

# Environmental Product Declaration

In accordance with ISO 14025 and EN 15804 +A2



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

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

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## SiTech+ PP Pipe STEM

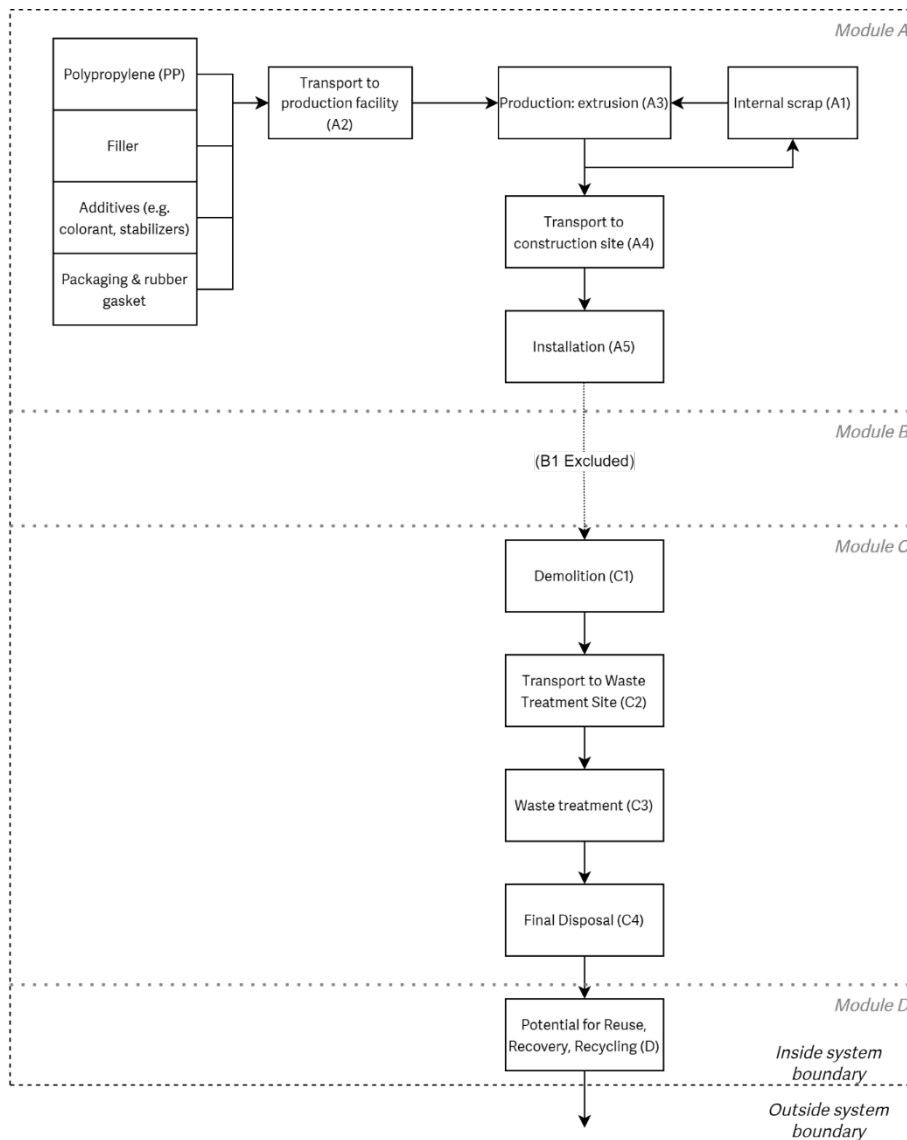
Wavin SiTech+ is a waste water system made of mineral-reinforced polypropylene (PP), which offers increased durability, but more importantly is quiet and easy to install.

**Manufacturer**  
Wavin Germany Twist









### Cut-off criteria:

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

## LCA: Scenarios and additional technical information

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

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

The transportation distance from Twist to Oslo was considered.

Type	Capacity utilisation (incl. return) %	Type of vehicle	Distance KM	Fuel/Energy consumption
Truck	50%	Unspecified	945	0,027 l diesel/tkm
Boat	50%	Ferry	163	0,0295 kg heavy fuel oil/tkm

## Assembly (A5)

Product losses of 10% are considered. The installation is done manually, and therefore no energy is needed.

	Unit	Value
Material loss	kg	0,1
Packaging waste	kg	0,14

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

Demolition is done manually, and therefore no energy is needed. The considered waste treatment for the pipe is 70% recycling, 20% incineration with energy recovery and 10% landfill. The considered waste treatment for the rubber gasket is 85% incineration with energy recovery, 10% landfill, and 5% recycling. The amount 'collected as mixed construction waste' is based on the 1 kg, minus the amount of packaging waste.

	Unit	Value
Collected as mixed construction waste	kg	0,86
Reuse	kg	0
Recycling	kg	0,60
Energy recovery	kg	0,18
To landfill	kg	0,09

## Transport to waste processing (C2)

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

Type	Capacity utilisation (incl. return) %	Type of vehicle	Distance KM	Fuel/Energy consumption
Truck	50%	Unspecified	199,4	0,027 l diesel/tkm

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

For the PP, and additives, 0,67 kg of saved virgin PP was considered per kg material recycled (total of A5 en C3). For the filler, 0,67 kg of saved virgin filler was considered per kg filler recycled. The benefits from exported energy were calculation from the energy efficiencies for Northern countries reported by CEWEP, which is equal to an electrical efficiency of 11,0%, and a thermal efficiency of 72,6%. Energy recovery from all materials (including rubber gasket and packaging) was considered. Substitution of Norwegian electricity mix and district heating mix was assumed.

	Unit	Value
Saving of virgin PP	kg	0,28
Saving of virgin filler	kg	0,16
Substitution of electric energy	MJ	0,62
Substitution of thermal energy	MJ	4,12

## Additional technical information

Not applicable.

## LCA: Results

The LCA results are presented below for the declared unit defined on page 2 of the EPD document. Recalculation to results for pipes per meter can be done based on the technical data specified on page 3.

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

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

## Core environmental impact indicators

Indicator	Unit	A1-A3	A4	A5	C1	C2	C3	C4	D
GWP-total	kg CO2 eq.	8,10E-01	1,22E-01	6,79E-01	0,00E+00	2,27E-02	5,10E-01	6,89E-03	-8,17E-01
GWP-fossil	kg CO2 eq.	1,28E+00	1,22E-01	1,98E-01	0,00E+00	2,27E-02	5,11E-01	6,89E-03	-8,15E-01
GWP-biogenic	kg CO2 eq.	-4,68E-01	6,12E-05	4,81E-01	0,00E+00	1,38E-05	-7,62E-04	6,33E-06	-2,63E-03
GWP-LULUC	kg CO2 eq.	3,67E-03	4,72E-05	3,87E-04	0,00E+00	8,02E-06	1,27E-04	1,42E-07	-2,55E-04
ODP	kg CFC11 eq.	5,11E-08	2,76E-08	1,08E-08	0,00E+00	5,22E-09	1,67E-08	2,36E-10	-4,36E-08
AP	mol H <sup>+</sup> eq.	5,06E-03	1,11E-03	7,51E-04	0,00E+00	1,29E-04	6,82E-04	5,37E-06	-2,40E-03
EP-freshwater	kg P eq.	2,19E-05	9,35E-07	2,72E-06	0,00E+00	1,86E-07	3,66E-06	6,29E-09	-9,39E-06
EP-marine	kg N eq.	9,87E-04	3,42E-04	1,80E-04	0,00E+00	4,62E-05	1,95E-04	3,19E-06	-4,59E-04
EP-terrestrial	mol N eq.	1,12E-02	3,78E-03	2,03E-03	0,00E+00	5,09E-04	2,14E-03	2,19E-05	-5,46E-03
POCP	kg NMVOC eq.	4,47E-03	1,04E-03	7,04E-04	0,00E+00	1,45E-04	6,83E-04	7,73E-06	-2,15E-03
ADP-M&M	kg Sb eq.	2,49E-05	3,18E-06	3,26E-06	0,00E+00	6,52E-07	3,07E-06	5,87E-09	-5,83E-06
ADP-fossil	MJ	4,16E+01	1,83E+00	4,66E+00	0,00E+00	3,48E-01	2,22E+00	1,68E-02	-2,42E+01
WDP	m <sup>3</sup>	1,19E+00	5,28E-03	1,24E-01	0,00E+00	1,07E-03	4,27E-02	7,51E-05	-4,07E-01

**GWP-total:** Global Warming Potential; **GWP-fossil:** Global Warming Potential fossil fuels; **GWP-biogenic:** Global Warming Potential biogenic; **GWP-LULUC:** Global Warming Potential land use and land use change; **ODP:** Depletion potential of the stratospheric ozone layer; **AP:** Acidification potential, Accumulated Exceedance; **EP-freshwater:** Eutrophication potential, fraction of nutrients reaching freshwater end compartment; See “additional Norwegian requirements” for indicator given as PO4 eq. **EP-marine:** Eutrophication potential, fraction of nutrients reaching freshwater end compartment; **EP-terrestrial:** Eutrophication potential, Accumulated Exceedance; **POCP:** Formation potential of tropospheric ozone; **ADP-M&M:** Abiotic depletion potential for non-fossil resources (minerals and metals); **ADP-fossil:** Abiotic depletion potential for fossil resources; **WDP:** Water deprivation potential, deprivation weighted water consumption

## Additional environmental impact indicators

Indicator	Unit	A1-A3	A4	A5	C1	C2	C3	C4	D
PM	Disease incidence	6,78E-08	1,01E-08	9,68E-09	0,00E+00	2,05E-09	1,15E-08	1,13E-10	-2,20E-08
IRP	kBq U235 eq.	3,11E-02	7,99E-03	4,96E-03	0,00E+00	1,52E-03	6,69E-03	7,65E-05	-1,25E-02
ETP-fw	CTUe	1,06E+01	1,45E+00	1,54E+00	0,00E+00	2,82E-01	2,49E+00	1,29E-02	-5,61E+00
HTP-c	CTUh	4,92E-10	5,53E-11	1,20E-10	0,00E+00	1,00E-11	2,77E-10	3,53E-13	-1,66E-10
HTP-nc	CTUh	1,06E-08	1,68E-09	1,77E-09	0,00E+00	3,37E-10	3,57E-09	8,03E-12	-4,58E-09
SQP	Dimensionless	4,58E+01	1,42E+00	4,98E+00	0,00E+00	2,98E-01	1,79E+00	4,14E-02	-1,19E+01

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

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

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



	Potential Comparative Toxic Unit for humans (HTP-nc)	2
	Potential Soil quality index (SQP)	2
<p><b>Disclaimer 1</b> – 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.</p> <p><b>Disclaimer 2</b> – 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</p>		

## Resource use

Parameter	Unit	A1-A3	A4	A5	C1	C2	C3	C4	D
RPEE	MJ	8,81E+00	2,47E-02	8,96E-01	0,00E+00	4,99E-03	1,09E-01	5,48E-04	-2,56E+00
RPEM	MJ	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
TPE	MJ	8,81E+00	2,47E-02	8,96E-01	0,00E+00	4,99E-03	1,09E-01	5,48E-04	-2,56E+00
NRPE	MJ	4,47E+01	1,94E+00	4,99E+00	0,00E+00	3,69E-01	2,36E+00	1,78E-02	-2,62E+01
NRPM	MJ	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
TRPE	MJ	4,47E+01	1,94E+00	4,99E+00	0,00E+00	3,69E-01	2,36E+00	1,78E-02	-2,62E+01
SM	kg	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
RSF	MJ	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
NRSF	MJ	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
W	m <sup>3</sup>	2,18E-02	1,94E-04	2,39E-03	0,00E+00	3,94E-05	1,25E-03	2,05E-05	-6,19E-03

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

## End of life - Waste

Parameter	Unit	A1-A3	A4	A5	C1	C2	C3	C4	D
HW	KG	1,08E-05	4,35E-06	2,09E-06	0,00E+00	8,89E-07	3,58E-06	1,98E-08	-7,37E-06
NHW	KG	1,14E-01	1,02E-01	5,37E-02	0,00E+00	2,16E-02	1,08E-01	8,64E-02	-2,28E-02
RW	KG	3,16E-05	1,25E-05	5,81E-06	0,00E+00	2,37E-06	8,50E-06	1,11E-07	-1,19E-05

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

## End of life – output flow

Parameter	Unit	A1-A3	A4	A5	C1	C2	C3	C4	D
CR	kg	0,00E+00	0,00E+00	7,48E-03	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
MR	kg	0,00E+00	0,00E+00	7,48E-02	0,00E+00	0,00E+00	5,99E-01	0,00E+00	0,00E+00
MER	kg	0,00E+00	0,00E+00	1,38E-01	0,00E+00	0,00E+00	1,76E-01	0,00E+00	0,00E+00
EEE	MJ	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	6,26E-01

ETE	MJ	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	4,12E+00
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CR Components for reuse; MR Materials for recycling; MER Materials for energy recovery; EEE Exported electric energy; ETE Exported thermal energy

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

Biogenic carbon content	Unit	Value
Biogenic carbon content in product	kg C	0
Biogenic carbon content in the accompanying packaging	kg C	0,131

## Additional Norwegian requirements

### Greenhouse gas emission from the use of electricity in the manufacturing phase

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

National electricity grid	Unit	Value
Hydroelectricity, average (Ecoinvent 3.6)	kg CO2 -eq/kWh	0,0496

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

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

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

Indicator	Unit	A1-A3	A4	A5	C1	C2	C3	C4	D
GWP-IOBC	kg CO2 eq.	1,28E+00	1,22E-01	1,98E-01	0,00E+00	2,27E-02	5,11E-01	6,88E-03	-8,15E-01
GWP-BC	kg CO2 eq.	-4,68E-01	6,12E-05	4,81E-01	0,00E+00	1,38E-05	-7,62E-04	6,33E-06	-2,63E-03
GWP	kg CO2 eq.	8,10E-01	1,22E-01	6,79E-01	0,00E+00	2,27E-02	5,10E-01	6,89E-03	-8,17E-01

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

### Hazardous substances

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

- The product contains no substances given by the REACH Candidate list or the Norwegian priority list.
- The product contains substances given by the REACH Candidate list or the Norwegian priority list that are less than 0,1 % by weight.

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

### Indoor environment




The product meets the requirements for low emissions.

### Carbon footprint

Carbon footprint has not been worked out for the product.

## Bibliography

ISO 14025:2010	Environmental labels and declarations - Type III environmental declarations - Principles and procedures
ISO 14044:2006	Environmental management - Life cycle assessment - Requirements and guidelines
EN 15804:2012+A2:2019	Sustainability of construction works - Environmental product declaration - Core rules for the product category of construction products
ISO 21930:2007	Sustainability in building construction - Environmental declaration of building products
NPCR Part A	Construction products and services. Ver. 2.0. March 2021, EPD-Norge
CEWEP	Results of Specific Data for Energy, R1 Plant Efficiency Factor and NCV of 314 European Waste-to-Energy (WtE) Plants, CEWEP Energy Report III (status 2007-2010), 2012, Reiman, D.O.

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