EPD-samling for Isovarm preisolerte rørsystem

MILJØDOKUMENTASJON

PIPELIFE

wienerberger

EPD-samling for Isovarm preisolerte rørsystem

Om dokumentet

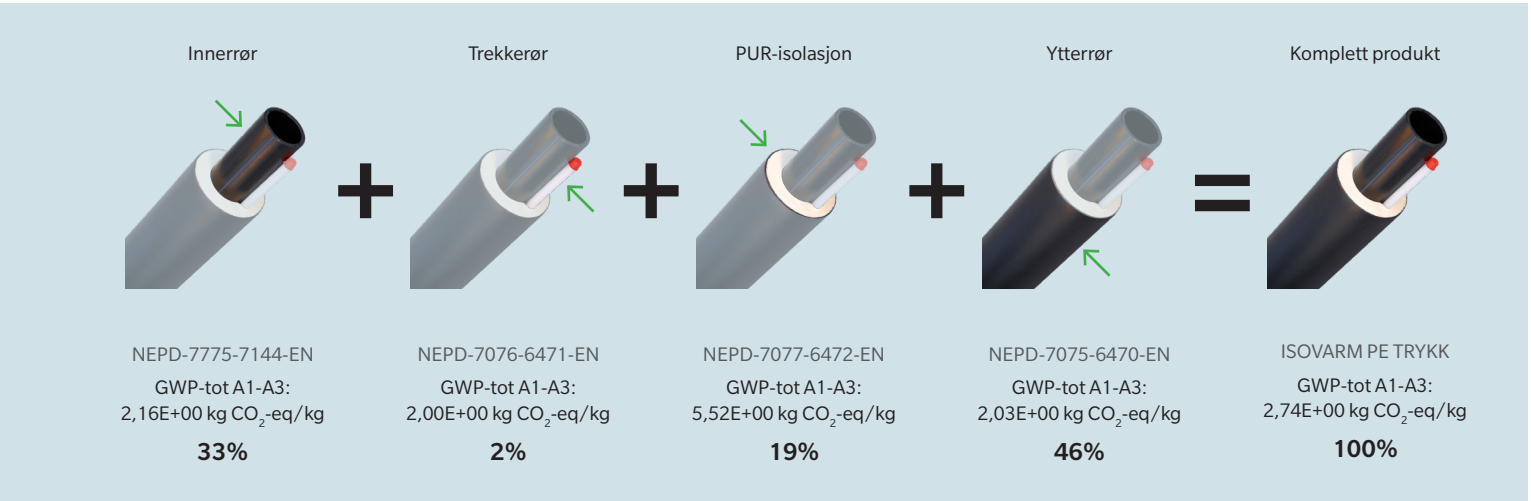
Dette dokumentet inneholder EPD-er som er aktuell for Isovarm. Samtlige EPD-er er godkjent og publisert av programoperatør EPD-Norge.

Pipelife har valgt å lage EPD-er for produktgrupper, i stedet for enkeltprodukter. De aller fleste av våre produkter tilhører en enkelt EPD, og samme EPD kan brukes for en hel produktgruppe. Dette fordi vi benytter deklarert enhet på 1 kg.

For noen av våre mer sammensatte produkter, slik som Isovarm, trengs det mer enn en enkelt EPD for å dekke en produktgruppe. Dette fordi mengde av de ulike rørene og isolasjon ikke skalerer lineært.

I vår produktkatalog, samt bransjeløsninger for produktinformasjon, finner du utvalgte EPD-data ferdig utregnet til enhver salgsartikkel. I Cobuilder Supply finnes komplette maskinlesbare EPD-data etter NS EN-ISO 22057. Utregningene er gjort slik illustrert på figuren under.

Prinsipp for utregning:



EPD-er i denne samlingen:

#	Beskrivelse	EPD navn	EPD reg.nr
1	**PE rørsystemer fra Ringebu**	Component EPD Ringebu: Extruded PE pipe systems from Ringebu - used as material component in various finished mixed products	NEPD-7075-6470-EN
2	**PP rørsystemer fra Ringebu**	Component EPD Ringebu: Extruded PP tracer pipes from Ringebu - used as material component in various finished mixed products	NEPD-7076-6471-EN
3	**PUR-isolasjon fra Ringebu**	Component EPD Ringebu: PUR foam insulation from Ringebu - used as material component in various finished mixed products	NEPD-7077-6472-EN
4	**PP rørdeler fra Surnadal**	Component EPD Ringebu: Injection moulded PP fittings and gullies from Surnadal - used as material component in various finished mixed products	NEPD-7772-7150-EN
5	**PP rørsystemer fra Surnadal**	Component EPD Ringebu: Extruded PP pipe systems from Surnadal - used as material component in various finished mixed products	NEPD-7773-7146-EN
6	**PVC-U rørsystemer fra Surnadal**	Component EPD Ringebu: Extruded PVC-U pipe systems from Surnadal - used as material component in various finished mixed products	NEPD-12947-14188
5	**PE rørsystemer fra Stathelle**	Component EPD Ringebu: Extruded PE pipe systems from Stathelle - used as material component in various finished mixed products	NEPD-7775-7144-EN

epd-norge
Global program operatør

Environmental product declaration

in accordance with ISO 14025 and EN 15804+A2

Component EPD Ringebu: Extruded PE pipe systems from Ringebu - used as material component in various finished mixed products

PIPELIFE

The Norwegian EPD Foundation

Owner of the declaration:
Pipelife Norge AS

Product:
Component EPD Ringebu: Extruded PE pipe systems from Ringebu - used as material component in various finished mixed products

Declared unit:
1 kg

This declaration is based on Product Category Rules:
CEN Standard EN 15804:2012+A2:2019 serves as core PCR
NPCR Part A: Construction products and services. Ver. 2.0 March 2021

Program operator:
The Norwegian EPD Foundation

Declaration number:

NEPD-7075-6470-EN

Registration number:

NEPD-7075-6470-EN

Issue date: 08.07.2024

Valid to: 08.07.2029

EPD software:
LCAno EPD generator ID: 429099

General information

Product

Component EPD Ringebu: Extruded PE pipe systems from Ringebu - used as material component in various finished mixed products

Owner of the declaration:

Pipelife Norge AS
Contact person: Are Lyubråten
Phone: +47 71 65 88 00
e-mail: are.lyubraten@pipelife.com

Program operator:

The Norwegian EPD Foundation
Post Box 5250 Majorstuen, 0303 Oslo, Norway
Phone: +47 977 22 020
web: www.epd-norge.no

Manufacturer:

Pipelife Norge AS
Hamnesvegen 97
6650 Surnadal, Norway

Declaration number:

NEPD-7075-6470-EN

Place of production:

Pipelife Norge AS - Ringebu
Flyplassvegen 16
2630 Ringebu, Norway

This declaration is based on Product Category Rules:

CEN Standard EN 15804:2012+A2:2019 serves as core PCR
NPCR Part A: Construction products and services. Ver. 2.0 March 2021

Management system:

NS-EN ISO 9001:2015 NS-EN ISO 14001:2015

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.

Organisation no:

980 457 575

Declared unit:

1 kg Component EPD Ringebu: Extruded PE pipe systems from Ringebu - used as material component in various finished mixed products

Issue date:

08.07.2024

Declared unit (cradle to gate) with option:

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

Valid to:

08.07.2029

Year of study:

2022

Functional unit:

Not applicable

Comparability:

EPD of construction products may not be comparable if they not comply with EN 15804+A2 and seen in a construction context.

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

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. NEPDT15

Developer of EPD: Diana Karin Schleider

Reviewer of company-specific input data and EPD: Are Lyubråten

Verification of EPD tool:

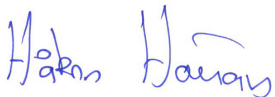
Independent third party verification of the EPD tool, background data and test-EPD in accordance with EPDNorway's procedures and guidelines for verification and approval of EPD tools.

Third party verifier:

Michael M. Jenssen, Asplan Viak AS

(no signature required)

Approved:



Håkon Hauan
Managing Director of EPD-Norway

Product

Product description:

PE 100 pipes, fittings and chambers made from PE 100 pipes for water supply and sewers under pressure; non-pressure drains, sewers, surface water piping systems and jacket pipes (smooth casings), as well as HDPE pipes for cable protection, jacket pipes (corrugated casings) and fiber cable pipes.
The colours are according to the product standards and the colour codes for these applications in Norway.
This EPD covers both finished products and products as material components, intended for use in various finished mixed products as e.g. flexible piping systems with or without integrated frost protection, pre-insulated piping systems, etc..
More information is found on www.pipelife.no

Product specification

The products covered by this EPD have small variations in composition and are manufactured with the same type of equipment. The composition below represents an average for these products manufactured in 2022.

Materials	kg	%
Polyethylene (HDPE)	0,93	99,96
Tape	0,00	0,04
Total	0,93	100,00

Packaging	kg	%
Packaging - Plastic	0,02	29,24
Packaging - Wood	0,05	70,76
Total incl. packaging	1,00	100,00

Technical data:

For products covered by this EPD the following applies:
Products used as media pipes for water supply, sewers, drains and surface water fullfill the requirements in accordance with EN 12201 (Nordic Poly Mark). Pipes intended for drinking water are also approved according to the Danish requirements (DK-VAND).
Single-walled corrugated pipes for land drainage fullfill the requirements in accordance with NS 3065 (NS marking).
Double-walled corrugated pipes in coils used for cable protection fullfill the requirements in accordance with NEK-EN 61386-1 and -24.
Smooth-walled pipes used for fiber cables fullfill the requirements in accordance with prNS 2967.
For technical information, see our handbook:
https://www.pipelife.no/content/dam/pipelife/norway/marketing/general/r%C3%B8rh%C3%A5ndboka/r%C3%B8rh%C3%A5ndboka2021/M-Materialdata.pdf

Market:

Mainly Norway, but also the Nordic countries.

Reference service life, product

When installed according to the relevant installation manual, used according to product spesifications and having normal operations, the service lifetime is at least 100 years.

Reference service life, building

Not relevant

LCA: Calculation rules

Declared unit:

1 kg Component EPD Ringebu: Extruded PE pipe systems from Ringebu - used as material component in various finished mixed products

Cut-off criteria:

All raw materials and all the essential energy are included.

Allocation:

The allocation is made in accordance with the provisions of EN 15804. Incoming energy and waste production in-house is allocated equally among all products manufactured at Ringebu from raw materials, through mass allocation. The Ringebu factory has its own water supply. Water is not consumed, it is used for cooling and then returned to natural flows. 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.

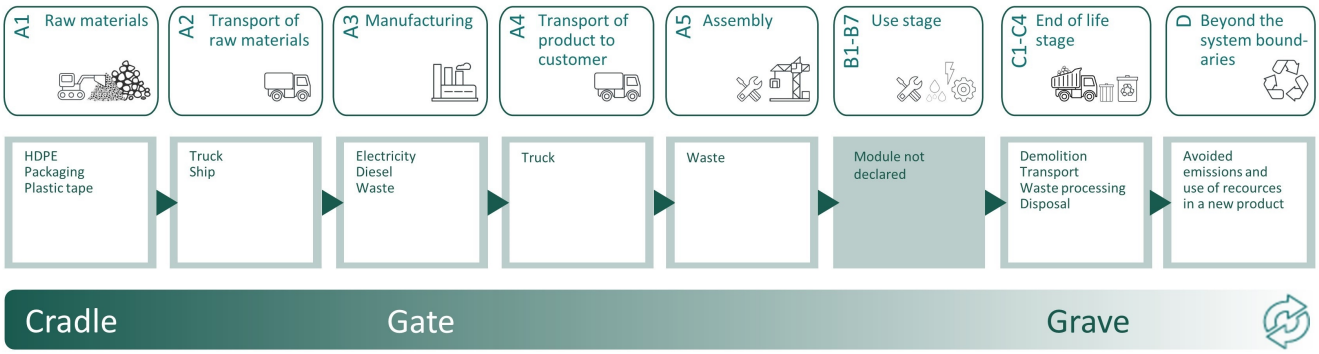
Materials	Source	Data quality	Year
Packaging - Plastic	ecoinvent 3.6	Database	2019
Packaging - Wood	ecoinvent 3.6	Database	2019
Polyethylene (HDPE)	ecoinvent 3.6	Database	2019
Tape	ecoinvent 3.6	Database	2019

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:

The analysis is a cradle-to-gate (A1 - A3) study, with option A4 transport to market. It includes the extraction and production of raw materials, transportation to the production site, the production process itself and transport to the market. A5, installation, is included for the transport of packaging waste from the construction site and the treatment of this waste - not the installation of the products.



Additional technical information:

Professionally executed design, storage, handling, installation and operations are a precondition for a long service life. The installation instructions must be followed.
Pipelife Norway AS is certified according to EN ISO 14001:2015
See www.pipelife.no for more information on how we are working on environmental issues.

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)
Truck, 16-32 tonnes, EURO 6 (km)	36,7 %	100	0,043	l/tkm	4,30

Assembly (A5)	Unit	Value			
Waste, hazardous waste, to average treatment (kg)	kg	0,00			
Waste, packaging, plastic film (LDPE), to average treatment - A5 including transport (kg)	kg	0,02			
Waste, packaging, wood to average treatment - A5 including transp. (kg)	kg	0,05			

Waste processing (C3)	Unit	Value			
Waste treatment of polyethylene (PE), incineration with energy recovery and fly ash extraction (kg)	kg	0,46			

Disposal (C4)	Unit	Value			
Landfilling of ashes from incineration of Polyethylene (PE), process per kg ashes and residues (kg)	kg	0,02			
Landfilling of plastic mixture (kg)	kg	0,46			

Benefits and loads beyond the system boundaries (D)	Unit	Value			
Substitution of electricity, in Norway (MJ)	MJ	0,90			
Substitution of thermal energy, district heating, in Norway (MJ)	MJ	13,63			

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	2,03E+00	1,63E-02	7,94E-02	0	0	1,40E+00	5,40E-02	-8,19E-02
	GWP-fossil	kg CO_2 -eq	2,09E+00	1,63E-02	3,21E-03	0	0	1,40E+00	5,40E-02	-7,90E-02
	GWP-biogenic	kg CO_2 -eq	-6,38E-02	6,76E-06	7,62E-02	0	0	1,13E-05	5,21E-06	-1,63E-04
	GWP-luluc	kg CO_2 -eq	1,09E-03	5,81E-06	8,82E-07	0	0	1,66E-06	1,17E-06	-2,72E-03
	ODP	kg CFC11 -eq	7,41E-08	3,70E-09	3,36E-10	0	0	1,07E-09	1,55E-09	-5,76E-03
	AP	mol H+ -eq	8,12E-03	4,69E-05	1,33E-05	0	0	1,75E-04	3,91E-05	-6,51E-04
	EP-FreshWater	kg P -eq	3,97E-05	1,31E-07	2,58E-08	0	0	1,07E-07	5,99E-08	-7,02E-06
	EP-Marine	kg N -eq	1,47E-03	9,29E-06	6,58E-06	0	0	8,42E-05	6,90E-05	-2,13E-04
	EP-Terrestial	mol N -eq	1,64E-02	1,04E-04	5,80E-05	0	0	9,11E-04	1,54E-04	-2,30E-03
	POCP	kg NMVOC -eq	7,39E-03	3,98E-05	1,55E-05	0	0	2,18E-04	5,51E-05	-6,35E-04
	ADP-minerals&metals[1]	kg Sb-eq	2,31E-05	4,51E-07	3,15E-08	0	0	4,91E-08	4,01E-08	-7,86E-07
	ADP-fossil[1]	MJ	6,97E+01	2,47E-01	2,38E-02	0	0	9,17E-02	1,15E-01	-1,13E+00
	WDP[1]	m^3	2,04E+02	2,39E-01	5,21E-02	0	0	2,08E-01	9,86E-01	-1,41E+01

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

Mechanical recycling of PE is very sustainable and in line with the circular economy. Scrap and used products should be collected for recycling.

Additional environmental impact indicators										
Indicator		**Unit**	A1-A3	A4	A5	C1	C2	C3	C4	D
	PM	Disease incidence	7,12E-08	1,00E-09	1,76E-10	0	0	6,88E-10	7,66E-10	-3,94E-08
	IRP[2]	kgBq U235 -eq	6,56E-02	1,08E-03	9,23E-05	0	0	1,55E-04	5,54E-04	-7,22E-03
	ETP-fw[1]	CTUe	1,54E+01	1,83E-01	2,94E-02	0	0	2,74E-01	1,43E-01	-6,15E+00
	HTP-c[1]	CTUh	7,05E-10	0,00E+00	2,00E-12	0	0	3,10E-11	4,00E-12	-1,12E-10
	HTP-nc[1]	CTUh	1,69E-08	2,00E-10	1,05E-10	0	0	1,18E-09	1,10E-10	-5,89E-09
	SQP[1]	dimensionless	6,71E+00	1,73E-01	2,22E-02	0	0	1,11E-02	4,26E-01	-7,56E+00

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)

"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	1,17E+01	3,54E-03	7,96E-04	0	0	2,69E-03	5,41E-03	-6,98E+00
	PERM	MJ	6,98E-01	0,00E+00	-6,98E-01	0	0	0,00E+00	0,00E+00	0,00E+00
	PERT	MJ	1,24E+01	3,54E-03	-6,97E-01	0	0	2,69E-03	5,41E-03	-6,98E+00
	PENRE	MJ	3,22E+01	2,47E-01	2,38E-02	0	0	9,17E-02	1,15E-01	-1,13E+00
	PENRM	MJ	4,03E+01	0,00E+00	-8,76E-01	0	0	0,00E+00	0,00E+00	0,00E+00
	PENRT	MJ	7,25E+01	2,47E-01	-8,52E-01	0	0	9,17E-02	1,15E-01	-1,13E+00
	SM	kg	3,30E-04	0,00E+00	0,00E+00	0	0	0,00E+00	0,00E+00	0,00E+00
	RSF	MJ	7,65E-02	1,26E-04	1,74E-05	0	0	7,59E-05	1,14E-04	-1,22E-03
	NRSF	MJ	3,06E-02	4,52E-04	1,56E-04	0	0	0,00E+00	1,83E-03	-4,14E-01
	FW	m^3	9,58E-02	2,64E-05	1,60E-05	0	0	2,59E-04	1,40E-04	-8,41E-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	1,07E-02	1,27E-05	1,94E-04	0	0	0,00E+00	1,39E-02	-5,31E-05
	NHWD	kg	1,70E-01	1,20E-02	7,06E-02	0	0	0,00E+00	4,73E-01	-2,67E-02
	RWD	kg	5,70E-05	1,68E-06	5,80E-09	0	0	0,00E+00	7,52E-07	-5,92E-06

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	0	0,00E+00	0,00E+00	0,00E+00
	MFR	kg	8,26E-02	0,00E+00	1,06E-02	0	0	0,00E+00	4,17E-05	0,00E+00
	MER	kg	3,10E-02	0,00E+00	5,00E-02	0	0	4,65E-01	1,02E-06	0,00E+00
	EEE	MJ	2,63E-02	0,00E+00	3,47E-02	0	0	9,01E-01	6,61E-05	0,00E+00
	EET	MJ	3,97E-01	0,00E+00	5,25E-01	0	0	1,36E+01	1,00E-03	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	0,00E+00
Biogenic carbon content in accompanying packaging	kg C	2,08E-02

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	Source	Amount	Unit
Electricity, Norway (kWh)	ecoinvent 3.6	24,33	g CO2-eq/kWh

Dangerous substances

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

Indoor environment

Not relevant

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	2,00E+00	1,63E-02	3,17E-03	0	0	1,40E+00	5,40E-02	-8,07E-02

GWP-IOBC: 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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ISO 21930:2017 Sustainability in buildings and civil engineering works - Core rules for environmental product declarations of construction products.
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Vold, et al., (2019) EPD generator for Pipelife - Background information for customer application and LCA data. report number 08.19
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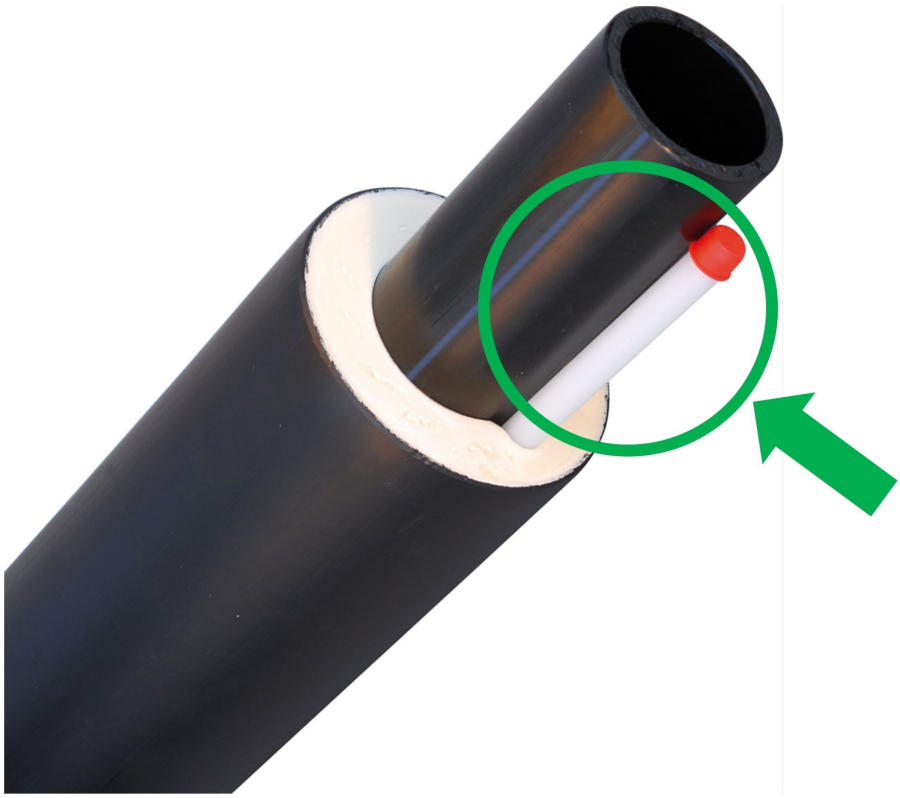
ECO PLATFORM EPD VERIFIED	ECO Platform ECO Portal	web: www.eco-platform.org web: ECO Portal

epd-norge
Global program operatør

Environmental product declaration

in accordance with ISO 14025 and EN 15804+A2

Component EPD Ringebu: Extruded PP tracer pipes from Ringebu - used as material component in various finished mixed products



PIPELIFE

The Norwegian EPD Foundation

Owner of the declaration:
Pipelife Norge AS

Product:
Component EPD Ringebu: Extruded PP tracer pipes from Ringebu - used as material component in various finished mixed products

Declared unit:
1 kg

This declaration is based on Product Category Rules:
CEN Standard EN 15804:2012+A2:2019 serves as core PCR
NPCR Part A: Construction products and services. Ver. 2.0 March 2021

Program operator:
The Norwegian EPD Foundation

Declaration number:

NEPD-7076-6471-EN

Registration number:

NEPD-7076-6471-EN

Issue date: 08.07.2024

Valid to: 08.07.2029

EPD software:
LCAno EPD generator ID: 442180

General information

Product

Component EPD Ringebu: Extruded PP tracer pipes from Ringebu - used as material component in various finished mixed products

Owner of the declaration:

Pipelife Norge AS
Contact person: Are Lyubråten
Phone: +47 71 65 88 00
e-mail: are.lyubraten@pipelife.com

Program operator:

The Norwegian EPD Foundation
Post Box 5250 Majorstuen, 0303 Oslo, Norway
Phone: +47 977 22 020
web: www.epd-norge.no

Manufacturer:

Pipelife Norge AS
Hamnesvegen 97
6650 Surnadal, Norway

Declaration number:

NEPD-7076-6471-EN

Place of production:

Pipelife Norge AS - Ringebu
Flyplassvegen 16
2630 Ringebu, Norway

This declaration is based on Product Category Rules:

CEN Standard EN 15804:2012+A2:2019 serves as core PCR
NPCR Part A: Construction products and services. Ver. 2.0 March 2021

Management system:

NS-EN ISO 9001:2015 NS-EN ISO 14001:2015

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.

Organisation no:

980 457 575

Declared unit:

1 kg Component EPD Ringebu: Extruded PP tracer pipes from Ringebu - used as material component in various finished mixed products

Issue date:

08.07.2024

Declared unit (cradle to gate) with option:

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

Valid to:

08.07.2029

Year of study:

2022

Functional unit:

Not applicable

Comparability:

EPD of construction products may not be comparable if they not comply with EN 15804+A2 and seen in a construction context.

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

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. NEPDT15

Developer of EPD: Diana Karin Schleider

Reviewer of company-specific input data and EPD: Are Lyubråten

Verification of EPD tool:

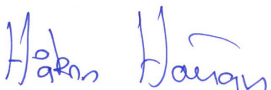
Independent third party verification of the EPD tool, background data and test-EPD in accordance with EPDNorway's procedures and guidelines for verification and approval of EPD tools.

Third party verifier:

Michael M. Jenssen, Asplan Viak AS

(no signature required)

Approved:



Håkon Hauan
Managing Director of EPD-Norway

Product

Product description:

PP pipes most commonly used as tracer pipes for installing of e.g. heating cables, other pipes, etc..
This EPD covers products as material components, intended for use in various finished mixed products as e.g. pre-insulated piping systems, etc..
More information is found on www.pipelife.no

Product specification

The products covered by this EPD have small variations in composition and are manufactured with the same type of equipment. The composition below represents an average for these products manufactured in 2022.

Materials	kg	%
Tape	0,00	0,04
Polypropylene (PP)	0,93	99,96
Total	0,93	100,00

Packaging	kg	%
Packaging - Plastic	0,02	29,24
Packaging - Wood	0,05	70,76
Total incl. packaging	1,00	100,00

Technical data:

For technical information, see our handbook:
https://www.pipelife.no/content/dam/pipelife/norway/marketing/general/r%C3%B8rh%C3%A5ndboka/r%C3%B8rh%C3%A5ndboka2021/M-Materialdata.pdf

Market:

Mainly Norway, but also the Nordic countries.

Reference service life, product

When installed according to the relevant installation manual, used according to product spesifications and having normal operations, the service lifetime is at least 100 years.

Reference service life, building

Not relevant

LCA: Calculation rules

Declared unit:

1 kg Component EPD Ringebu: Extruded PP tracer pipes from Ringebu - used as material component in various finished mixed products

Cut-off criteria:

All raw materials and all the essential energy are included.

Allocation:

The allocation is made in accordance with the provisions of EN 15804. Incoming energy and waste production in-house is allocated equally among all products manufactured at Ringebu from raw materials, through mass allocation. The Ringebu factory has its own water supply. Water is not consumed, it is used for cooling and then returned to natural flows. 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.

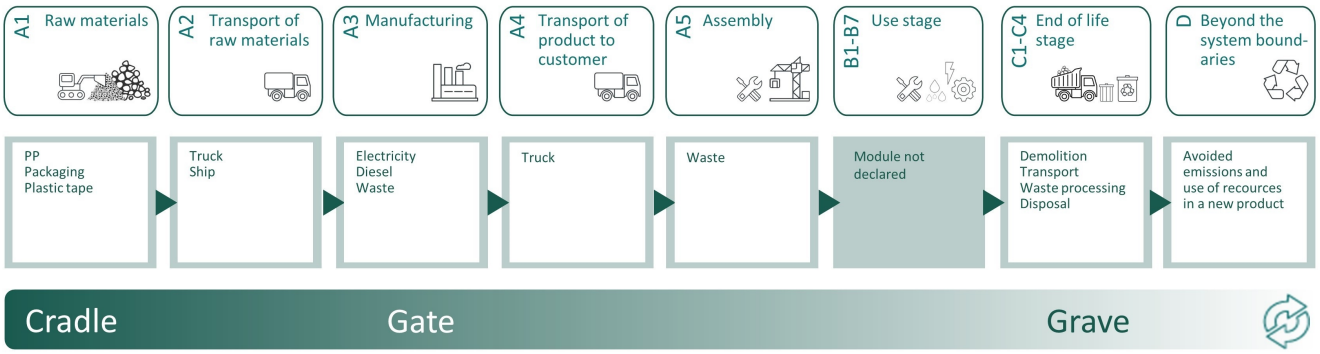
Materials	Source	Data quality	Year
Packaging - Plastic	ecoinvent 3.6	Database	2019
Packaging - Wood	ecoinvent 3.6	Database	2019
Polypropylene (PP)	ecoinvent 3.6	Database	2019
Tape	ecoinvent 3.6	Database	2019

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:

The analysis is a cradle-to-gate (A1 - A3) study, with option A4 transport to market. It includes the extraction and production of raw materials, transportation to the production site, the production process itself and transport to the market. A5, installation, is included for the transport of packaging waste from the construction site and the treatment of this waste - not the installation of the products.



Additional technical information:

Professionally executed design, storage, handling, installation and operations are a precondition for a long service life. The installation instructions must be followed.
Pipelife Norway AS is certified according to EN ISO 14001:2015
See www.pipelife.no for more information on how we are working on environmental issues.

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)
Truck, 16-32 tonnes, EURO 6 (km)	36,7 %	100	0,043	l/tkm	4,30

Assembly (A5)	Unit	Value			
Waste, hazardous waste, to average treatment (kg)	kg	0,00			
Waste, packaging, plastic film (LDPE), to average treatment - A5 including transport (kg)	kg	0,02			
Waste, packaging, wood to average treatment - A5 including transp. (kg)	kg	0,05			

Waste processing (C3)	Unit	Value			
Waste treatment of polypropylene (PP), incineration with energy recovery and fly ash extraction (kg)	kg	0,46			

Disposal (C4)	Unit	Value			
Landfilling of ashes from incineration of Polypropylene (PP), process per kg ashes and residues (kg)	kg	0,01			
Landfilling of plastic mixture (kg)	kg	0,46			

Benefits and loads beyond the system boundaries (D)	Unit	Value			
Substitution of electricity, in Norway (MJ)	MJ	0,76			
Substitution of thermal energy, district heating, in Norway (MJ)	MJ	11,44			

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	2,00E+00	1,63E-02	7,94E-02	0	0	1,18E+00	5,38E-02	-6,87E-02
	GWP-fossil	kg CO_2 -eq	2,07E+00	1,63E-02	3,21E-03	0	0	1,18E+00	5,38E-02	-6,63E-02
	GWP-biogenic	kg CO_2 -eq	-6,51E-02	6,76E-06	7,62E-02	0	0	9,77E-06	5,13E-06	-1,37E-04
	GWP-luluc	kg CO_2 -eq	9,63E-04	5,81E-06	8,82E-07	0	0	1,49E-06	1,15E-06	-2,28E-03
	ODP	kg CFC11 -eq	5,47E-08	3,70E-09	3,36E-10	0	0	9,31E-10	1,53E-09	-4,83E-03
	AP	mol H+ -eq	7,80E-03	4,69E-05	1,33E-05	0	0	1,49E-04	3,86E-05	-5,46E-04
	EP-FreshWater	kg P -eq	3,39E-05	1,31E-07	2,58E-08	0	0	9,94E-08	5,80E-08	-5,89E-06
	EP-Marine	kg N -eq	1,39E-03	9,29E-06	6,58E-06	0	0	7,14E-05	6,89E-05	-1,79E-04
	EP-Terrestial	mol N -eq	1,54E-02	1,04E-04	5,80E-05	0	0	7,72E-04	1,53E-04	-1,93E-03
	POCP	kg NMVOC -eq	6,81E-03	3,98E-05	1,55E-05	0	0	1,86E-04	5,47E-05	-5,33E-04
	ADP-minerals&metals[1]	kg Sb-eq	2,20E-05	4,51E-07	3,15E-08	0	0	4,34E-08	3,93E-08	-6,60E-07
	ADP-fossil[1]	MJ	7,06E+01	2,47E-01	2,38E-02	0	0	8,02E-02	1,14E-01	-9,49E-01
	WDP[1]	m^3	1,89E+02	2,39E-01	5,21E-02	0	0	1,87E-01	9,73E-01	-1,18E+01

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

Mechanical recycling of PP is very sustainable and in line with the circular economy. Scrap and used products should be collected for recycling.

Additional environmental impact indicators										
Indicator		Unit	A1-A3	A4	A5	C1	C2	C3	C4	D
	PM	Disease incidence	7,11E-08	1,00E-09	1,76E-10	0	0	6,99E-10	7,60E-10	-3,31E-08
	IRP[2]	kgBq U235 -eq	5,42E-02	1,08E-03	9,23E-05	0	0	1,40E-04	5,48E-04	-6,06E-03
	ETP-fw[1]	CTUe	1,36E+01	1,83E-01	2,94E-02	0	0	2,37E-01	1,41E-01	-5,16E+00
	HTP-c[1]	CTUh	5,77E-10	0,00E+00	2,00E-12	0	0	2,70E-11	4,00E-12	-9,40E-11
	HTP-nc[1]	CTUh	1,61E-08	2,00E-10	1,05E-10	0	0	1,01E-09	1,06E-10	-4,95E-09
	SQP[1]	dimensionless	6,35E+00	1,73E-01	2,22E-02	0	0	1,01E-02	4,23E-01	-6,34E+00

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)

"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	1,15E+01	3,54E-03	7,96E-04	0	0	2,43E-03	5,34E-03	-5,86E+00
	PERM	MJ	6,98E-01	0,00E+00	-6,98E-01	0	0	0,00E+00	0,00E+00	0,00E+00
	PERT	MJ	1,22E+01	3,54E-03	-6,97E-01	0	0	2,43E-03	5,34E-03	-5,86E+00
	PENRE	MJ	4,18E+01	2,47E-01	2,38E-02	0	0	8,02E-02	1,14E-01	-9,48E-01
	PENRM	MJ	3,13E+01	0,00E+00	-8,76E-01	0	0	0,00E+00	0,00E+00	0,00E+00
	PENRT	MJ	7,32E+01	2,47E-01	-8,52E-01	0	0	8,02E-02	1,14E-01	-9,48E-01
	SM	kg	3,30E-04	0,00E+00	0,00E+00	0	0	0,00E+00	0,00E+00	0,00E+00
	RSF	MJ	6,28E-02	1,26E-04	1,74E-05	0	0	6,70E-05	1,12E-04	-1,03E-03
	NRSF	MJ	2,75E-02	4,52E-04	1,56E-04	0	0	0,00E+00	1,83E-03	-3,47E-01
	FW	m^3	9,25E-02	2,64E-05	1,60E-05	0	0	2,21E-04	1,39E-04	-7,06E-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	1,05E-02	1,27E-05	1,94E-04	0	0	0,00E+00	1,17E-02	-4,46E-05
	NHWD	kg	1,67E-01	1,20E-02	7,06E-02	0	0	0,00E+00	4,72E-01	-2,24E-02
	RWD	kg	4,54E-05	1,68E-06	5,80E-09	0	0	0,00E+00	7,45E-07	-4,97E-06

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	0	0,00E+00	0,00E+00	0,00E+00
	MFR	kg	8,26E-02	0,00E+00	1,06E-02	0	0	0,00E+00	4,17E-05	0,00E+00
	MER	kg	3,10E-02	0,00E+00	5,00E-02	0	0	4,65E-01	1,02E-06	0,00E+00
	EEE	MJ	2,63E-02	0,00E+00	3,47E-02	0	0	7,56E-01	6,61E-05	0,00E+00
	EET	MJ	3,97E-01	0,00E+00	5,25E-01	0	0	1,14E+01	1,00E-03	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	0,00E+00
Biogenic carbon content in accompanying packaging	kg C	2,08E-02

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	Source	Amount	Unit
Electricity, Norway (kWh)	ecoinvent 3.6	24,33	g CO2-eq/kWh

Dangerous substances

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

Indoor environment

Not relevant

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	1,96E+00	1,63E-02	3,17E-03	0	0	1,18E+00	5,39E-02	-6,77E-02

GWP-IOBC: 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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ISO 21930:2017 Sustainability in buildings and civil engineering works - Core rules for environmental product declarations of construction products.
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NPCR Part A: Construction products and services. Ver. 2.0. March 2021, EPD-Norge.

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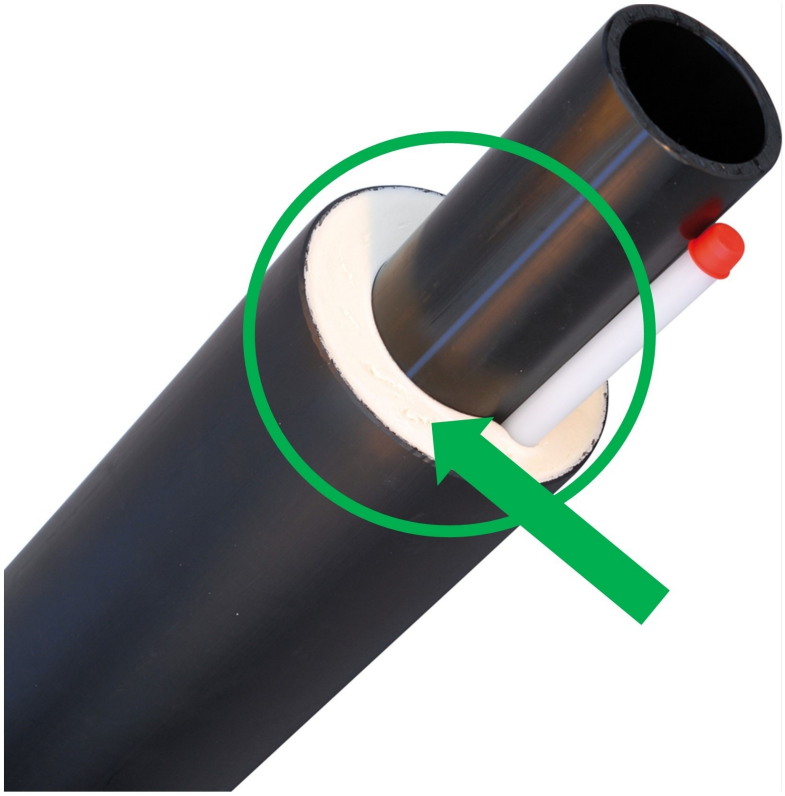
ECO PLATFORM EPD VERIFIED	ECO Platform ECO Portal	web: www.eco-platform.org web: ECO Portal

epd-norge
Global program operatør

Environmental product declaration

in accordance with ISO 14025 and EN 15804+A2

Component EPD Ringebu: PUR foam insulation from Ringebu - used as material component in various finished mixed products



PIPELIFE

The Norwegian EPD Foundation

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Pipelife Norge AS

Product:
Component EPD Ringebu: PUR foam insulation from Ringebu - used as material component in various finished mixed products

Declared unit:
1 kg

This declaration is based on Product Category Rules:
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NPCR Part A: Construction products and services. Ver. 2.0 March 2021

Program operator:
The Norwegian EPD Foundation

Declaration number:

NEPD-7077-6472-EN

Registration number:

NEPD-7077-6472-EN

Issue date: 08.07.2024

Valid to: 08.07.2029

EPD software:
LCAno EPD generator ID: 442918

General information

Product

Component EPD Ringebu: PUR foam insulation from Ringebu - used as material component in various finished mixed products

Owner of the declaration:

Pipelife Norge AS
Contact person: Are Lyubråten
Phone: +47 71 65 88 00
e-mail: are.lyubraten@pipelife.com

Program operator:

The Norwegian EPD Foundation
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Phone: +47 977 22 020
web: www.epd-norge.no

Manufacturer:

Pipelife Norge AS
Hamnesvegen 97
6650 Surnadal, Norway

Declaration number:

NEPD-7077-6472-EN

Place of production:

Pipelife Norge AS - Ringebu
Flyplassvegen 16
2630 Ringebu, Norway

This declaration is based on Product Category Rules:

CEN Standard EN 15804:2012+A2:2019 serves as core PCR
NPCR Part A: Construction products and services. Ver. 2.0 March 2021

Management system:

NS-EN ISO 9001:2015 NS-EN ISO 14001:2015

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.

Organisation no:

980 457 575

Declared unit:

1 kg Component EPD Ringebu: PUR foam insulation from Ringebu - used as material component in various finished mixed products

Issue date:

08.07.2024

Declared unit (cradle to gate) with option:

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

Valid to:

08.07.2029

Year of study:

2022

Functional unit:

Not applicable

Comparability:

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General information on verification of EPD from EPD tools:

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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. NEPDT15

Developer of EPD: Diana Karin Schleider

Reviewer of company-specific input data and EPD: Are Lyubråten

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.

Third party verifier:

Michael M. Jenssen, Asplan Viak AS

(no signature required)

Approved:

Håkon Hauan
Managing Director of EPD-Norway

Product

Product description:

MDI based rigid polyurethane (PUR) foam insulation with foaming based on CO2.
This EPD covers products as material components, intended for use in various finished mixed products as e.g. pre-insulated piping systems, etc..
More information is found on www.pipelife.no

Product specification

The products covered by this EPD have small variations in composition and are manufactured with the same type of equipment. The composition below represents an average for these products manufactured in 2022.

Materials	kg	%
Tape	0,00	0,04
Chemical	0,93	99,96
Total	0,93	100,00

Packaging	kg	%
Packaging - Wood	0,05	70,76
Packaging - Plastic	0,02	29,24
Total incl. packaging	1,00	100,00

Technical data:

For products covered by this EPD the following applies:
Products used as insulation fullfill the requirements in accordance with DIN 4102-B3.
For technical information, see our documentation for the specific finished mixed product where insulation as covered by this EPD is a constituent component.

Market:

Mainly Norway, but also the Nordic countries.

Reference service life, product

Predictions, based on long-term aging and thermal testing at average service temperatures covered by this EPD, indicate that the service life may be up to 95 years. In practice, however, it can be expected that the service life will exceed at least 60 years. (NCBI / NHI, Long-Service-Life Rigid Polyurethane Foam Fillings for Spent Fuel Transportation Casks, 2024)

Reference service life, building

Not relevant

LCA: Calculation rules

Declared unit:

1 kg Component EPD Ringebu: PUR foam insulation from Ringebu - used as material component in various finished mixed products

Cut-off criteria:

All raw materials and all the essential energy are included.

Allocation:

The allocation is made in accordance with the provisions of EN 15804. Incoming energy and waste production in-house is allocated equally among all products manufactured at Ringebu from raw materials, through mass allocation. The Ringebu factory has its own water supply. Water is not consumed, it is used for cooling and then returned to natural flows. 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.

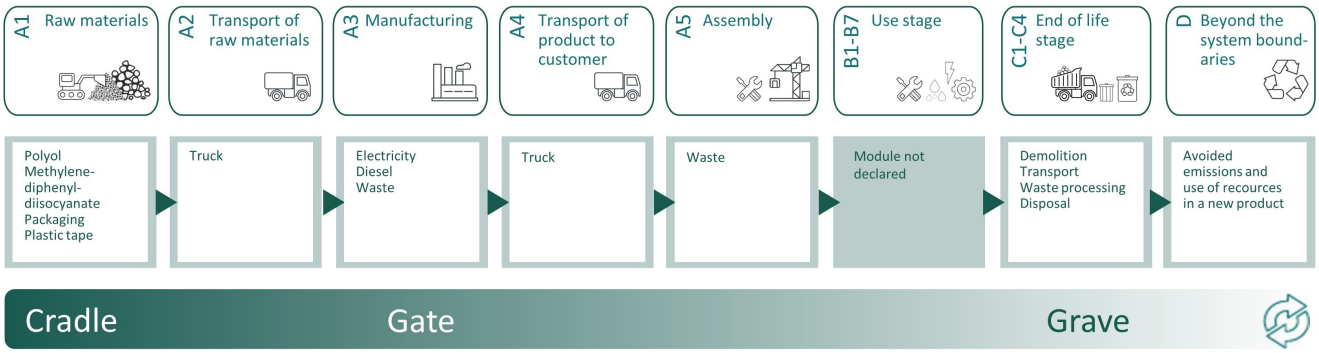
Materials	Source	Data quality	Year
Chemical	Ecoinvent 3.6	Database	2019
Packaging - Plastic	ecoinvent 3.6	Database	2019
Packaging - Wood	ecoinvent 3.6	Database	2019
Tape	ecoinvent 3.6	Database	2019

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:

The analysis is a cradle-to-gate (A1 - A3) study, with option A4 transport to market. It includes the extraction and production of raw materials, transportation to the production site, the production process itself and transport to the market. A5, installation, is included for the transport of packaging waste from the construction site and the treatment of this waste - not the installation of the products.



Additional technical information:

Professionally executed design, storage, handling, installation and operations are a precondition for a long service life. The installation instructions must be followed.
Pipelife Norway AS is certified according to EN ISO 14001:2015
See www.pipelife.no for more information on how we are working on environmental issues.

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)
Truck, 16-32 tonnes, EURO 6 (km)	36,7 %	100	0,043	l/tkm	4,30

Assembly (A5)	Unit	Value			
Waste, hazardous waste, to average treatment (kg)	kg	0,00			
Waste, packaging, plastic film (LDPE), to average treatment - A5 including transport (kg)	kg	0,02			
Waste, packaging, wood to average treatment - A5 including transp. (kg)	kg	0,05			

Waste processing (C3)	Unit	Value			
Waste treatment of hazardous waste, incineration with energy recovery and fly ash extraction (kg)	kg	0,46			

Disposal (C4)	Unit	Value			
Landfilling of ashes from incineration of Hazardous waste, process per kg ashes and residues (kg)	kg	0,09			
Landfilling of hazardous waste (kg)	kg	0,46			

Benefits and loads beyond the system boundaries (D)	Unit	Value			
Substitution of electricity, in Norway (MJ)	MJ	0,00			
Substitution of thermal energy, district heating, in Norway (MJ)	MJ	0,01			

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	5,52E+00	1,63E-02	7,94E-02	0	0	1,03E+00	1,38E-01	-4,18E-05
	GWP-fossil	kg CO_2 -eq	5,57E+00	1,63E-02	3,21E-03	0	0	1,03E+00	1,37E-01	-4,03E-05
	GWP-biogenic	kg CO_2 -eq	-4,70E-02	6,76E-06	7,62E-02	0	0	2,58E-03	1,02E-04	-8,33E-08
	GWP-luluc	kg CO_2 -eq	3,20E-03	5,81E-06	8,82E-07	0	0	2,60E-04	8,79E-04	-1,39E-06
	ODP	kg CFC11 -eq	8,27E-07	3,70E-09	3,36E-10	0	0	1,18E-07	6,87E-09	-2,94E-06
	AP	mol H+ -eq	3,29E-02	4,69E-05	1,33E-05	0	0	1,51E-03	5,39E-04	-3,32E-07
	EP-FreshWater	kg P -eq	3,34E-04	1,31E-07	2,58E-08	0	0	2,47E-05	4,79E-06	-3,59E-09
	EP-Marine	kg N -eq	8,54E-03	9,29E-06	6,58E-06	0	0	3,13E-04	1,13E-04	-1,09E-07
	EP-Terrestial	mol N -eq	6,28E-02	1,04E-04	5,80E-05	0	0	3,52E-03	1,23E-03	-1,17E-06
	POCP	kg NMVOC -eq	2,28E-02	3,98E-05	1,55E-05	0	0	9,88E-04	5,55E-04	-3,24E-07
	ADP-minerals&metals[1]	kg Sb-eq	8,38E-05	4,51E-07	3,15E-08	0	0	3,60E-06	6,36E-07	-4,02E-10
	ADP-fossil[1]	MJ	1,04E+02	2,47E-01	2,38E-02	0	0	4,32E+00	1,27E+00	-5,77E-04
	WDP[1]	m^3	3,66E+02	2,39E-01	5,21E-02	0	0	1,60E+01	5,37E+00	-7,18E-03

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	3,89E-07	1,00E-09	1,76E-10	0	0	2,32E-08	8,95E-09	-2,00E-11
	IRP[2]	kgBq U235 -eq	2,18E-01	1,08E-03	9,23E-05	0	0	1,97E-02	2,60E-03	-3,69E-06
	ETP-fw[1]	CTUe	3,30E+02	1,83E-01	2,94E-02	0	0	2,10E+01	3,33E+00	-3,14E-03
	HTP-c[1]	CTUh	5,91E-08	0,00E+00	2,00E-12	0	0	9,90E-10	4,72E-10	0,00E+00
	HTP-nc[1]	CTUh	1,34E-07	2,00E-10	1,05E-10	0	0	6,04E-09	4,12E-09	-3,00E-12
	SQP[1]	dimensionless	1,75E+01	1,73E-01	2,22E-02	0	0	1,70E+00	3,27E+00	-3,86E-03

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)

"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	1,59E+01	3,54E-03	7,96E-04	0	0	7,80E-01	4,05E-01	-3,56E-03
	PERM	MJ	6,98E-01	0,00E+00	-6,98E-01	0	0	0,00E+00	0,00E+00	0,00E+00
	PERT	MJ	1,66E+01	3,54E-03	-6,97E-01	0	0	7,80E-01	4,05E-01	-3,56E-03
	PENRE	MJ	1,03E+02	2,47E-01	2,38E-02	0	0	4,32E+00	1,27E+00	-5,77E-04
	PENRM	MJ	8,88E-01	0,00E+00	-8,76E-01	0	0	0,00E+00	0,00E+00	0,00E+00
	PENRT	MJ	1,04E+02	2,47E-01	-8,52E-01	0	0	4,32E+00	1,27E+00	-5,77E-04
	SM	kg	3,30E-04	0,00E+00	0,00E+00	0	0	0,00E+00	1,00E-02	0,00E+00
	RSF	MJ	2,36E-01	1,26E-04	1,74E-05	0	0	1,72E-02	1,21E-03	-6,24E-07
	NRSF	MJ	4,85E-02	4,52E-04	1,56E-04	0	0	0,00E+00	9,07E-02	-2,11E-04
	FW	m^3	1,87E-01	2,64E-05	1,60E-05	0	0	4,00E-03	9,02E-04	-4,29E-06

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	1,76E-02	1,27E-05	1,94E-04	0	0	0,00E+00	4,65E-01	-2,71E-08
	NHWD	kg	5,95E-01	1,20E-02	7,06E-02	0	0	4,65E-01	8,78E-02	-1,36E-05
	RWD	kg	2,15E-04	1,68E-06	5,80E-09	0	0	0,00E+00	0,00E+00	-3,02E-09

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	0	0,00E+00	0,00E+00	0,00E+00
	MFR	kg	8,26E-02	0,00E+00	1,06E-02	0	0	0,00E+00	0,00E+00	0,00E+00
	MER	kg	3,10E-02	0,00E+00	5,00E-02	0	0	4,65E-01	0,00E+00	0,00E+00
	EEE	MJ	2,63E-02	0,00E+00	3,47E-02	0	0	4,60E-04	0,00E+00	0,00E+00
	EET	MJ	3,97E-01	0,00E+00	5,25E-01	0	0	6,96E-03	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	0,00E+00
Biogenic carbon content in accompanying packaging	kg C	2,08E-02

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	Source	Amount	Unit
Electricity, Norway (kWh)	ecoinvent 3.6	24,33	g CO2-eq/kWh

Dangerous substances

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

Indoor environment

Not relevant

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	5,60E+00	1,63E-02	3,17E-03	0	0	1,03E+00	1,38E-01	-4,12E-05

GWP-IOBC: 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

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 Environmental product declaration - Core rules for the product category of construction products.
ISO 21930:2017 Sustainability in buildings and civil engineering works - Core rules for environmental product declarations of construction products.
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Vold, et al., (2019) EPD generator for Pipelife - Background information for customer application and LCA data. report number 08.19
NPCR Part A: Construction products and services. Ver. 2.0. March 2021, EPD-Norge.

NCBI - National Center for Biotechnology Information / NHI - National Library of Medicine, Long-Service-Life Rigid Polyurethane Foam Fillings for Spent Fuel Transportation Casks, https://www.ncbi.nlm.nih.gov/pmc/articles/PMC10819990/,
received 2023 Dec 20; revised 2024 Jan 9; accepted 2024 Jan 11

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ECO PLATFORM EPD VERIFIED	ECO Platform ECO Portal	web: www.eco-platform.org web: ECO Portal

epd-norge
Global program operatør

Environmental product declaration

in accordance with ISO 14025 and EN 15804+A2

Component EPD Ringebu: Injection moulded PP fittings and gullies from Surnadal - used as material component in various finished mixed products

PIPELIFE

The Norwegian EPD Foundation

Owner of the declaration:
Pipelife Norge AS

Product:
Component EPD Ringebu: Injection moulded PP fittings and gullies from Surnadal - used as material component in various finished mixed products

Declared unit:
1 kg

This declaration is based on Product Category Rules:
CEN Standard EN 15804:2012+A2:2019 serves as core PCR
NPCR Part A: Construction products and services. Ver. 2.0 March 2021

Program operator:
The Norwegian EPD Foundation

Declaration number:

NEPD-7772-7150-EN

Registration number:

NEPD-7772-7150-EN

Issue date: 10.10.2024

Valid to: 10.10.2029

EPD software:
LCAno EPD generator ID: 444381

General information

Product

Component EPD Ringebu: Injection moulded PP fittings and gullies from Surnadal - used as material component in various finished mixed products

Program operator:

The Norwegian EPD Foundation
Post Box 5250 Majorstuen, 0303 Oslo, Norway
Phone: +47 977 22 020
web: www.epd-norge.no

Declaration number:

NEPD-7772-7150-EN

This declaration is based on Product Category Rules:

CEN Standard EN 15804:2012+A2:2019 serves as core PCR
NPCR Part A: Construction products and services. Ver. 2.0 March 2021

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 Component EPD Ringebu: Injection moulded PP fittings and gullies from Surnadal - used as material component in various finished mixed products

Declared unit (cradle to gate) with option:

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

Functional unit:

Not applicable

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.

Third party verifier:

Michael M. Jenssen, Asplan Viak AS

(no signature required)

Owner of the declaration:

Pipelife Norge AS
Contact person: Are Lyubråten
Phone: +47 71 65 88 00
e-mail: are.lyubraten@pipelife.com

Manufacturer:

Pipelife Norge AS
Hamnesvegen 97
6650 Surnadal, Norway

Place of production:

Pipelife Norge AS - Ringebu
Flyplassvegen 16
2630 Ringebu, Norway

Management system:

NS-EN ISO 9001:2015 NS-EN ISO 14001:2015

Organisation no:

980 457 575

Issue date:

10.10.2024

Valid to:

10.10.2029

Year of study:

2021

Comparability:

EPD of construction products may not be comparable if they not comply with EN 15804+A2 and seen in a construction context.

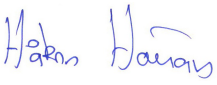
Development and verification of EPD:

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. NEPDT15

Developer of EPD: Diana Karin Schleider

Reviewer of company-specific input data and EPD: Are Lyubråten

Approved:



Håkon Hauan, CEO EPD-Norge

Product

Product description:

Injection moulded PP fittings and gullies for underground non-pressure drains, sewers and surface water piping systems.
The colours are according to the product standards and the colour codes for these applications in Norway.
This EPD covers products as material components, intended for use in various finished mixed products as e.g. pre-insulated piping systems, etc..
More information is found on www.pipelife.no

Product specification

The products covered by this EPD have small variations in composition and are manufactured with the same type of equipment. The composition below represents an average for these products manufactured in 2021.

Materials	kg	%
Plastic products	1,00	100,00
Total	1,00	100,00

Technical data:

For products covered by this EPD the following applies:
Products used as non-pressure media pipe fitting fullfill the requirements in accordance with EN 1852 (Nordic Poly Mark). For technical informatio, see our handbook:
https://www.pipelife.no/content/dam/pipelife/norway/marketing/general/r%C3%B8rh%C3%A5ndboka/r%C3%B8rh%C3%A5ndboka2021/M-Materialdata.pdf

Market:

Mainly Norway, but also the Nordic countries.

Reference service life, product

When installed according to the relevant installation manual and having normal operations, the service lifetime is at least 100 years.

Reference service life, building

Not relevant

LCA: Calculation rules

Declared unit:

1 kg Component EPD Ringebu: Injection moulded PP fittings and gullies from Surnadal - used as material component in various finished mixed products

Cut-off criteria:

All raw materials and all the essential energy are included.

Allocation:

The allocation is made in accordance with the provisions of EN 15804. Incoming energy and water and waste production in-house is not allocated among internally or externally purchased components which are not further processed, only handled and assembled, before leaving Ringebu.

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.

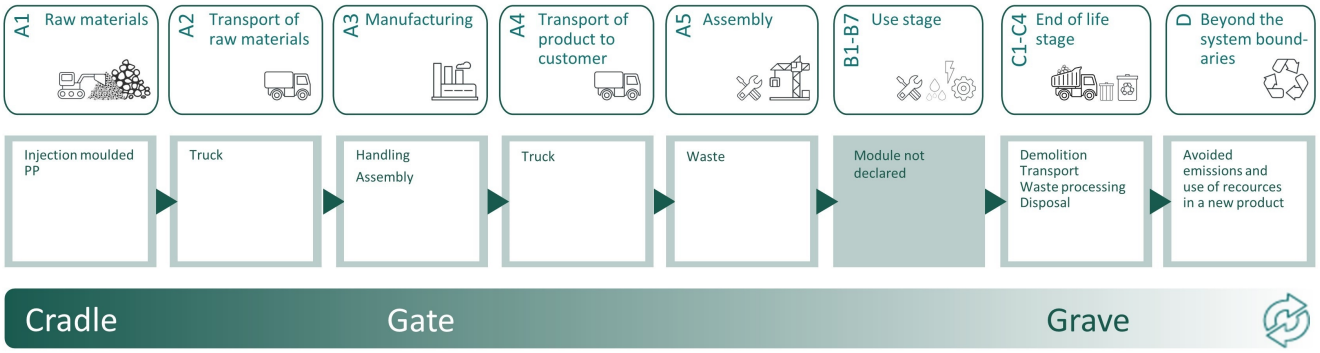
Materials	Source	Data quality	Year
Plastic products	NEPD-4619-3866-EN	EPD	2021

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:

The analysis is a cradle-to-gate (A1 - A3) study, with option A4 transport to market. It includes the extraction and production of raw materials, transportation to the production site, the production process itself and transport to the market. A5, installation, is included for the transport of packaging waste from the construction site and the treatment of this waste - not the installation of the products. The material data set used in A1 is generated from the cradle to gate part (A1-A3) of a published EPD from Pipelife Norway's production at Surnadal. Transport in A2 is the specific transport of the material from Surnadal to Ringebu.



Additional technical information:

Professionally executed design, storage, handling, installation and operations are a precondition for a long service life. The installation instructions must be followed.
Pipelife Norway AS is certified according to EN ISO 14001:2015
See www.pipelife.no for more information on how we are working on environmental issues.

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)
Truck, 16-32 tonnes, EURO 6 (km)	36,7 %	100	0,043	l/tkm	4,30

Transport to waste processing (C2)	Capacity utilisation (incl. return) %	Distance (km)	Fuel/Energy Consumption	Unit	Value (Liter/tonne)
Truck, 16-32 tonnes, EURO 6 (km)	36,7 %	85	0,043	l/tkm	3,66

Waste processing (C3)	Unit	Value			
Waste treatment of polypropylene (PP), incineration with energy recovery and fly ash extraction (kg)	kg	0,50			

Disposal (C4)	Unit	Value			
Landfilling of ashes from incineration of Polypropylene (PP), process per kg ashes and residues (kg)	kg	0,01			
Landfilling of plastic mixture (kg)	kg	0,50			

Benefits and loads beyond the system boundaries (D)	Unit	Value			
Substitution of electricity, in Norway (MJ)	MJ	0,81			
Substitution of thermal energy, district heating, in Norway (MJ)	MJ	12,31			

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	2,84E+00	1,63E-02	0	0	1,39E-02	1,27E+00	5,79E-02	-7,40E-02
	GWP-fossil	kg CO_2 -eq	2,82E+00	1,63E-02	0	0	1,39E-02	1,27E+00	5,79E-02	-7,14E-02
	GWP-biogenic	kg CO_2 -eq	2,17E-02	6,76E-06	0	0	5,75E-06	1,05E-05	5,52E-06	-1,47E-04
	GWP-luluc	kg CO_2 -eq	4,83E-03	5,81E-06	0	0	4,94E-06	1,61E-06	1,24E-06	-2,46E-03
	ODP	kg CFC11 -eq	1,95E-07	3,70E-09	0	0	3,15E-09	1,00E-09	1,65E-09	-5,20E-03
	AP	mol H+ -eq	1,29E-02	4,69E-05	0	0	3,99E-05	1,61E-04	4,16E-05	-5,88E-04
	EP-FreshWater	kg P -eq	8,32E-05	1,31E-07	0	0	1,11E-07	1,07E-07	6,24E-08	-6,34E-06
	EP-Marine	kg N -eq	2,56E-03	9,29E-06	0	0	7,90E-06	7,68E-05	7,41E-05	-1,92E-04
	EP-Terrestial	mol N -eq	2,83E-02	1,04E-04	0	0	8,83E-05	8,31E-04	1,64E-04	-2,08E-03
	POCP	kg NMVOC -eq	1,10E-02	3,98E-05	0	0	3,38E-05	2,00E-04	5,88E-05	-5,73E-04
	ADP-minerals&metals[1]	kg Sb-eq	1,20E-04	4,51E-07	0	0	3,84E-07	4,67E-08	4,23E-08	-7,10E-07
	ADP-fossil[1]	MJ	8,43E+01	2,47E-01	0	0	2,10E-01	8,63E-02	1,22E-01	-1,02E+00
	WDP[1]	m^3	6,47E+02	2,39E-01	0	0	2,03E-01	2,01E-01	1,05E+00	-1,27E+01

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

Mechanical recycling of PP is very sustainable and in line with the circular economy. Scrap and used products should be collected for recycling.

Additional environmental impact indicators									
Indicator		**Unit**	A1-A3	A4	A5	C1	C2	C3	C4	D
	PM	Disease incidence	1,40E-07	1,00E-09	0	0	8,50E-10	7,52E-10	8,18E-10	-3,56E-08
	IRP[2]	kgBq U235 -eq	1,48E-01	1,08E-03	0	0	9,18E-04	1,50E-04	5,90E-04	-6,52E-03
	ETP-fw[1]	CTUe	5,31E+01	1,83E-01	0	0	1,56E-01	2,55E-01	1,52E-01	-5,55E+00
	HTP-c[1]	CTUh	1,42E-09	0,00E+00	0	0	0,00E+00	3,00E-11	4,00E-12	-1,01E-10
	HTP-nc[1]	CTUh	3,68E-08	2,00E-10	0	0	1,70E-10	1,09E-09	1,14E-10	-5,32E-09
	SQP[1]	dimensionless	4,64E+01	1,73E-01	0	0	1,47E-01	1,09E-02	4,55E-01	-6,83E+00

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)

"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	5,01E+01	3,54E-03	0	0	3,01E-03	2,62E-03	5,75E-03	-6,31E+00
	PERM	MJ	0,00E+00	0,00E+00	0	0	0,00E+00	0,00E+00	0,00E+00	0,00E+00
	PERT	MJ	5,01E+01	3,54E-03	0	0	3,01E-03	2,62E-03	5,75E-03	-6,31E+00
	PENRE	MJ	5,41E+01	2,47E-01	0	0	2,10E-01	8,63E-02	1,22E-01	-1,02E+00
	PENRM	MJ	3,26E+01	0,00E+00	0	0	0,00E+00	-3,26E+01	0,00E+00	0,00E+00
	PENRT	MJ	8,67E+01	2,47E-01	0	0	2,10E-01	-3,25E+01	1,22E-01	-1,02E+00
	SM	kg	0,00E+00	0,00E+00	0	0	0,00E+00	0,00E+00	0,00E+00	0,00E+00
	RSF	MJ	1,25E-01	1,26E-04	0	0	1,08E-04	7,21E-05	1,21E-04	-1,10E-03
	NRSF	MJ	9,97E-02	4,52E-04	0	0	3,84E-04	0,00E+00	1,97E-03	-3,74E-01
	FW	m^3	3,47E-01	2,64E-05	0	0	2,25E-05	2,38E-04	1,50E-04	-7,59E-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	7,90E-03	1,27E-05	0	0	1,08E-05	0,00E+00	1,26E-02	-4,80E-05
	NHWD	kg	4,62E-01	1,20E-02	0	0	1,02E-02	0,00E+00	5,07E-01	-2,41E-02
	RWD	kg	1,29E-04	1,68E-06	0	0	1,43E-06	0,00E+00	8,02E-07	-5,34E-06

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	0	0,00E+00	0,00E+00	0,00E+00	0,00E+00
	MFR	kg	0,00E+00	0,00E+00	0	0	0,00E+00	0,00E+00	4,48E-05	0,00E+00
	MER	kg	0,00E+00	0,00E+00	0	0	0,00E+00	5,00E-01	1,10E-06	0,00E+00
	EEE	MJ	0,00E+00	0,00E+00	0	0	0,00E+00	8,14E-01	7,12E-05	0,00E+00
	EET	MJ	0,00E+00	0,00E+00	0	0	0,00E+00	1,23E+01	1,08E-03	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	0,00E+00
Biogenic carbon content in accompanying packaging	kg C	0,00E+00

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).

Dangerous substances

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

Indoor environment

Not relevant

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	2,74E+00	1,63E-02	0	0	1,39E-02	1,27E+00	5,80E-02	-7,29E-02

GWP-IOBC: 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

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 Environmental product declaration - Core rules for the product category of construction products.
ISO 21930:2017 Sustainability in buildings and civil engineering works - Core rules for environmental product declarations of construction products.
ecoinvent v3, Allocation, cut-off by classification, Swiss Centre of Life Cycle Inventories.
Iversen et al., (2021) eEPD v2021.09 Background information for EPD generator tool system verification, LCA.no rapportnummer: : 07.21.
Vold, et al., (2019) EPD generator for Pipelife - Background information for customer application and LCA data. report number 08.19
NPCR Part A: Construction products and services. Ver. 2.0. March 2021, EPD-Norge.

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ECO PLATFORM EPD VERIFIED	ECO Platform ECO Portal	web: www.eco-platform.org web: ECO Portal

epd-norge
Global program operatør

Environmental product declaration

in accordance with ISO 14025 and EN 15804+A2

Component EPD Ringebu: Extruded PP pipe systems from Surnadal - used as material component in various finished mixed products

PIPELIFE

The Norwegian EPD Foundation

Owner of the declaration:
Pipelife Norge AS

Product:
Component EPD Ringebu: Extruded PP pipe systems from Surnadal - used as material component in various finished mixed products

Declared unit:
1 kg

This declaration is based on Product Category Rules:
CEN Standard EN 15804:2012+A2:2019 serves as core PCR
NPCR Part A: Construction products and services. Ver. 2.0 March 2021

Program operator:
The Norwegian EPD Foundation

Declaration number:

NEPD-7773-7146-EN

Registration number:

NEPD-7773-7146-EN

Issue date: 10.10.2024

Valid to: 10.10.2029

EPD software:
LCAno EPD generator ID: 444082

General information

Product

Component EPD Ringebu: Extruded PP pipe systems from Surnadal - used as material component in various finished mixed products

Program operator:

The Norwegian EPD Foundation
Post Box 5250 Majorstuen, 0303 Oslo, Norway
Phone: +47 977 22 020
web: www.epd-norge.no

Declaration number:

NEPD-7773-7146-EN

This declaration is based on Product Category Rules:

CEN Standard EN 15804:2012+A2:2019 serves as core PCR
NPCR Part A: Construction products and services. Ver. 2.0 March 2021

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 Component EPD Ringebu: Extruded PP pipe systems from Surnadal - used as material component in various finished mixed products

Declared unit (cradle to gate) with option:

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

Functional unit:

Not applicable

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.

Third party verifier:

Michael M. Jenssen, Asplan Viak AS

(no signature required)

Owner of the declaration:

Pipelife Norge AS
Contact person: Are Lyubråten
Phone: +47 71 65 88 00
e-mail: are.lyubraten@pipelife.com

Manufacturer:

Pipelife Norge AS
Hamnesvegen 97
6650 Surnadal, Norway

Place of production:

Pipelife Norge AS - Ringebu
Flyplassvegen 16
2630 Ringebu, Norway

Management system:

NS-EN ISO 9001:2015 NS-EN ISO 14001:2015

Organisation no:

980 457 575

Issue date:

10.10.2024

Valid to:

10.10.2029

Year of study:

2021

Comparability:

EPD of construction products may not be comparable if they not comply with EN 15804+A2 and seen in a construction context.

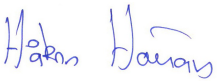
Development and verification of EPD:

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. NEPDT15

Developer of EPD: Diana Karin Schleider

Reviewer of company-specific input data and EPD: Are Lyubråten

Approved:



Håkon Hauan, CEO EPD-Norge

Product

Product description:

PP pipes and fittings and chambers made from PP pipes for underground non-pressure drains, sewers and surface water piping systems.
The colours are according to the product standards and the colour codes for these applications in Norway.
This EPD covers products as material components, intended for use in various finished mixed products as e.g. pre-insulated piping systems, etc..
More information is found on www.pipelife.no

Product specification

The products covered by this EPD have small variations in composition and are manufactured with the same type of equipment. The composition below represents an average for these products manufactured in 2021.

Materials	kg	%
Plastic products	1,00	100,00
Total	1,00	100,00

Technical data:

For products covered by this EPD the following applies:
Smooth-walled pipes used as non-pressure media pipes fullfill the requirements in accordance with EN 1852 (Nordic Poly Mark).
Structured-walled pipes used as non-pressure media pipes fullfill the requirements in accordance with EN 13476-1 and -3 (Nordic Poly Mark). For technical information, see our handbook:
https://www.pipelife.no/content/dam/pipelife/norway/marketing/general/r%C3%B8rh%C3%A5ndboka/r%C3%B8rh%C3%A5ndboka2021/M-Materialdata.pdf

Market:

Mainly Norway, but also the Nordic countries.

Reference service life, product

When installed according to the relevant installation manual and having normal operations, the service lifetime is at least 100 years.

Reference service life, building

Not relevant

LCA: Calculation rules

Declared unit:

1 kg Component EPD Ringebu: Extruded PP pipe systems from Surnadal - used as material component in various finished mixed products

Cut-off criteria:

All raw materials and all the essential energy are included.

Allocation:

The allocation is made in accordance with the provisions of EN 15804. Incoming energy and water and waste production in-house is not allocated among internally or externally purchased components which are not further processed, only handled and assembled, before leaving Ringebu.

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.

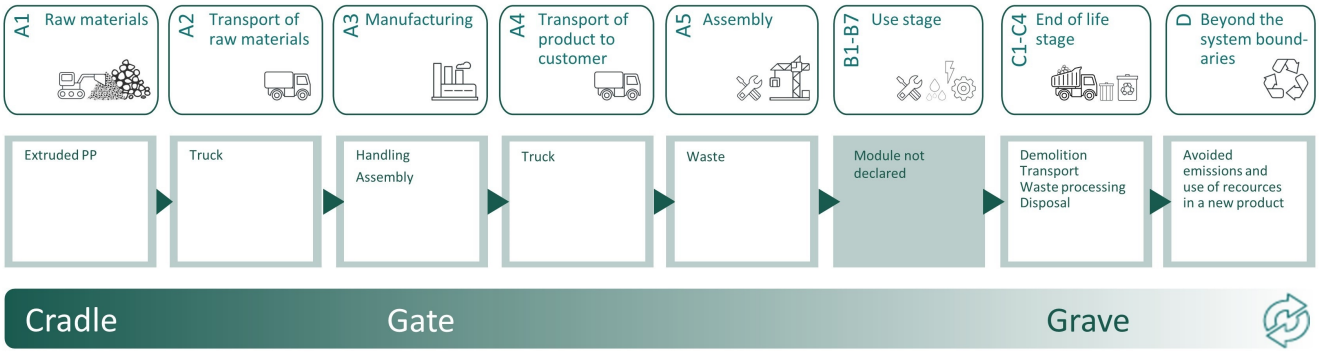
Materials	Source	Data quality	Year
Plastic products	NEPD-4618-3867-EN	EPD	2021

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:

The analysis is a cradle-to-gate (A1 - A3) study, with option A4 transport to market. It includes the extraction and production of raw materials, transportation to the production site, the production process itself and transport to the market. A5, installation, is included for the transport of packaging waste from the construction site and the treatment of this waste - not the installation of the products. The material data set used in A1 is generated from the cradle to gate part (A1-A3) of a published EPD from Pipelife Norway's production at Surnadal. Transport in A2 is the specific transport of the material from Surnadal to Ringebu.



Additional technical information:

Professionally executed design, storage, handling, installation and operations are a precondition for a long service life. The installation instructions must be followed.
Pipelife Norway AS is certified according to EN ISO 14001:2015
See www.pipelife.no for more information on how we are working on environmental issues.

LCA: Scenarios and additional technical information

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

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Transport to waste processing (C2)	Capacity utilisation (incl. return) %	Distance (km)	Fuel/Energy Consumption	Unit	Value (Liter/tonne)
Truck, 16-32 tonnes, EURO 6 (km)	36,7 %	85	0,043	l/tkm	3,66

Waste processing (C3)	Unit	Value			
Waste treatment of polypropylene (PP), incineration with energy recovery and fly ash extraction (kg)	kg	0,50			

Disposal (C4)	Unit	Value			
Landfilling of ashes from incineration of Polypropylene (PP), process per kg ashes and residues (kg)	kg	0,01			
Landfilling of plastic mixture (kg)	kg	0,50			

Benefits and loads beyond the system boundaries (D)	Unit	Value			
Substitution of electricity, in Norway (MJ)	MJ	0,81			
Substitution of thermal energy, district heating, in Norway (MJ)	MJ	12,31			

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	2,30E+00	1,63E-02	0	0	1,39E-02	1,27E+00	5,79E-02	-7,40E-02
	GWP-fossil	kg CO_2 -eq	2,29E+00	1,63E-02	0	0	1,39E-02	1,27E+00	5,79E-02	-7,14E-02
	GWP-biogenic	kg CO_2 -eq	9,43E-03	6,76E-06	0	0	5,75E-06	1,05E-05	5,52E-06	-1,47E-04
	GWP-luluc	kg CO_2 -eq	1,14E-03	5,81E-06	0	0	4,94E-06	1,61E-06	1,24E-06	-2,46E-03
	ODP	kg CFC11 -eq	9,06E-08	3,70E-09	0	0	3,15E-09	1,00E-09	1,65E-09	-5,20E-03
	AP	mol H+ -eq	9,09E-03	4,69E-05	0	0	3,99E-05	1,61E-04	4,16E-05	-5,88E-04
	EP-FreshWater	kg P -eq	4,24E-05	1,31E-07	0	0	1,11E-07	1,07E-07	6,24E-08	-6,34E-06
	EP-Marine	kg N -eq	1,75E-03	9,29E-06	0	0	7,90E-06	7,68E-05	7,41E-05	-1,92E-04
	EP-Terrestial	mol N -eq	1,95E-02	1,04E-04	0	0	8,83E-05	8,31E-04	1,64E-04	-2,08E-03
	POCP	kg NMVOC -eq	8,07E-03	3,98E-05	0	0	3,38E-05	2,00E-04	5,88E-05	-5,73E-04
	ADP-minerals&metals[1]	kg Sb-eq	2,35E-05	4,51E-07	0	0	3,84E-07	4,67E-08	4,23E-08	-7,10E-07
	ADP-fossil[1]	MJ	7,68E+01	2,47E-01	0	0	2,10E-01	8,63E-02	1,22E-01	-1,02E+00
	WDP[1]	m^3	1,31E+02	2,39E-01	0	0	2,03E-01	2,01E-01	1,05E+00	-1,27E+01

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

Mechanical recycling of PP is very sustainable and in line with the circular economy. Scrap and used products should be collected for recycling.

Additional environmental impact indicators									
Indicator		**Unit**	A1-A3	A4	A5	C1	C2	C3	C4	D
	PM	Disease incidence	8,91E-08	1,00E-09	0	0	8,50E-10	7,52E-10	8,18E-10	-3,56E-08
	IRP[2]	kgBq U235 -eq	6,89E-02	1,08E-03	0	0	9,18E-04	1,50E-04	5,90E-04	-6,52E-03
	ETP-fw[1]	CTUe	1,36E+01	1,83E-01	0	0	1,56E-01	2,55E-01	1,52E-01	-5,55E+00
	HTP-c[1]	CTUh	5,51E-10	0,00E+00	0	0	0,00E+00	3,00E-11	4,00E-12	-1,01E-10
	HTP-nc[1]	CTUh	1,57E-08	2,00E-10	0	0	1,70E-10	1,09E-09	1,14E-10	-5,32E-09
	SQP[1]	dimensionless	9,44E+00	1,73E-01	0	0	1,47E-01	1,09E-02	4,55E-01	-6,83E+00

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)

"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	5,79E+00	3,54E-03	0	0	3,01E-03	2,62E-03	5,75E-03	-6,31E+00
	PERM	MJ	0,00E+00	0,00E+00	0	0	0,00E+00	0,00E+00	0,00E+00	0,00E+00
	PERT	MJ	5,79E+00	3,54E-03	0	0	3,01E-03	2,62E-03	5,75E-03	-6,31E+00
	PENRE	MJ	4,67E+01	2,47E-01	0	0	2,10E-01	8,63E-02	1,22E-01	-1,02E+00
	PENRM	MJ	3,23E+01	0,00E+00	0	0	0,00E+00	-3,23E+01	0,00E+00	0,00E+00
	PENRT	MJ	7,90E+01	2,47E-01	0	0	2,10E-01	-3,23E+01	1,22E-01	-1,02E+00
	SM	kg	0,00E+00	0,00E+00	0	0	0,00E+00	0,00E+00	0,00E+00	0,00E+00
	RSF	MJ	8,71E-02	1,26E-04	0	0	1,08E-04	7,21E-05	1,21E-04	-1,10E-03
	NRSF	MJ	2,25E-02	4,52E-04	0	0	3,84E-04	0,00E+00	1,97E-03	-3,74E-01
	FW	m^3	4,71E-02	2,64E-05	0	0	2,25E-05	2,38E-04	1,50E-04	-7,59E-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	3,05E-03	1,27E-05	0	0	1,08E-05	0,00E+00	1,26E-02	-4,80E-05
	NHWD	kg	1,58E-01	1,20E-02	0	0	1,02E-02	0,00E+00	5,07E-01	-2,41E-02
	RWD	kg	6,58E-05	1,68E-06	0	0	1,43E-06	0,00E+00	8,02E-07	-5,34E-06

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	0	0,00E+00	0,00E+00	0,00E+00	0,00E+00
	MFR	kg	0,00E+00	0,00E+00	0	0	0,00E+00	0,00E+00	4,48E-05	0,00E+00
	MER	kg	0,00E+00	0,00E+00	0	0	0,00E+00	5,00E-01	1,10E-06	0,00E+00
	EEE	MJ	0,00E+00	0,00E+00	0	0	0,00E+00	8,14E-01	7,12E-05	0,00E+00
	EET	MJ	0,00E+00	0,00E+00	0	0	0,00E+00	1,23E+01	1,08E-03	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	0,00E+00
Biogenic carbon content in accompanying packaging	kg C	0,00E+00

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).

Dangerous substances

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

Indoor environment

Not relevant

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	2,20E+00	1,63E-02	0	0	1,39E-02	1,27E+00	5,80E-02	-7,29E-02

GWP-IOBC: 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

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 Environmental product declaration - Core rules for the product category of construction products.
ISO 21930:2017 Sustainability in buildings and civil engineering works - Core rules for environmental product declarations of construction products.
ecoinvent v3, Allocation, cut-off by classification, Swiss Centre of Life Cycle Inventories.
Iversen et al., (2021) eEPD v2021.09 Background information for EPD generator tool system verification, LCA.no rapportnummer: : 07.21.
Vold, et al., (2019) EPD generator for Pipelife - Background information for customer application and LCA data. report number 08.19
NPCR Part A: Construction products and services. Ver. 2.0. March 2021, EPD-Norge.

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Environmental product declaration

in accordance with ISO 14025 and EN 15804+A2

Component EPD Ringebu: Extruded PVC-U pipe systems from Surnadal - used as material component in various finished mixed products

PIPELIFE

EPD-Global

Owner of the declaration:
Pipelife Norge AS

Product:
Component EPD Ringebu: Extruded PVC-U pipe systems from Surnadal - used as material component in various finished mixed products

Declared unit:
1 kg

This declaration is based on Product Category Rules:
CEN Standard EN 15804:2012+A2:2019 serves as core PCR
NPCR Part A: Construction products and services. Ver. 2.0 March 2021

Program operator:
EPD-Global

Declaration number:
NEPD-12947-14188

Issue date:
03.11.2025

Valid to:
03.11.2030

EPD software:
LCAno EPD generator ID: 1232430

General information

Product

Component EPD Ringebu: Extruded PVC-U pipe systems from Surnadal - used as material component in various finished mixed products

Program operator:

EPD-Global
Post Box 5250 Majorstuen, 0303 Oslo, Norway
Phone: +47 977 22 020
web: www.epd-global.com

Declaration number:

NEPD-12947-14188

This declaration is based on Product Category Rules:

CEN Standard EN 15804:2012+A2:2019 serves as core PCR
NPCR Part A: Construction products and services. Ver. 2.0 March 2021

Statement of liability:

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

Declared unit:

1 kg Component EPD Ringebu: Extruded PVC-U pipe systems from Surnadal - used as material component in various finished mixed products

Declared unit (cradle to gate) with option:

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

Functional unit:

Not applicable

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-Global'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-Global, and iii) the process is reviewed annually by an independent third party verifier. See Appendix G of EPD-Global'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 EPD-Global's procedures and guidelines for verification and approval of EPD tools.

Third party verifier:

Michael M. Jenssen, Asplan Viak AS

(no signature required)

Owner of the declaration:

Pipelife Norge AS
Contact person: Are Lyubråten
Phone: +47 71 65 88 00
e-mail: are.lyubraten@pipelife.com

Manufacturer:

Pipelife Norge AS
Hamnesvegen 97
6650 Surnadal, Norway

Place of production:

Pipelife Norge AS - Ringebu
Flyplassvegen 16
2630 Ringebu, Norway

Management system:

NS-EN ISO 9001:2015 NS-EN ISO 14001:2015

Organisation no:

980 457 575

Issue date:

03.11.2025

Valid to:

03.11.2030

Year of study:

2024

Comparability:

EPD of construction products may not be comparable if they not comply with EN 15804+A2 and seen in a construction context.

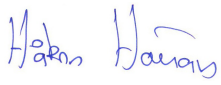
Development and verification of EPD:

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-Global. NEPDT15

Developer of EPD: Diana Karin Schleider

Reviewer of company-specific input data and EPD: Are Lyubråten

Approved:



Håkon Hauan, CEO EPD-Global

Product

Product description:

PVC-U pipes and fittings made from PVC-U pipes for underground water supply and sewers under pressure and non-pressure drains, sewers and surface water piping systems.
The colours are according to the product standards and the colour codes for these applications in Norway.
This EPD covers products as material components, intended for use in various finished mixed products as e.g. pre-insulated piping systems, etc..
More information is found on www.pipelife.no

Product specification

The products covered by this EPD have small variations in composition and are manufactured with the same type of equipment. The composition below represents an average for these products manufactured in 2024.

Materials	kg	%
Plastic - Polyvinyl chloride (PVC)	1.00	100.00
Total	1.00	100.00

Technical data:

For products covered by this EPD the following applies:
Products used as media pipes under pressure fullfill the requirements in accordance with EN ISO 1452 (Nordic Poly Mark). Pipes intended for drinking water are also approved according to the Danish requirements (DK-VAND).
Products used as non-pressure media pipe fullfill the requirements in accordance with EN 1401 (Nordic Poly Mark). For technical information, see our handbook:
https://www.pipelife.no/content/dam/pipelife/norway/marketing/general/r%C3%B8rh%C3%A5ndboka/r%C3%B8rh%C3%A5ndboka2021/M-Materialdata.pdf

Market:

Mainly Norway, but also the Nordic countries.

Reference service life, product

When installed according to the relevant installation manual and having normal operations, the service lifetime is at least 100 years.

Reference service life, building

Not relevant

LCA: Calculation rules

Declared unit:

1 kg Component EPD Ringebu: Extruded PVC-U pipe systems from Surnadal - used as material component in various finished mixed products

Cut-off criteria:

All raw materials and all the essential energy are included.

Allocation:

The allocation is made in accordance with the provisions of EN 15804. Incoming energy and water and waste production in-house is not allocated among internally or externally purchased, components which are not further processed, only handled and assembled, before leaving Ringebu.

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.

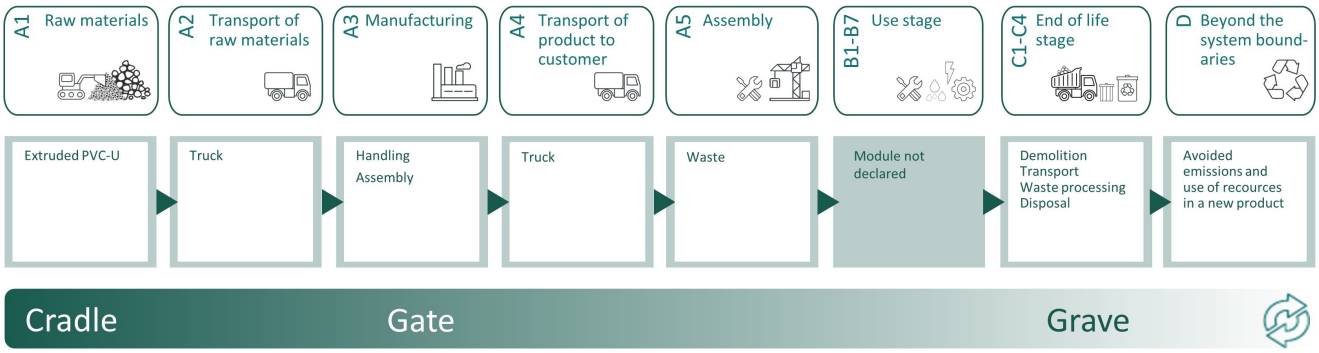
Materials	Source	Data quality	Year
Plastic - Polyvinyl chloride (PVC)	NEPD-12233-12287	EPD	2024

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:

The analysis is a cradle-to-gate (A1 - A3) study, with option A4 transport to market. It includes the extraction and production of raw materials, transportation to the production site, the production process itself and transport to the market. The material data set used in A1 is generated from the cradle to gate part (A1-A3) of a published EPD from Pipelife Norway's production at Surnadal. Transport in A2 is the specific transport of the material from Surnadal to Ringebu.



Additional technical information:

Professionally executed design, storage, handling, installation and operations are a precondition for a long service life. The installation instructions must be followed.
Pipelife Norway AS is certified according to EN ISO 14001:2015
See www.pipelife.no for more information on how we are working on environmental issues.

LCA: Scenarios and additional technical information

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

It is assumed that the products declared in this EPD will remain in the ground after the end of their functional life.

Transport from production place to user (A4)	Capacity utilisation (incl. return) %	Distance (km)	Fuel/Energy Consumption	Unit	Value (Liter/tonne)
Truck, 16-32 tonnes, EURO 6 (km)	36.7 %	100.00	0.043	l/tkm	4.30

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	1.22E+00	1.63E-02	0	0	0	0.00E+00	0	0
	GWP-fossil	kg CO_2 -eq	1.21E+00	1.63E-02	0	0	0	0.00E+00	0	0
	GWP-biogenic	kg CO_2 -eq	7.67E-03	6.76E-06	0	0	0	0.00E+00	0	0
	GWP-luluc	kg CO_2 -eq	4.98E-04	5.81E-06	0	0	0	0.00E+00	0	0
	ODP	kg CFC11 -eq	2.06E-07	3.70E-09	0	0	0	0.00E+00	0	0
	AP	mol H+ -eq	4.97E-03	4.69E-05	0	0	0	0.00E+00	0	0
	EP-FreshWater	kg P -eq	2.37E-04	1.31E-07	0	0	0	0.00E+00	0	0
	EP-Marine	kg N -eq	1.24E-03	9.29E-06	0	0	0	0.00E+00	0	0
	EP-Terrestial	mol N -eq	1.28E-02	1.04E-04	0	0	0	0.00E+00	0	0
	POCP	kg NMVOC -eq	5.21E-03	3.98E-05	0	0	0	0.00E+00	0	0
	ADP-minerals&metals[1]	kg Sb-eq	1.54E-05	4.51E-07	0	0	0	0.00E+00	0	0
	ADP-fossil[1]	MJ	3.84E+01	2.47E-01	0	0	0	0.00E+00	0	0
	WDP[1]	m^3	6.32E+00	2.39E-01	0	0	0	0.00E+00	0	0

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"

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	3.82E-08	1.00E-09	0	0	0	0.00E+00	0	0
	IRP[2]	kgBq U235 -eq	1.41E-01	1.08E-03	0	0	0	0.00E+00	0	0
	ETP-fw[1]	CTUe	1.08E+01	1.83E-01	0	0	0	0.00E+00	0	0
	HTP-c[1]	CTUh	9.50E-10	0.00E+00	0	0	0	0.00E+00	0	0
	HTP-nc[1]	CTUh	1.37E-08	2.00E-10	0	0	0	0.00E+00	0	0
	SQP[1]	dimensionless	2.22E+01	1.73E-01	0	0	0	0.00E+00	0	0

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)

"Reading example: 9.0 E-03 = 9.0*10-3 = 0.009"

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	6.02E+00	3.54E-03	0	0	0	0.00E+00	0	0
	PERM	MJ	0.00E+00	0.00E+00	0	0	0	0.00E+00	0	0
	PERT	MJ	6.02E+00	3.54E-03	0	0	0	0.00E+00	0	0
	PENRE	MJ	3.75E+01	2.47E-01	0	0	0	0.00E+00	0	0
	PENRM	MJ	1.69E+01	0.00E+00	0	0	0	-1.69E+01	0	0
	PENRT	MJ	5.43E+01	2.47E-01	0	0	0	-1.69E+01	0	0
	SM	kg	2.28E-05	0.00E+00	0	0	0	0.00E+00	0	0
	RSF	MJ	3.52E-03	1.26E-04	0	0	0	0.00E+00	0	0
	NRSF	MJ	6.58E-03	4.52E-04	0	0	0	0.00E+00	0	0
	FW	m^3	3.98E-02	2.64E-05	0	0	0	0.00E+00	0	0

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"

End of life - Waste										
Indicator		Unit	A1-A3	A4	A5	C1	C2	C3	C4	D
	HWD	kg	2.04E-03	1.27E-05	0	0	0	0.00E+00	0	0
	NHWD	kg	1.36E-01	1.20E-02	0	0	0	0.00E+00	0	0
	RWD	kg	1.52E-05	1.68E-06	0	0	0	0.00E+00	0	0

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"

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	0	0	0.00E+00	0	0
	MFR	kg	0.00E+00	0.00E+00	0	0	0	0.00E+00	0	0
	MER	kg	0.00E+00	0.00E+00	0	0	0	0.00E+00	0	0
	EEE	MJ	0.00E+00	0.00E+00	0	0	0	0.00E+00	0	0
	EET	MJ	0.00E+00	0.00E+00	0	0	0	0.00E+00	0	0

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"

Biogenic Carbon Content		
Indicator	Unit	At the factory gate
Biogenic carbon content in product	kg C	0.00E+00
Biogenic carbon content in accompanying packaging	kg C	0.00E+00

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).

Dangerous substances

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

Indoor environment

Not relevant

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	1.21E+00	1.63E-02	0	0	0	0.00E+00	0	0

GWP-IOBC: 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

ISO 14025:2010 Environmental labels and declarations - Type III environmental declarations - Principles and procedures.
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ISO 21930:2017 Sustainability in buildings and civil engineering works - Core rules for environmental product declarations of construction products.
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Vold, et al., (2019) EPD generator for Pipelife - Background information for customer application and LCA data. report number 08.19
NPCR Part A: Construction products and services. Ver. 2.0. March 2021, EPD-Norge.

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ECO PLATFORM EPD VERIFIED	ECO Platform ECO Portal	web: web:	www.eco-platform.org ECO Portal

epd-norge
Global program operatør

Environmental product declaration

in accordance with ISO 14025 and EN 15804+A2

Component EPD Ringebu: Extruded PE pipe systems from Stathelle - used as material component in various finished mixed products

PIPELIFE

The Norwegian EPD Foundation

Owner of the declaration:
Pipelife Norge AS

Product:
Component EPD Ringebu: Extruded PE pipe systems from Stathelle - used as material component in various finished mixed products

Declared unit:
1 kg

This declaration is based on Product Category Rules:
CEN Standard EN 15804:2012+A2:2019 serves as core PCR
NPCR Part A: Construction products and services. Ver. 2.0 March 2021

Program operator:
The Norwegian EPD Foundation

Declaration number:

NEPD-7775-7144-EN

Registration number:

NEPD-7775-7144-EN

Issue date: 14.10.2024

Valid to: 14.10.2029

EPD software:
LCAno EPD generator ID: 443382

General information

Product

Component EPD Ringebu: Extruded PE pipe systems from Stathelle - used as material component in various finished mixed products

Program operator:

The Norwegian EPD Foundation
Post Box 5250 Majorstuen, 0303 Oslo, Norway
Phone: +47 977 22 020
web: www.epd-norge.no

Declaration number:

NEPD-7775-7144-EN

This declaration is based on Product Category Rules:

CEN Standard EN 15804:2012+A2:2019 serves as core PCR
NPCR Part A: Construction products and services. Ver. 2.0 March 2021

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 Component EPD Ringebu: Extruded PE pipe systems from Stathelle - used as material component in various finished mixed products

Declared unit (cradle to gate) with option:

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

Functional unit:

Not applicable

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.

Third party verifier:

Michael M. Jenssen, Asplan Viak AS

(no signature required)

Owner of the declaration:

Pipelife Norge AS
Contact person: Are Lyubråten
Phone: +47 71 65 88 00
e-mail: are.lyubraten@pipelife.com

Manufacturer:

Pipelife Norge AS
Hamnesvegen 97
6650 Surnadal, Norway

Place of production:

Pipelife Norge AS - Ringebu
Flyplassvegen 16
2630 Ringebu, Norway

Management system:

NS-EN ISO 9001:2015 NS-EN ISO 14001:2015

Organisation no:

980 457 575

Issue date:

14.10.2024

Valid to:

14.10.2029

Year of study:

2021

Comparability:

EPD of construction products may not be comparable if they not comply with EN 15804+A2 and seen in a construction context.

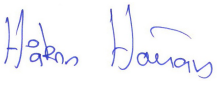
Development and verification of EPD:

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. NEPDT15

Developer of EPD: Diana Karin Schleider

Reviewer of company-specific input data and EPD: Are Lyubråten

Approved:



Håkon Hauan, CEO EPD-Norge

Product

Product description:

PE 100 pipes and fittings and chambers made from PE 100 pipes for water supply, drains and sewers under pressure, non-pressure drains, sewers and surface water piping systems as well as HDPE and PE 100 pipes, corrugated or smooth, for jacket pipes (casings).
The colours are according to the product standards and the colour codes for these applications in Norway.
This EPD covers products as material components, intended for use in various finished mixed products as e.g. flexible piping systems with or without integrated frost protection, pre-insulated piping systems, etc..
More information is found on www.pipelife.no

Product specification

The products covered by this EPD have small variations in composition and are manufactured with the same type of equipment. The composition below represents an average for these products manufactured in 2021.

Materials	kg	%
Plastic products	1,00	100,00
Total	1,00	100,00

Technical data:

For products covered by this EPD the following applies:
Products used as media pipes smooth-walled fullfill the requirements in accordance with EN 12201 (Nordic Poly Mark). They are also approved for drinking water according to the Danish requirements (DK-VAND). For technical information, see our handbook:
https://www.pipelife.no/content/dam/pipelife/norway/marketing/general/r%C3%B8rh%C3%A5ndboka/r%C3%B8rh%C3%A5ndboka2021/M-Materialdata.pdf

Market:

Mainly Norway, but also the Nordic countries.

Reference service life, product

When installed according to the relevant installation manual and having normal operations, the service lifetime is at least 100 years.

Reference service life, building

Not relevant

LCA: Calculation rules

Declared unit:

1 kg Component EPD Ringebu: Extruded PE pipe systems from Stathelle - used as material component in various finished mixed products

Cut-off criteria:

All raw materials and all the essential energy are included.

Allocation:

The allocation is made in accordance with the provisions of EN 15804. Incoming energy and water and waste production in-house is not allocated among internally or externally purchased, components which are not further processed, only handled and assembled, before leaving Ringebu.

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.

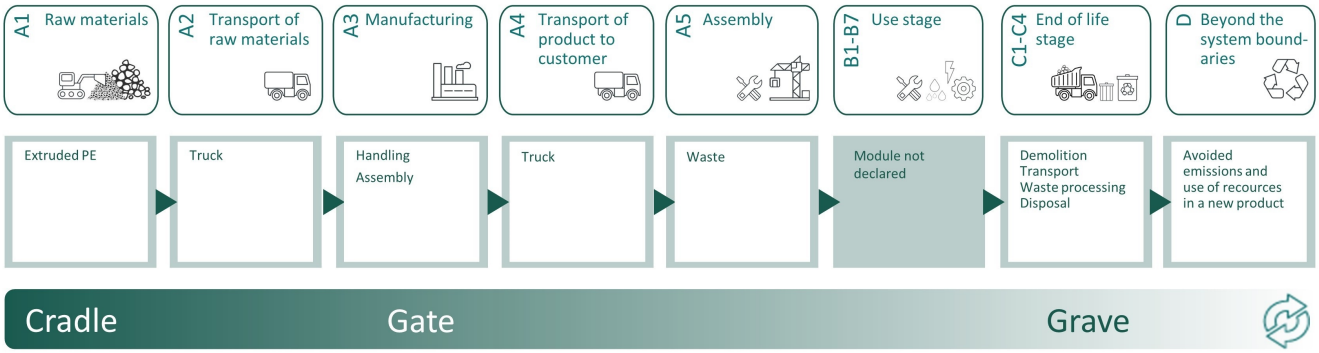
Materials	Source	Data quality	Year
Plastic products	NEPD-4620-3865-EN	EPD	2021

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:

The analysis is a cradle-to-gate (A1 - A3) study, with option A4 transport to market. It includes the extraction and production of raw materials, transportation to the production site, the production process itself and transport to the market. A5, installation, is included for the transport of packaging waste from the construction site and the treatment of this waste - not the installation of the products. The material data set used in A1 is generated from the cradle to gate part (A1-A3) of a published EPD from Pipelife Norway's production at Stathelle. Transport in A2 is the specific transport of the material from Stathelle to Ringebu.



Additional technical information:

Professionally executed design, storage, handling, installation and operations are a precondition for a long service life. The installation instructions must be followed.
Pipelife Norway AS is certified according to EN ISO 14001:2015
See www.pipelife.no for more information on how we are working on environmental issues.

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)
Truck, 16-32 tonnes, EURO 6 (km)	36,7 %	100	0,043	l/tkm	4,30

Waste processing (C3)	Unit	Value			
Waste treatment of polyethylene (PE), incineration with energy recovery and fly ash extraction (kg)	kg	0,50			

Disposal (C4)	Unit	Value			
Landfilling of ashes from incineration of Polyethylene (PE), process per kg ashes and residues (kg)	kg	0,02			
Landfilling of plastic mixture (kg)	kg	0,50			

Benefits and loads beyond the system boundaries (D)	Unit	Value			
Substitution of electricity, in Norway (MJ)	MJ	0,97			
Substitution of thermal energy, district heating, in Norway (MJ)	MJ	14,67			

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	2,16E+00	1,63E-02	0	0	0	1,51E+00	5,81E-02	-8,81E-02
	GWP-fossil	kg CO_2 -eq	2,15E+00	1,63E-02	0	0	0	1,51E+00	5,81E-02	-8,50E-02
	GWP-biogenic	kg CO_2 -eq	1,19E-02	6,76E-06	0	0	0	1,22E-05	5,60E-06	-1,76E-04
	GWP-luluc	kg CO_2 -eq	8,28E-04	5,81E-06	0	0	0	1,79E-06	1,26E-06	-2,93E-03
	ODP	kg CFC11 -eq	7,78E-08	3,70E-09	0	0	0	1,16E-09	1,66E-09	-6,20E-03
	AP	mol H+ -eq	7,92E-03	4,69E-05	0	0	0	1,89E-04	4,21E-05	-7,01E-04
	EP-FreshWater	kg P -eq	3,78E-05	1,31E-07	0	0	0	1,16E-07	6,45E-08	-7,56E-06
	EP-Marine	kg N -eq	1,39E-03	9,29E-06	0	0	0	9,07E-05	7,43E-05	-2,29E-04
	EP-Terrestial	mol N -eq	1,55E-02	1,04E-04	0	0	0	9,81E-04	1,66E-04	-2,48E-03
	POCP	kg NMVOC -eq	7,27E-03	3,98E-05	0	0	0	2,35E-04	5,93E-05	-6,83E-04
	ADP-minerals&metals[1]	kg Sb-eq	2,17E-05	4,51E-07	0	0	0	5,28E-08	4,31E-08	-8,46E-07
	ADP-fossil[1]	MJ	7,30E+01	2,47E-01	0	0	0	9,87E-02	1,24E-01	-1,22E+00
	WDP[1]	m^3	1,18E+02	2,39E-01	0	0	0	2,23E-01	1,06E+00	-1,51E+01

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

Mechanical recycling of PE is very sustainable and in line with the circular economy. Scrap and used products should be collected for recycling.

Additional environmental impact indicators										
Indicator		**Unit**	A1-A3	A4	A5	C1	C2	C3	C4	D
	PM	Disease incidence	6,93E-08	1,00E-09	0	0	0	7,40E-10	8,24E-10	-4,25E-08
	IRP[2]	kgBq U235 -eq	6,01E-02	1,08E-03	0	0	0	1,67E-04	5,96E-04	-7,77E-03
	ETP-fw[1]	CTUe	1,34E+01	1,83E-01	0	0	0	2,95E-01	1,54E-01	-6,61E+00
	HTP-c[1]	CTUh	6,08E-10	0,00E+00	0	0	0	3,40E-11	4,00E-12	-1,21E-10
	HTP-nc[1]	CTUh	1,49E-08	2,00E-10	0	0	0	1,27E-09	1,19E-10	-6,34E-09
	SQP[1]	dimensionless	4,91E+00	1,73E-01	0	0	0	1,20E-02	4,59E-01	-8,13E+00

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)

"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	4,47E+00	3,54E-03	0	0	0	2,90E-03	5,83E-03	-7,51E+00
	PERM	MJ	0,00E+00	0,00E+00	0	0	0	0,00E+00	0,00E+00	0,00E+00
	PERT	MJ	4,47E+00	3,54E-03	0	0	0	2,90E-03	5,83E-03	-7,51E+00
	PENRE	MJ	3,35E+01	2,47E-01	0	0	0	9,87E-02	1,24E-01	-1,22E+00
	PENRM	MJ	4,25E+01	0,00E+00	0	0	0	-4,25E+01	0,00E+00	0,00E+00
	PENRT	MJ	7,60E+01	2,47E-01	0	0	0	-4,24E+01	1,24E-01	-1,22E+00
	SM	kg	0,00E+00	0,00E+00	0	0	0	0,00E+00	0,00E+00	0,00E+00
	RSF	MJ	7,68E-02	1,26E-04	0	0	0	8,17E-05	1,23E-04	-1,32E-03
	NRSF	MJ	1,83E-02	4,52E-04	0	0	0	0,00E+00	1,97E-03	-4,45E-01
	FW	m^3	4,86E-02	2,64E-05	0	0	0	2,79E-04	1,51E-04	-9,05E-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	2,78E-03	1,27E-05	0	0	0	0,00E+00	1,49E-02	-5,72E-05
	NHWD	kg	1,61E-01	1,20E-02	0	0	0	0,00E+00	5,09E-01	-2,87E-02
	RWD	kg	5,64E-05	1,68E-06	0	0	0	0,00E+00	8,10E-07	-6,37E-06

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	0	0	0,00E+00	0,00E+00	0,00E+00
	MFR	kg	0,00E+00	0,00E+00	0	0	0	0,00E+00	4,48E-05	0,00E+00
	MER	kg	0,00E+00	0,00E+00	0	0	0	5,00E-01	1,10E-06	0,00E+00
	EEE	MJ	0,00E+00	0,00E+00	0	0	0	9,70E-01	7,12E-05	0,00E+00
	EET	MJ	0,00E+00	0,00E+00	0	0	0	1,47E+01	1,08E-03	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	0,00E+00
Biogenic carbon content in accompanying packaging	kg C	0,00E+00

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).

Dangerous substances

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

Indoor environment

Not relevant

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	2,05E+00	1,63E-02	0	0	0	1,51E+00	5,81E-02	-8,69E-02

GWP-IOBC: 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.

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