (m3)	320,5
Backfill volume (m3)	213,6

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

Reference service life, product:
50 years

Reference service life, building:

LCA: Calculation rules

Declared unit:
100 m3 AquaCell infiltration unit

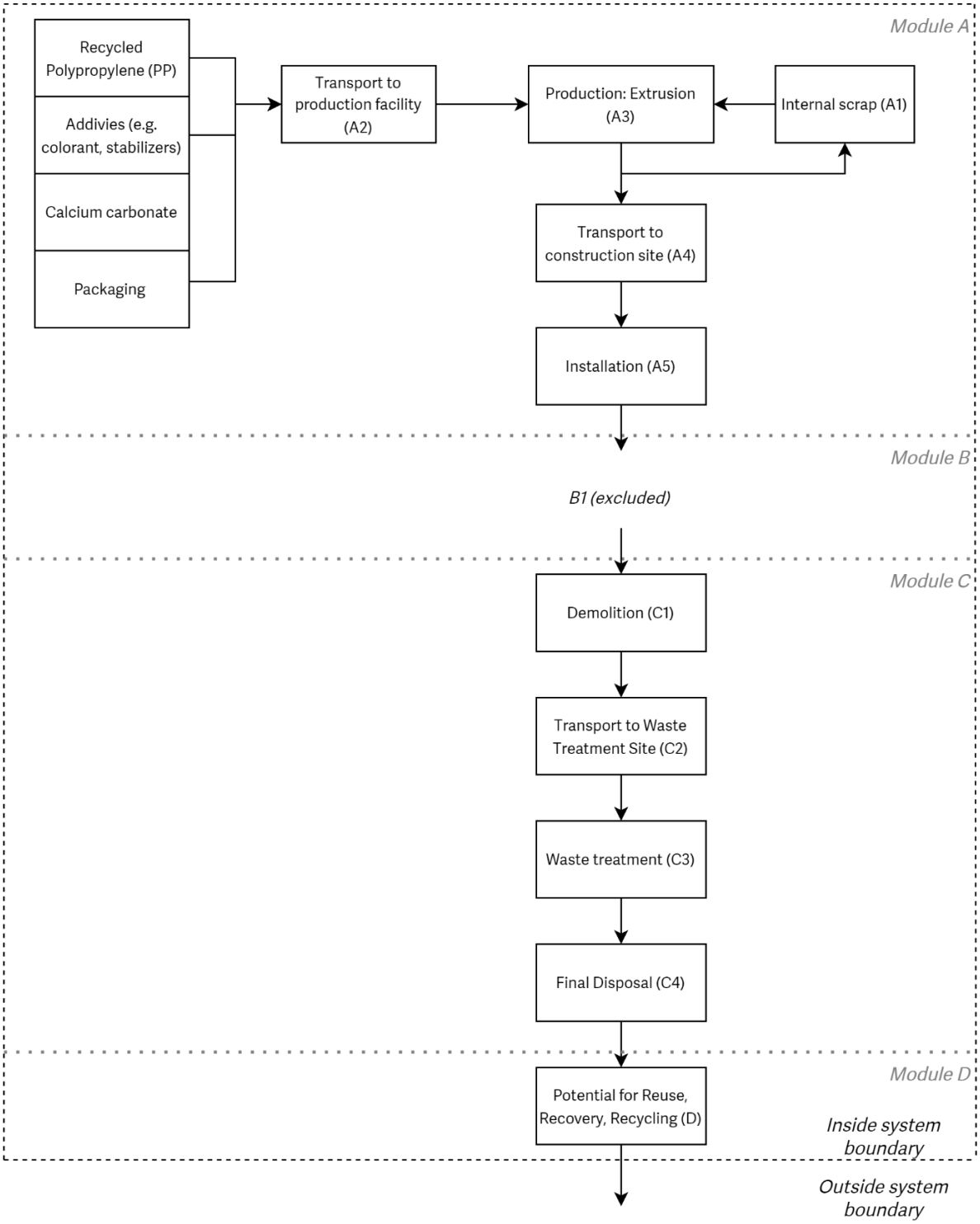
Data quality:
For module A1, specific data for product compositions as provided by the manufacturer are used. For module A2, transportation data of the raw materials used to the production site was collected. For module A3, energy consumption and waste production data was collected for production year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

For the recycled PP, the assumed end-of-waste point for this material is sorted plastic waste that has been delivered to the facility that carries out the final recycling processes. This means that all processes required to produce granulate from this plastic waste, like further cleaning, shredding and granulation are included in module A1 of the specific material.

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 Buk to Oslo was considerd.

Type	Capacity utilisation (incl. return) %	Type of vehicle	Distance KM	Fuel/Energy consumption
Truck	50%	Unspecified	1086	0,027 l diesel/tkm
Boat	50%	Ferry	113	0,0295 kg heavy fuel oil/tkm

Assembly (A5)

Product losses of 2% are considered. Installation is done manually, but the excavation of the sand is assumed to take place with a hydraulic digger. The diesel consumption for the hydraulic digger is calculated from the excavation volume (m3) and the diesel consumption per m3.

	Unit	Value
Material loss	kg	114,0
Packaging waste	kg	636,3
Diesel consumption	kg	42,0

End of Life (C1, C3, C4)

At the end-of-life, the demolition is done manually. However, the excavation of the sand is assumed to take place with a hydraulic digger. The diesel consumption for the hydraulic digger is calculated from the excavation volume (m3) and the diesel consumption per m3. The considered waste treatment of the Q-bic plus infiltration unit components (PP column unit, base plate and side plates) is 70% recycling, 20% incineration with energy recovery and 10% landfill.

	Unit	Value
Diesel consumption	kg	42,0
Collected as mixed construction waste	kg	5061,7
Reuse	kg	0
Recycling	kg	3543,2
Energy recovery	kg	1012,3
To landfill	kg	506,2

Transport to waste processing (C2)

The considered distances are 50 km to landfill, 100 km for energy recovery, and 250 km for recycling.

Type	Capacity utilisation (incl. return) %	Type of vehicle	Distance KM	Fuel/Energy consumption
Truck	50%	Unspecified	200,0	0,027 l diesel/tkm

Benefits and loads beyond the system boundaries (D)

For the PP and addives, 0,67 kg of saved virgin PP was considered per kg material recycled (total of A5 en C3). The 67% is the considered quality factor, which means that the product is at least three times recyclable. 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%. Energy recovery from all materials (including packaging) was considered. Substition of Norwegian electricity mix and district heating mix was assumed.

	Unit	Value
Saving of virgin PP	kg	-844,4
Savings of virgin filler	kg	1,38
Substition of electric energy	MJ	3752,2
Subsitition of thermal energy	MJ	24764,8

Additional technical information

Not applicable

LCA: Results

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

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	MND	MND	MND	MND	MND	MND	MND	X	X	X	X	X

Core environmental impact indicators

Indicator	Unit	A1-A3	A4	A5	C1	C2	C3	C4	D
GWP-total	kg CO2 eq.	1,70E+03	7,66E+02	1,63E+03	1,71E+02	1,30E+02	3,76E+03	6,11E+01	-5,15E+02
GWP-fossil	kg CO2 eq.	2,60E+03	7,65E+02	3,72E+02	1,71E+02	1,30E+02	3,77E+03	6,11E+01	-5,23E+02
GWP-biogenic	kg CO2 eq.	-9,02E+02	4,14E-01	1,26E+03	6,56E-02	7,89E-02	-5,21E+00	5,29E-02	8,67E+00
GWP-LULUC	kg CO2 eq.	3,83E+00	2,87E-01	1,18E-01	1,78E-02	4,60E-02	7,29E-01	1,10E-03	-2,62E-01
ODP	kg CFC11 eq.	2,70E-04	1,75E-04	4,82E-05	3,58E-05	2,99E-05	9,48E-05	1,54E-06	-2,49E-04
AP	mol H^+ eq.	1,51E+01	6,02E+00	2,32E+00	1,74E+00	7,40E-01	3,98E+00	3,70E-02	3,02E+00
EP-freshwater	kg P eq.	1,53E-01	6,03E-03	4,67E-03	9,45E-04	1,07E-03	2,10E-02	4,96E-05	1,27E-02
EP-marine	kg N eq.	2,54E+00	1,93E+00	9,04E-01	7,63E-01	2,65E-01	1,16E+00	2,35E-02	1,83E-01
EP-terrestial	mol N eq.	2,99E+01	2,14E+01	9,96E+00	8,37E+00	2,92E+00	1,27E+01	1,50E-01	1,89E+00
POCP	kg NMVOC eq.	8,09E+00	5,95E+00	2,75E+00	2,31E+00	8,34E-01	4,02E+00	5,60E-02	2,04E+00
ADP-M&M	kg Sb eq.	1,49E-01	1,86E-02	4,12E-03	2,96E-04	3,36E-03	1,58E-02	3,77E-05	1,07E-02
ADP-fossil	MJ	4,07E+04	1,16E+04	3,75E+03	2,34E+03	1,99E+03	1,27E+04	1,13E+02	2,37E+04
WDP	m^3	8,45E+02	3,42E+01	2,75E+01	4,10E+00	6,12E+00	2,48E+02	7,71E-01	1,04E+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	C1	C2	C3	C4	D
PM	Disease incidence	1,60E-04	6,54E-05	5,25E-05	4,59E-05	1,17E-05	6,56E-05	7,74E-07	2,18E-05
IRP	kBq U235 eq.	2,23E+02	5,06E+01	1,67E+01	9,92E+00	8,72E+00	3,81E+01	5,18E-01	9,37E+00
ETP-fw	CTUe	7,24E+04	9,27E+03	3,59E+03	1,55E+03	1,62E+03	1,43E+04	9,42E+01	1,29E+03
HTP-c	CTUh	2,48E-06	3,44E-07	2,04E-07	8,04E-08	5,76E-08	1,84E-06	2,90E-09	-2,70E-07
HTP-nc	CTUh	5,01E-05	1,08E-05	3,43E-06	1,51E-06	1,93E-06	2,16E-05	6,16E-08	4,21E-06
SQP	Dimensionless	1,22E+05	9,35E+03	3,24E+03	3,09E+02	1,71E+03	1,01E+04	2,88E+02	-8,54E+04

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	C1	C2	C3	C4	D
RPEE	MJ	3,39E+04	1,60E+02	7,15E+02	1,87E+01	2,86E+01	6,24E+02	4,24E+00	-1,22E+04
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
TPE	MJ	3,39E+04	1,60E+02	7,15E+02	1,87E+01	2,86E+01	6,24E+02	4,24E+00	-1,22E+04
NRPE	MJ	4,33E+04	1,23E+04	3,99E+03	2,48E+03	2,12E+03	1,35E+04	1,19E+02	2,42E+04
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
TRPE	MJ	4,33E+04	1,23E+04	3,99E+03	2,48E+03	2,12E+03	1,35E+04	1,19E+02	2,42E+04

SM	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
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
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
W	m³	3,31E+01	1,26E+00	1,05E+00	1,44E-01	2,26E-01	7,29E+00	1,38E-01	1,45E+01

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	C1	C2	C3	C4	D
HW	KG	5,96E-02	2,83E-02	8,89E-03	6,45E-03	5,10E-03	2,07E-02	1,37E-04	-4,20E-02
NHW	KG	5,67E+02	6,71E+02	6,12E+01	4,26E+00	1,24E+02	6,22E+02	4,94E+02	-1,09E+01
RW	KG	2,01E-01	7,89E-02	2,32E-02	1,59E-02	1,36E-02	4,83E-02	7,32E-04	-1,36E-03

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

End of life – output flow

Parameter	Unit	A1-A3	A4	A5	C1	C2	C3	C4	D
CR	kg	0,00E+00	0,00E+00	4,88E+02	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
MR	kg	0,00E+00	0,00E+00	1,34E+02	0,00E+00	0,00E+00	3,54E+03	0,00E+00	0,00E+00
MER	kg	0,00E+00	0,00E+00	1,15E+02	0,00E+00	0,00E+00	1,01E+03	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	2,48E+04
ETE	MJ	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	3,75E+03

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	582,9

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
Wind, 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	C1	C2	C3	C4	D
GWP-IOBC	kg CO2 eq.	2,60E+03	7,65E+02	3,72E+02	1,71E+02	1,30E+02	3,77E+03	6,11E+01	-5,23E+02
GWP-BC	kg CO2 eq.	-9,02E+02	4,14E-01	1,26E+03	6,56E-02	7,89E-02	-5,21E+00	5,29E-02	8,67E+00
GWP	kg CO2 eq.	1,70E+03	7,66E+02	1,63E+03	1,71E+02	1,30E+02	3,76E+03	6,11E+01	-5,15E+02

EP-freshwater* *Eutrophication potential, fraction of nutrients reaching freshwater end compartment. Declared as PO4 eq.* ***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
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.

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