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The Norwegian EPD Foundation

ENVIRONMENTAL PRODUCT DECLARATION

in accordance with ISO 14025, ISO 21930 and EN 15804

Owner of the declaration:	Amiblu Technology AS
Program operator:	The Norwegian EPD Foundation
Publisher:	The Norwegian EPD Foundation
Declaration number:	NEPD-3220-1858-EN
Registration number:	NEPD-3220-1858-EN
ECO Platform reference number:	-
Issue date:	15.11.2021
Valid to:	15.11.2026

Flowtite Pressure Pipe FP2.1 with coupling DN300-400, PN1-6, SN5000-10000 and DN300-400, PN10, SN10000

Amiblu Technology AS

www.epd-norge.no

General information

Product:

Flowtite Pressure Pipe FP2.1 with coupling
DN300-400, PN1-6, SN5000-10000 and DN300-400, PN10, SN10000

Program operator:

The Norwegian EPD Foundation
Pb. 5250 Majorstuen, 0303 Oslo
Phone: +47 23 08 80 00
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Declaration number:

NEPD-3220-1858-EN

ECO Platform reference number:

This declaration is based on Product Category Rules:

CEN Standard EN 15804:2012+A1:2013 serves as core PCR
NPCR Part A: Construction products and services. Ver. 1.0. April 2017

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 Flowtite Pressure Pipe FP2.1 with coupling DN300-400, PN1-6, SN5000-10000 and DN300-400, PN10, SN10000

Declared unit with option:

A1,A2,A3,A4,A5,C1,C2,C3,C4,D

Functional unit:

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. Individual third party verification of each EPD is not required when the EPD tool is i) integrated into the company's environmental management system, ii) the procedures for use of the EPD tool are approved by EPDNorway, and iii) the proccess is reviewed annualy. 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.

Michael M. Jenssen, Asplan Viak AS

(no signature required)

Owner of the declaration:

Amiblu Technology AS
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Manufacturer:

Averaged CFW data from 4 production sites, see Technical data on page 3 for more details

Place of production:

Averaged CFW data from 4 production sites, see Technical data on page 3 for more details

Global

Management system:

ISO 14001

Organisation no:

916 041 195

Issue date: 15.11.2021

Valid to: 15.11.2026

Year of study:

2020

Comparability:

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

Development and verification of EPD:

The declaration has been developed and verified using EPD tool lca.tools ver EPD2020.11, developed by LCA.no AS. The EPD tool is integrated into the company's environmental management system, and has been approved by EPD-Norway

Developer of EPD:

Marcin Pazdro

Reviewer of company-specific input data and EPD:

Petter Åsrud

Approved:

Sign

Håkon Hauan, CEO EPD-Norge

Product

Product description:

FP2.1 Pipe, Flowtite Diameter Series, DN300-400, Liner: Standard (Type 1), Length: 12 m,
Covered pressure classes and stiffness classes are described in Technical Data section.

Product specification

Glass: ECR, Resin: Ortho/rPET, Liner Resin: Ortho, with FPC2.1 Coupling

Specifications and product details are presented here:
https://www.amiblu.com/pressure-pipes/

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

Materials	%
Polyester Resin	20-30
Sand	45-55
Glass fibers	20-30
Rubber gasket	0-1
Peroxide	0-1

Technical data:

The list below provides a mass of a functional unite (1m pipe section with the coupling assembled on a 12m pipe unit). This information is used to calculate the A1-A3 and A4 outputs for 1m section of pipeline by multiplying the values presented in tables on page 6-7 with the mass of of the pipe. Furthermore, mass of 1m pipe section shall also be used to calculate A5 outputs according to the equation provided on page 4.

DN300 PN1 SN5000 - 11.2 kg/m
DN300 PN1 SN10000 - 13.5 kg/m
DN300 PN6 SN5000 - 11.2 kg/m
DN300 PN6 SN10000 - 13.5 kg/m
DN300 PN10 SN10000 - 13.5 kg/m
DN350 PN1 SN5000 - 15.1 kg/m
DN350 PN1 SN10000 - 18.2 kg/m
DN350 PN6 SN5000 - 15.1 kg/m
DN350 PN6 SN10000 - 18.2 kg/m
DN350 PN10 SN10000 - 18.2 kg/m
DN400 PN1 SN5000 - 19.9 kg/m
DN400 PN1 SN10000 - 24.1 kg/m
DN400 PN6 SN5000 - 19.9 kg/m
DN400 PN6 SN10000 - 24.1 kg/m
DN400 PN10 SN10000 - 24.1 kg/m

Market:

Europe

Reference service life, product

Up to 150 years

Reference service life, construcion

LCA: Calculation rules

Declared unit:

1 kg Flowtite Pressure Pipe FP2.1 with coupling DN300-400, PN1-6, SN5000-10000 and DN300-400, PN10, SN10000

Cut-off criteria:

All raw materials which are present in the final product at a concentration greater than 0.1 % are included. Some of the raw materials used at lower content are modeled using datasets representing the closest match according to the best knowledge of Amiblu. The contribution of capital goods is estimated to be lower than the general cut-off criteria of 1%. Transport of personnel is outside the scope of the LCA

Allocation:

Allocation was carried out in accordance with EN 15804. There are no-allocations between co-products in the EPD since there are no co-products created during the manufacturing. Environmental burdens related to A1 and A2 stages are allocated to pipes based on the specific pipe composition, transport modes and distances of raw materials to a plant in which the product has been produced. All manufacturing inputs (energy and auxiliary materials) are allocated equally to products through mass allocation. Equal allocation also applies to waste, although for certain waste flows, a specific allocation was performed based on the production process and product formulation. 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.

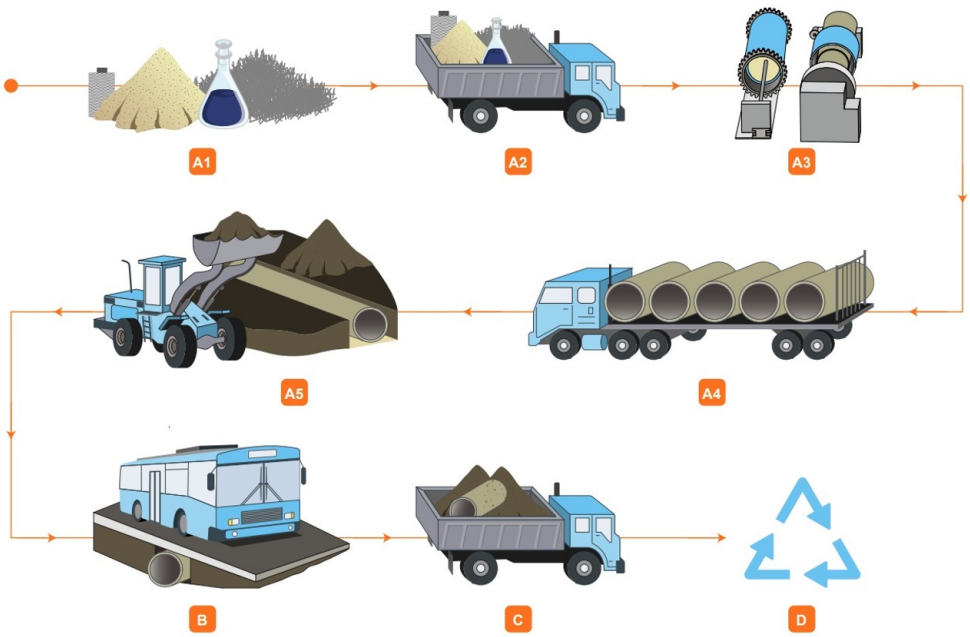
Data quality:

Specific data for the product compositions are used. In case of some raw materials, data from ecoinvent 3.6 were modified to better reflect the composition of specific materials used by Amiblu. Transportation modes and distances are collected for all raw materials, specific for each production site. Energy inputs are also specific for each site. Production site data were collected in the year of study defined on page 2. The data quality of the raw materials in A1 is presented in the table below.

Materials	Source	Data quality	Year
Chemicals	ecoinvent3.6	Database	2019
Glass fibre	ecoinvent3.6	Database	2019
Rubber, synthetic	ecoinvent3.6	Database	2019
Sand	ecoinvent3.6	Database	2019
Polyester resin	Modified ecoinvent3.6	Database	2019

System boundary:

Production Flow



A1 - Raw materials
Typically including glass fibers, resin, sand, filler, rubber

A2 - Transport of raw materials
Tanker, container transport, sea-transport

A3- Manufacturing
Continuous Filament Winding, Centrifugal Casting, Filament Winding, Hand Lay-up Lamination

A4 - Transport to site
Road transport, sea transport

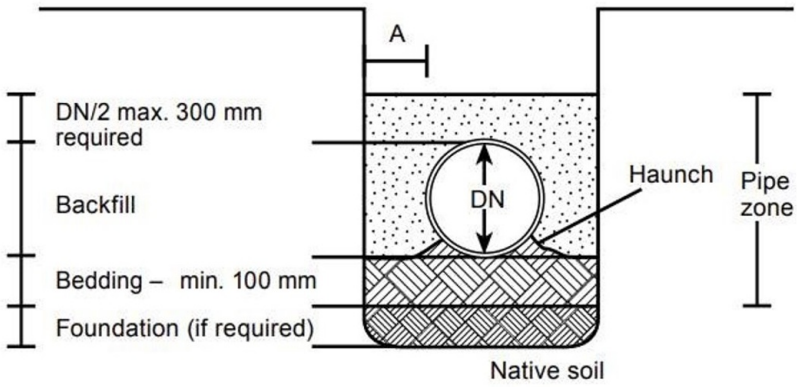
A5 - Installation
Operation of excavators and earth moving equipment, bedding material, transport

B - Use
Use, maintenance, repair, replacement, refurbishment, operational energy use, operational water use

C - End of life
Excavation, transport, waste processing, disposal

D - Beyond construction works Life Cycle
Reuse, recovery, recycling potential

Standard Trench Geometry



Assumptions:

- "A" distance is calculated according to following equation: A=(0,2156*DN+205,2)/1000
- Bedding and foundation material are represented as "gravel, round – gravel and sand quarry operation, EcoInvent database".
- The amount of soil reused as backfill, the amount of gravel used as foundation and bedding material and the distance from the quarry, the consumption of diesel fuel for excavation and finishing operations are provided in "Scenarios and additional technical information" on page 5.

A5 outputs should be calculated according to the equation below:

$$A5_{DN_{x,1m}} = A5_{DN_{1kg}} * \frac{A_{T-DN}}{A_{T-DN_x}} * m_{1mPipe}$$, where:

$A5_{DNx,1m}$ – A5 impact calculated for 1m piping section;
$A5_{DN,1kg}$ – A5 impact given in tables on page 6 or 7 for a modelled pipe;
A_{T-DN} – cross-section area for a trench used in LCA calculations (used for generation of the data in tables on page 6 and 7);
A_{T-DNx} – cross-section area for a trench modelled for a pipe having different diameter than the modelled one;
m_{1mPipe} – weight of 1m piping section of pipe used for LCA calculations(Technical data section on page 2);

Trench's cross-section area for a pipe with a known DN can be calculated using following equation:

$$A_{T-DN} = 1.79 * \left(\frac{DN}{1000}\right)^2 + 1.94 * \frac{DN}{1000} + 0.41$$

Additional technical information:

https://www.amiblu.com/

LCA: Scenarios and additional technical information

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

For A4 stage, a typical transport distance of 500 km from the pipe production plant to the installation site is assumed. A project specific EPD can be provided on request. For A5 module, a trench geometry is calculated automatically based on the diameter of the pipe. The trench depth is assume to be DN + 1/4DN + DN. The diesel consumption of 0,36 liter per 1 cubic meter of excavated soil is used. In addition, the consumption of 1.6 liter of diesel per 1m of the trench length is used to account for material compaction and trench filling operations. It is assumed that 50% of excavated soil is replaced with gravel. Transport distance for disposal site of unused soil and gravel from quarry is assumed to be 20 km on average. Use stage has not been included since glass reinforced plastic piping, once installed, does not require maintenance. It has been assumed that at the end of the functional life of the piping, the installation is either left in ground or re-lined. Potential relining is considered to be a second life stage, thus, all environmental burdens associated with re-lining are omitted in this declaration. LCA study was performed for the Flowtite Pressure Pipe FP2.1 DN350 PN1 SN5000 with the corresponding with Reka coupling. The environmental impacts for 1kg of other piping systems covered by this EPD stays within the +/- 10% range compared to values presented on pages 6 and 7. The A2 and A3 scenario represents an weight average calculated for 2020 for following manufacturing plants: - Amiblu Germany GmbH (DE30), Am Fuchsloch 19, 04720 Döbeln, GERMANY; - Amiblu Pipes Spain S.A. (ES10), Polígono Industrial La Venta Nova, 91, 43894 Camarles, Tarragona, SPAIN; - Amiblu Sp. z o.o. (PL30), Ul. Nowy Swiat 20a, 80-299 Gdansk-Barniewice, POLAND; - Amitech Maroc Pach Industriel SAPINO, Ilots 10 et 20, Nouasseur, Z.I. Sapino -Casablanca, MAROC;

Transport from production place to user (A4)

Type	Capacity utilisation (incl. return) %	Type of vehicle	Distance km	Fuel/Energy consumption	Unit	Value (l/t)
Truck	38,8 %	Amiblu - Truck, lorry 16-32 tonnes, EURO 5	500	0,044606	l/tkm	22,30
Railway					l/tkm	
Boat					l/tkm	
Other Transportation					l/tkm	

Assembly (A5)

.	Unit	Value
Auxiliary	kg	152,3109
Water consumption	m^3	
Electricity consumption	kWh	
Other energy carriers	MJ	3,0264
Material loss	kg	
Output materials from waste treatment	kg	
Dust in the air	kg	
VOC emissions	kg	

LCA: Results

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

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

Product stage			Construction installation stage		User stage							End of life stage				.	Beyond the system bondaries
Raw materials	Transport	Manufacturing	Transport	Assembly	Use	Maintenance	Repair	Replacement	Refurbishment	Operational energy use	Operational water use	De-construction demolition	Transport	Waste processing	Disposal		Reuse-Recovery-Recycling-potential
A1	A2	A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	.	D
X	X	X	X	X								X	X	X	X	.	X

Environmental impact

Parameter	Unit	A1-A3	A4	A5	C1	C2	C3	C4	D
GWP	kg CO_2 -eq	1,72E+00	8,13E-02	6,77E-01	0	0	0	0	0
ODP	kg CFC11 -eq	2,02E-07	1,50E-08	1,22E-07	0	0	0	0	0
POCP	kg C_2H_4-eq	5,95E-04	1,33E-05	1,19E-04	0	0	0	0	0
AP	kg SO_2 -eq	8,13E-03	2,59E-04	2,10E-03	0	0	0	0	0
EP	kg PO_4^{3-} -eq	1,03E-03	4,30E-05	5,11E-04	0	0	0	0	0
ADPM	kg Sb -eq	5,10E-05	2,48E-07	2,81E-06	0	0	0	0	0
ADPE	MJ	3,56E+01	1,23E+00	9,50E+00	0	0	0	0	0

GWP Global warming potential; ODP Depletion potential of the stratospheric ozone layer; POCP Formation potential of tropospheric photochemical oxidants; AP Acidification potential of land and water; EP Eutrophication potential; ADPM Abiotic depletion potential for non fossil resources; ADPE Abiotic depletion potential for fossil resources

"Reading example: 9,0 E-03 = 9,0*10-3 = 0,009"
*INA Indicator Not Assessed

Resource use

Parameter	Unit	A1-A3	A4	A5	C1	C2	C3	C4	D
RPEE	MJ	1,70E+00	1,79E-02	5,78E-01	0	0	0	0	0
RPEM	MJ	7,85E-04	0,00E+00	0,00E+00	0	0	0	0	0
TPE	MJ	1,70E+00	1,79E-02	5,78E-01	0	0	0	0	0
NRPE	MJ	3,97E+01	1,25E+00	1,07E+01	0	0	0	0	0
NRPM	MJ	5,79E-01	0,00E+00	0,00E+00	0	0	0	0	0
TRPE	MJ	4,02E+01	1,25E+00	1,07E+01	0	0	0	0	0
SM	kg	3,47E-02	0,00E+00	8,02E+01	0	0	0	0	0
RSF	MJ	9,05E-02	0,00E+00	5,08E-04	0	0	0	0	0
NRSF	MJ	5,53E-03	0,00E+00	7,47E-03	0	0	0	0	0
W	m^3	2,01E-02	2,35E-04	1,02E-01	0	0	0	0	0

RPEE Renewable primary energy resources used as energy carrier; RPEM Renewable primary energy resources used as raw materials; TPE Total use of renewable primary energy resources; NRPE Non renewable primary energy resources used as energy carrier; NRPM Non renewable primary energy resources used as materials; TRPE Total use of non renewable primary energy resources; SM Use of secondary materials; RSF Use of renewable secondary fuels; NRSF Use of non renewable secondary fuels; W Use of net fresh water

"Reading example: 9,0 E-03 = 9,0*10-3 = 0,009"
*INA Indicator Not Assessed

End of life - Waste

Parameter	Unit	A1-A3	A4	A5	C1	C2	C3	C4	D
HW	kg	4,18E-03	7,33E-07	1,18E-04	0	0	0	0	0
NHW	kg	2,92E-01	6,60E-02	2,55E-01	0	0	0	0	0
RW	kg	8,18E-05	8,61E-06	7,91E-05	0	0	0	0	0

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

"Reading example: 9,0 E-03 = 9,0*10-3 = 0,009"
*INA Indicator Not Assessed

End of life - Output flow

Parameter	Unit	A1-A3	A4	A5	C1	C2	C3	C4	D
CR	kg	0,00E+00	0,00E+00	0,00E+00	0	0	0	0	0
MR	kg	1,01E-03	0,00E+00	5,70E-06	0	0	0	0	0
MER	kg	1,31E-02	0,00E+00	1,84E-03	0	0	0	0	0
EEE	MJ	9,27E-03	0,00E+00	1,96E-05	0	0	0	0	0
ETE	MJ	1,16E-01	0,00E+00	2,96E-04	0	0	0	0	0

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

"Reading example: 9,0 E-03 = 9,0*10-3 = 0,009"
*INA Indicator Not Assessed

Additional requirements

Greenhouse gas emissions from the use of electricity in the manufacturing phase

National production mix from import, low voltage (production of transmission lines, in addition to direct emissions and losses in grid) of applied electricity for the manufacturing process (A3).

Electricity mix	Data source	Amount	Unit
Amiblu - Electricity, Poland (kWh)	ecoinvent 3.6	1099,70	g CO2-ekv/kWh
Amiblu - Electricity, Spain (kWh)	ecoinvent 3.6	349,18	g CO2-ekv/kWh
Amiblu - Electricity, Germany (kWh)	ecoinvent 3.6	629,86	g CO2-ekv/kWh
Amiblu - Electricity, Morocco (kWh)	ecoinvent 3.6	888,34	g CO2-ekv/kWh

Dangerous substances

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

Indoor environment

Not relevant

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+A1:2013 Environmental product declaration - Core rules for the product category of construction products.
ISO 21930:2017 Core rules for environmental product declarations of construction products.
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Iversen et al., (2018) eEPD v3.0 - Background information for EPD generator system. LCA.no report 04.18.
Ruttenborg et al., (2021) EPD generator for Amiblu Technology AS Background information for customer application and LCA data, LCA.no report number 01.21
NPCR Part A: Construction products and services. Ver. 1.0. April 2017, EPD-Norge.
NPCR 019 Part B for Piping systems for use in sewage and storm water systems (under gravity), Ver 2.0.

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