epddanmark

ECO PLATFORM EPD VERIFIED

Owner: Ribaplan Danmark ApS
No.: MD-23131-EN
Issued: 21-07-2023
Valid to: 21-07-2028

3rd PARTY **VERIFIED**

EPD

VERIFIED ENVIRONMENTAL PRODUCT DECLARATION | **ISO 14025 & EN 15804**

Owner of declaration
Ribaplan Danmark ApS
Sophienlundsvej 1, 4300 Holbæk
CVR-nr: 33881975

Programme
EPD Danmark
www.epddanmark.dk

☐ Industry EPD
☒ Product EPD

Declared product(s)
Ribaplan 18

Number of declared datasets/product variations: 1

Production site
The company operates out of the following address.
Sophienlundsvej 1, DK-4300 Holbæk.

The actual site of production occurs on a construction site and therefore varies. It was estimated that construction occurs on average within 24km of the city of Copenhagen.

Product(s) use
EPS (expanded polystyrene) concrete is a lightweight and insulating material that is used as a subfloor or underlayment for flooring systems. It is made by combining EPS beads with cement and other additives. Once installed, a variety of flooring materials can be placed on top of it to provide the walking surface. Its use as a subfloor material can reduce the weight of the overall flooring system, making it a popular choice for high-rise buildings or situations where weight is a concern.

Declared/ functional unit
1 m3 of Subfloor made from Ribaplan

Year of production site data
2022

EPD version
First version

Issued: 21-07-2023
Valid to: 21-07-2028

Basis of calculation
This EPD is developed in accordance with the European standard EN 15804+A2, and PCR16757:2022 Product Category Rules for Concrete and Concrete Elements.

Comparability
EPDs of construction products may not be comparable if they do not comply with the requirements in EN 15804. EPD data may not be comparable if the datasets used are not developed in accordance with EN 15804 and if the background systems are not based on the same database.

Validity
This EPD has been verified in accordance with ISO 14025 and is valid for 5 years from the date of issue.

Use
The intended use of an EPD is to communicate scientifically based environmental information for construction products, for the purpose of assessing the environmental performance of buildings.

EPD type
☐Cradle-to-gate with modules C1-C4 and D
☐Cradle-to-gate with options, modules C1-C4 and D
☒Cradle-to-grave and module D
☐Cradle-to-gate
☐Cradle-to-gate with options

CEN standard EN 15804 serves as the core PCR

Independent verification of the declaration and data, according to EN ISO 14025

☐ internal ☒ external

Third party verifier:

Charlotte B. Merlin

Martha Katrine Sørensen
EPD Danmark

Life cycle stages and modules (MND = module not declared)																
Product			Construction process		Use							End of life				Beyond the system boundary
Raw material supply	Transport	Manufacturing	Transport	Installation process	Use	Maintenance	Repair	Replacement	Refurbishment	Operational energy use	Operational water use	De-construction demolition	Transport	Waste processing	Disposal	Re-use, recovery and 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	X	X	X	X	X	X	X

Product information

Product description

The main product components for the uncured product are shown in the table below. Product loses 5% of water when cured

Material	% W/W of declared product
EPS	3,7%
Cement	58,0%
Water	37,1%
Additive	1,1%

Product packaging:

The product is formulated on the site of installation, without packaging.

Representativity

This declaration, including data collected, modelling, and derived results, represents all lifecycle modules of Ribaplan in the geographical context of Denmark. Product specific data are based on average values collected in the period 2022. Background data are based on the GaBi 2022.2, and Ecoinvent v3.8 databases, and are with one negligeable exception, less than 10 years old. Generally, the used background datasets are of high quality, where most of the datasets are only a couple of years old.

Hazardous substances

Ribaplan does not contain substances listed in the "Candidate List of Substances of Very High Concern for authorization"

(http://echa.europa.eu/candidate-list-table)

Essential characteristics

Ribaplan is exempt from CE markings under the European standard for concrete, EN206, as it is manufactured on the construction site.[1]

Further technical information can be obtained by contacting the manufacturer or on the manufacturer's website:

http://www.ribaplan.dk/

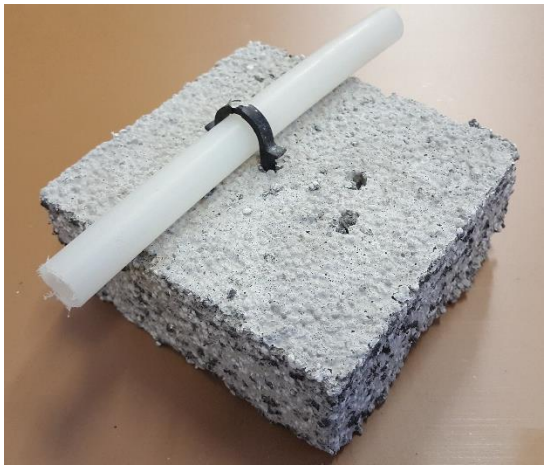
Reference Service Life (RSL)

> 50 years

EPS concrete is a relatively new product, and comprehensive real-world service life data is not yet available to definitively establish its long-term durability.

Above given RSL is based on values given by PCR 16757:2022.

Picture of product(s)



1 https://www.concretecentre.com/Specification/Tools/CE-Marking-and-Concrete/CE-Marking-for-Engineers.aspx

LCA background

Declared unit
Not Applicable

Functional unit

A functional unit was defined as opposed to a declared unit, as this LCA includes the use phase of the products lifecycle. The functional unit was defined as 1m^3 of subflooring made from Ribaplan 18.

The function of subflooring is to act as a low weight surface for which a floor can be built atop, while providing sound, and heat insulating properties to the building for which it is installed.

Relevant technical specifications have been included as part of the functional unit.

The LCI and LCIA results in this EPD relates to the lifecycle of 1m3 of Subflooring made from Ribaplan.

Name	Value	Unit
Functional unit	1	m3
Cured Density	295	kg/m3
Conversion factor to 1 kg.	0,003	m3/kg
Uncured Density	310	Kg/m3
Reference Service Life	>50	Years
Compressive Strength	100	kN/m2
Minimal Application Thickness	30	Mm
Thermal Conductivity	0,047	W/m*K

PCR
This EPD is developed according to the core rules for the product category of construction products in EN 15804, and PCR EN16757 for concrete and concrete elements.

Guarantee of Origin – certificates

Foreground system:

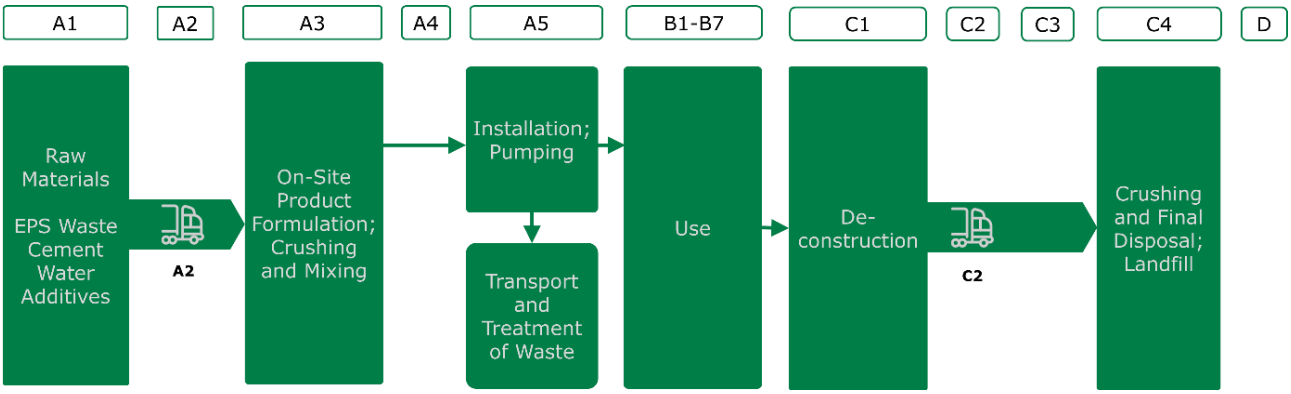
There are no "Guarantees of Origin" certificates used in the production.

Consumption of electricity is modelled with residual grid mix. Electricity is only used for crushing the EPS waste into a uniform size, pumping the concrete out during installation, as well as powering the jackhammer used in deconstruction at the end of the products lifecycle.

Background system:

Processes upstream and downstream from the production is modelled with processes from the GaBi background 2022.2, and Ecoinvent v3.8 databases, that are based on average data.

Flowdiagram



System boundary

This EPD is based on a cradle-to-grave LCA, in which over 99,9 weight-% has been accounted for.

The general rules for the exclusion of inputs and outputs follows the requirements in EN 15804, 6.3.5, where the total of neglected input flows per module shall be a maximum of 5 % of energy usage and mass and 1 % of energy usage and mass for unit processes.

The secondary material big-bags which the EPS waste arrives packed in are excluded from the assessment as they are reused many times and can be neglected in accordance with the above mentioned requirements.

Product stage (A1-A3) includes:

A1 – Extraction and processing of raw materials

A2 – Transport to the production site

A3 – Manufacturing processes

The product stage comprises the acquisition of all raw materials, and semi-finished goods, transport of these materials to production site, as well as the energy consumed by the manufacturing process. The LCA results are declared in aggregated form for the product stage, which means, that the sub-modules A1, A2 and A3 are declared as one module A1-A3.

The A2 module declares the transport of materials on to the production site which is also theconstruction site.

A3 Declares all impacts associated with activities in the formulation of the product which occurs on the construction site. This includes the consumption of electricity to crush EPS waste and diesel to power the pump trucks mixer, which formulates the raw materials into the final product.

Construction process stage (A4-A5) includes:

A4 includes transportation of the product to the construction site. However as the product is formulated on the construction site, there is no transport between site of production and site of installation. Therefore all transportation of raw materials to the site of production and construction is declared under module A2.

A5 module declares the installation of Ribaplan on the construction site. It therefore includes the consumption of diesel to drive the pump, which lays Ribaplan out, for subsequent hardening into concrete subfloor. This module also declares the impacts associated with cleaning out residual product from the pump truck, as well as the transport of this residual material and water to a depot to be landfilled as construction waste.

Production of auxiliary goods such as the broom used to disperse the product during installation, as well as the laser leveler used to maintain a level surface of the product were excluded from the assessment. The use of these tools in the scope of this assessment are not limited to a number of installations, the uncertainty of which is relatively high.

Use stage (B1-B7) includes:

Subflooring made from Ribaplan is designed to be used the entire RSL without the need for maintenance or cleaning, which is also supported by the PCR. The PCR does, however, make prescriptions for including carbonation, and emissions to indoor air, soil or water, however these are not relevant to concrete subflooring as it wouldn't be in contact with indoor air, soil, or water as it is sealed off by the rest of the flooring system.

End of Life (C1-C4) includes:

Module C1 Declares the impacts associated with deconstruction of the floor, which is carried out using an electric jackhammer. This breaks the floor into pieces which are subsequently collected as mixed demolition waste, and transported by truck (C2) to a waste processing plant which crushes the waste, before landfilling it (C4).

The material cannot currently be recycled as aggregate because of the EPS contained within the concrete. In accordance with the PCR, cement in the concrete will achieve 75% of the maximum theoretical carbon uptake via the process of carbonation during landfilling.

Re-use, recovery and recycling potential (D) includes:

No benefits are derived outside of the system, as the product reaches final disposal as construction waste on landfill.

LCA results

The LCIA results are calculated using GaBi 10.7 with database version 2022.2, and using the characterization model defined in GaBi as EN15804+A2 for classifying and characterizing input and output flows. In some instances supplementary data was sourced from the Ecoinvent 3.8 database.

ENVIRONMENTAL IMPACTS PER M³ OF RIBAPLAN 18 SUBFLOORING										
Parameter	**Unit**	**A1-A3**	**A4**	**A5**	**B1-B7**	**C1**	**C2**	**C3**	**C4**	**D**
GWP-total	[kg CO_2 eq.]	1,69E+02	0,00E+00	1,42E+00	0,00E+00	4,86E-02	6,22E+00	0,00E+00	-6,11E+01	0,00E+00
GWP-fossil	[kg CO_2 eq.]	1,68E+02	0,00E+00	1,40E+00	0,00E+00	4,86E-02	6,11E+00	0,00E+00	-6,10E+01	0,00E+00
GWP-biogenic	[kg CO_2 eq.]	5,55E-01	0,00E+00	1,67E-02	0,00E+00	-8,37E-09	7,37E-02	0,00E+00	-1,29E-01	0,00E+00
GWP-luluc	[kg CO_2 eq.]	8,72E-02	0,00E+00	9,34E-03	0,00E+00	3,44E-06	4,04E-02	0,00E+00	8,98E-03	0,00E+00
ODP	[kg CFC 11 eq.]	1,02E-06	0,00E+00	1,72E-13	0,00E+00	6,79E-13	6,03E-13	0,00E+00	1,04E-11	0,00E+00
AP	[mol H^+ eq.]	2,31E-01	0,00E+00	6,64E-02	0,00E+00	3,71E-05	1,78E-02	0,00E+00	3,13E-02	0,00E+00
EP-freshwater	[kg P eq.]	2,05E-03	0,00E+00	5,10E-06	0,00E+00	8,03E-09	2,15E-05	0,00E+00	7,92E-06	0,00E+00
EP-marine	[kg N eq.]	8,01E-02	0,00E+00	3,43E-02	0,00E+00	1,35E-05	5,61E-03	0,00E+00	8,03E-03	0,00E+00
EP-terrestrial	[mol N eq.]	8,68E-01	0,00E+00	3,77E-01	0,00E+00	1,45E-04	6,37E-02	0,00E+00	8,83E-02	0,00E+00
POCP	[kg NMVOC eq.]	2,33E-01	0,00E+00	9,75E-02	0,00E+00	3,70E-05	1,52E-02	0,00E+00	2,44E-02	0,00E+00
ADPm[1]	[kg Sb eq.]	5,84E-05	0,00E+00	1,41E-07	0,00E+00	1,20E-08	6,14E-07	0,00E+00	7,85E-07	0,00E+00
ADPf[1]	[MJ]	6,38E+02	0,00E+00	1,84E+01	0,00E+00	8,12E-01	8,17E+01	0,00E+00	5,93E+01	0,00E+00
WDP[1]	[m^3 world eq. deprived]	1,12E+01	0,00E+00	5,35E-01	0,00E+00	6,50E-04	6,75E-02	0,00E+00	4,93E-01	0,00E+00
Caption	GWP-total = Globale 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 = Ozone Depletion; AP = Acidifcation; EP-freshwater = Eutrophication – aquatic freshwater; EP-marine = Eutrophication – aquatic marine; EP-terrestrial = Eutrophication – terrestrial; POCP = Photochemical zone formation; ADPm = Abiotic Depletion Potential – minerals and metals; ADPf = Abiotic Depletion Potential – fossil fuels; WDP = water depletion potential									
	The numbers are declared in scientific notation, fx 1,95E+02. This number can also be written as: $1,95*10^2$ or 195, while 1,12E-11 is the same as $1,12*10^{-11}$ or 0,0000000000112.									
Disclaimer	[1] The results of this environmental indicator shall be used with care as the uncertainties on these results are high or as there is limited experienced with the indicator.									

ADDITIONAL ENVIRONMENTAL IMPACTS PER M³ OF RIBAPLAN 18 SUBFLOORING										
Parameter	**Unit**	**A1-A3**	**A4**	**A5**	**B1-B7**	**C1**	**C2**	**C3**	**C4**	**D**
PM	[Disease incidence]	4,51E-06	0,00E+00	1,36E-06	0,00E+00	4,14E-10	2,22E-07	0,00E+00	3,86E-07	0,00E+00
IRP[2]	[kBq U235 eq.]	2,61E+00	0,00E+00	5,40E-03	0,00E+00	1,05E-02	2,27E-02	0,00E+00	7,18E-02	0,00E+00
ETP-fw[1]	[CTUe]	3,18E+02	0,00E+00	1,36E+01	0,00E+00	1,87E-01	5,79E+01	0,00E+00	3,35E+01	0,00E+00
HTP-c[1]	[CTUh]	2,47E-08	0,00E+00	1,27E-08	0,00E+00	4,91E-12	1,19E-09	0,00E+00	4,96E-09	0,00E+00
HTP-nc[1]	[CTUh]	1,15E-06	0,00E+00	7,43E-08	0,00E+00	1,65E-10	6,50E-08	0,00E+00	5,47E-07	0,00E+00
SQP[1]	-	3,14E+02	0,00E+00	7,72E+00	0,00E+00	3,02E-02	3,33E+01	0,00E+00	1,27E+01	0,00E+00
Caption	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 = Soil Quality (dimensionless)									
	The numbers are declared in scientific notation, fx 1,95E+02. This number can also be written as: $1,95*10^2$ or 195, while 1,12E-11 is the same as $1,12*10^{-11}$ or 0,0000000000112.									
Disclaimers	[1] The results of this environmental 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 PER M³ OF RIBAPLAN 18 SUBFLOORING										
Parameter	**Unit**	**A1-A3**	**A4**	**A5**	**B1-B7**	**C1**	**C2**	**C3**	**C4**	**D**
PERE	[MJ]	1,92E+02	0,00E+00	1,90E+00	0,00E+00	2,10E-01	5,47E+00	0,00E+00	8,77E+00	0,00E+00
PERM	[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
PERT	[MJ]	1,92E+02	0,00E+00	1,90E+00	0,00E+00	2,10E-01	5,47E+00	0,00E+00	8,77E+00	0,00E+00
PENRE	[MJ]	1,56E+02	0,00E+00	2,74E+01	0,00E+00	8,12E-01	8,20E+01	0,00E+00	5,94E+01	0,00E+00
PENRM	[MJ]	4,73E+02	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
PENRT	[MJ]	6,30E+02	0,00E+00	2,74E+01	0,00E+00	8,12E-01	8,20E+01	0,00E+00	5,94E+01	0,00E+00
SM	[kg]	1,16E+01	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	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
FW	[m³]	3,35E-01	0,00E+00	1,43E-02	0,00E+00	1,23E-04	6,32E-03	0,00E+00	1,50E-02	0,00E+00
Caption	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 material; RSF = Use of renewable secondary fuels; NRSF = Use of non renewable secondary fuels; FW = Net use of fresh water									
	The numbers are declared in scientific notation, fx 1,95E+02. This number can also be written as: $1,95*10^{2}$ or 195, while 1,12E-11 is the same as $1,12*10^{-11}$ or 0,0000000000112.									

WASTE CATEGORIES AND OUTPUT FLOWS PER M³ OF RIBAPLAN 18 SUBFLOORING										
Parameter	**Unit**	**A1-A3**	**A4**	**A5**	**B1-B7**	**C1**	**C2**	**C3**	**C4**	**D**
HWD	[kg]	2,79E-08	0,00E+00	1,07E-10	0,00E+00	3,97E-11	4,30E-10	0,00E+00	2,97E-09	0,00E+00
NHWD	[kg]	1,76E+00	0,00E+00	9,08E-01	0,00E+00	2,96E-04	1,32E-02	0,00E+00	2,95E+02	0,00E+00
RWD	[kg]	1,80E-02	0,00E+00	3,63E-05	0,00E+00	9,49E-05	1,50E-04	0,00E+00	6,45E-04	0,00E+00
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	0,00E+00
MFR	[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	0,00E+00
MER	[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	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	0,00E+00
EET	[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
Caption	HWD = Hazardous waste disposed; NHWD = Non hazardous waste disposed; RWD = Radioactive waste disposed; CRU = Components for re-use; MFR = Materials for recycling; MER = Materials for energy recovery; EEE = Exported electrical energy; EET = Exported thermal energy									
	The numbers are declared in scientific notation, fx 1,95E+02. This number can also be written as: $1,95*10^{2}$ or 195, while 1,12E-11 is the same as $1,12*10^{-11}$ or 0,0000000000112.									

BIOGENIC CARBON CONTENT PER M³ OF RIBAPLAN 18 SUBFLOORING			
Parameter		**Unit**	**At the factory gate**
Biogenic carbon content in product		[kg C]	5,42E-01
Biogenic carbon content in accompanying packaging		[kg C]	0,00E+00
Note	1 kg biogenic carbon is equivalent to 44/12 kg of CO_2		

Additional information

LCA interpretation

The tables below show the processes contributing the most to the specific impact categories, and how much they contribute to the given environmental impact category.

The contributions (in percentages) are expressed relative to the total impacts, which is a result of both impacts (positive values) and savings from processes such as recycling and energy recovery (negative values).

ENVIRONMENTAL IMPACTS				
Impact Category	**Unit**	**Maximum contribution on category**	**Process**	**Percentage of category**
Climate Change - total	[kg CO_2 eq.]	1,56E+02	A1_Cement	66%
Climate Change, fossil	[kg CO_2 eq.]	1,56E+02	A1_Cement	66%
Climate Change, biogenic	[kg CO_2 eq.]	5,37E-01	A1_Cement	41%
Climate Change, land use and land use change	[kg CO_2 eq.]	4,04E-02	C2_Transport	28%
Ozone depletion	[kg CFC 11 eq.]	1,02E-06	A1_Rhiofin	100%
Acidification	[mol H^+ eq.]	1,25E-01	A1_Cement	36%
Eutrophication, freshwater	[kg PO_4 eq.]	1,95E-03	A1_Rhiofin	94%
Eutrophication, marine	[kg N eq.]	3,67E-02	A1_Cement	29%
Eutrophication, terrestrial	[mol N eq.]	3,99E-01	A1_Cement	29%
Photochemical ozone formation, human health	[kg NMVOC eq.]	1,10E-01	A1_Cement	30%
Resource use, mineral and metals	[kg Sb eq.]	5,01E-05	A1_Rhiofin	84%
Resource use, fossils	[MJ]	4,44E+02	A1_Cement	56%
Water use	[m^3]	4,96E+00	A1_Water	40%

Technical information on scenarios

Transport to the building site (A4)
Not applicable

Installation of the product in the building (A5)

Scenario information	Value	Unit
Water used for cleaning	12	kg
Diesel	16,1	MJ
Product lost as waste	0,9	kg
Output materials (Subflooring)	295	kg
Direct emissions to air, soil or water	113	kg
Water loss as vapor during curing	15,5	kg
CO2 uptake from carbonation of product loss	0,19	kg

Reference service life

RSL information		Unit
Reference service Life	>50	Years
Declared product properties	Further technical information can be obtained by contacting the manufacturer or on the manufacturer's website: http://www.ribaplan.dk/	As appropriate
Design application parameters		As appropriate
Assumed quality of work		As appropriate
Outdoor environment		As appropriate

Indoor environment		As appropriate
Usage conditions		As appropriate
Maintenance		As appropriate

Use (B1-B7)

In accordance with EN16757:2017, Subflooring does not have any impacts associated with its use phase that can be declared in B1-B7.

End of life (C1-C4)

Scenario information	Value	Unit
Collected separately	-	kg
Collected with mixed waste	295	kg
For reuse	-	kg
For recycling	-	kg
For energy recovery	-	kg
For final disposal	295	kg
CO2uptake form Carbonation	65,5	kg

Re-use, recovery and recycling potential (D)

No benefits are derived outside of the system, as the product reaches final disposal as construction waste on landfill.

Indoor air

The EPD does not give information on release of dangerous substances to indoor air because the horizontal standards on the relevant measurements are not available. Read more in EN15804+A1 chapter 7.4.1.

Soil and water

The EPD does not give information on release of dangerous substances to soil and water because the horizontal standards on the relevant measurements are not available. Read more in EN15804+A1 chapter 7.4.2.

References

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General program instructions
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EN 15804
DS/EN 15804 + A2:2019 – "Sustainability of construction works – Environmental product declarations – Core rules for the product category of construction products"
Based on EF 3,1

EN 16757
EN 16757:2022 – "Product Category Rules for concrete and concrete elements"

EN 15942
DS/EN 15942:2011 – "Sustainability of construction works – Environmental product declarations – Communication format business-to-business"

ISO 14025
DS/EN ISO 14025:2010 – "Environmental labels and declarations – Type III environmental declarations – Principles and procedures"

ISO 14040
DS/EN ISO 14040:2008 – "Environmental management – Life cycle assessment – Principles and framework"

ISO 14044
DS/EN ISO 14044:2008 – "Environmental management – Life cycle assessment – Requirements and guidelines"