epd-norge
Global program operatør

Environmental product declaration

in accordance with ISO 14025 and EN 15804+A2

PFN

TROX® TECHNIK
The art of handling air

The Norwegian EPD Foundation

Owner of the declaration:
TROX Group

Product:
PFN

Declared unit:
1 pcs

This declaration is based on Product Category Rules:
CEN Standard EN 15804:2012+A2:2019 serves as core PCR
NPCR 030:2021 Part B for ventilation components

Program operator:
The Norwegian EPD Foundation

Declaration number:

NEPD-5563-4847-EN

Registration number:

NEPD-5563-4847-EN

Issue date: 13.12.2023

Valid to: 13.12.2028

EPD Software:
LCA.no EPD generator ID: 71916

General information

Product

PFN

Program operator:

Post Box 5250 Majorstuen, 0303 Oslo, Norway
The Norwegian EPD Foundation
Phone: +47 23 08 80 00
web: post@epd-norge.no

Declaration number: NEPD-5563-4847-EN

This declaration is based on Product Category Rules:

CEN Standard EN 15804:2012+A2:2019 serves as core PCR
NPCR 030:2021 Part B for ventilation components

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 pcs PFN

Declared unit with option:

A1-A3,A4,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. 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:

Alexander Borg, Asplan Viak AS

(no signature required

Owner of the declaration:

TROX Group
Contact person: Dirk Scherder
Phone: +49 2845 2020
e-mail: productsustainability-de@troxgroup.com

Manufacturer:

TROX Group
Heinrich-Trox-Platz 1
47506 Neukirchen-Vluyn, Germany

Place of production:

TROX KS Filter s.r.o.
Evropská 710
261 01 Příbram, Czech Republic

Management system:

ISO 9001, ISO 14001:2015, ISO 50001:2018

Organisation no:

DE 120250070

Issue date: 13.12.2023

Valid to: 13.12.2028

Year of study:

2022

Comparability:

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

Developer of EPD: David Meiering

Reviewer of company-specific input data and EPD: Jule Dallmann

Approved:

Håkon Hauan
Managing Director of EPD-Norway

Product

Product description:

Prefilters or final filters in ventilation and air conditioning systems.

For more information see:
www.trox.de/en/pocket-filters-made-of-nanowave-medium/pfn-fb05ea35df31b056

Product specification

Pocket filter PFN made of NanoWave® medium as prefilters or final filters for the separation of fine dust in ventilation and air conditioning systems. Wedge-shaped filter pockets ensure ideal airflow conditions. Highest possible dust holding capacity with an extremely low initial differential pressure due to a multi-layer filter medium with a prefilter layer and a layer of corrugated extra fine fibres. Pocket filters made of NanoWave® medium are available in standard sizes with variable numbers of pockets and pocket depth, filter groups ePM10 and ePM1 according to ISO 16890. Pocket filters made of NanoWave® medium are Eurovent-certified and compliant with VDI 6022 in terms of hygiene. The PFN-EX pocket filters with optional EX protection may be used in areas with a potentially explosive atmosphere of zones 1 and 2, as well as zones 21 and 22 (EX II 2G Ex h IIC Gb and EX II 2D Ex h IIIB Db). It is mandatory to connect the filters to the earth potential. All conductive and dissipative parts must be connected together and grounded. Conductive dusts are excluded from the application. Under no circumstances should metallic foreign materials enter the filter.
Ambient temperature range: -40 °C = Ta = +80 °C.

This EPD declares the environmental data of the product series PFN. The following represents a representative dataset of the default variant PFN-ePM1-65%-PLA-25/592x592x600x8.

Materials	kg	%
Filter, plastic based	0,87	52,99
Plastic - Polyethylene	0,01	0,85
Plastic - Polystyrene (PS)	0,73	44,33
Plastic - Polyvinyl chloride (PVC)	0,03	1,83
Total	1,64	

Packaging	kg	%
Packaging - Cardboard	0,02	5,92
Packaging - Pallet	0,38	92,52
Packaging - Plastic	0,01	1,55
Total incl. packaging	2,05	

Technical data:

For technical data see:
www.trox.de/en/pocket-filters-made-of-nanowave-medium/pfn-fb05ea35df31b056#technical-information

Market:

Europe.

Reference service life, product

1-2 years.

Reference service life, building or construction works

60 years.

LCA: Calculation rules

Declared unit:

1 pcs PFN

Cut-off criteria:

All major raw materials and all the essential energy is included. The production processes for raw materials and energy flows with very small amounts (less than 1%) are not included. These cut-off criteria do not apply for hazardous materials and substances.

Allocation:

The allocation is made in accordance with the provisions of EN 15804. Energy, water and waste production in-house is allocated equally among all products through mass allocation. 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:

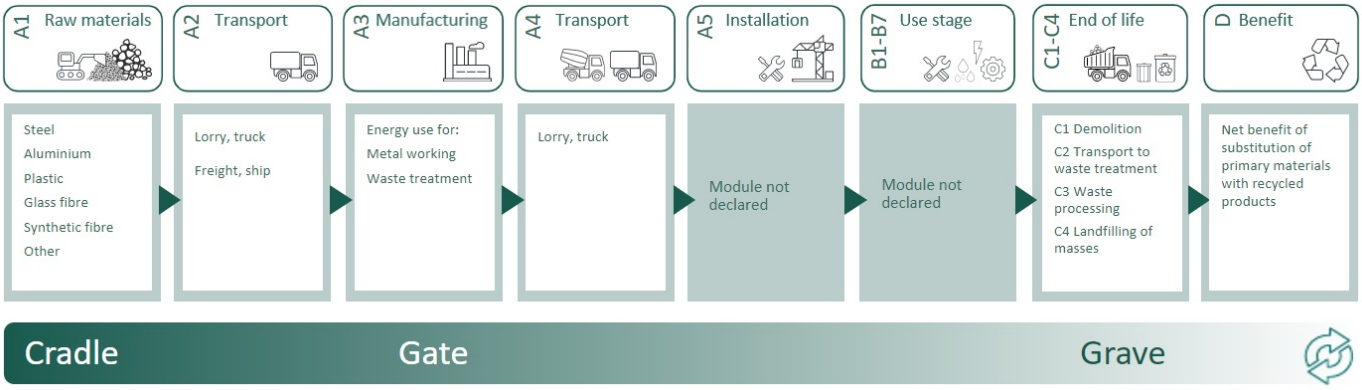
Specific data for the product composition are provided by the manufacturer. The data represent the production of the declared product and were collected for EPD development in the year of study. Background data is based on EPDs according to EN 15804 and different LCA databases. The data quality of the raw materials in A1 is presented in the table below.

Materials	Source	Data quality	Year
Filter, plastic based	ecoinvent 3.6	Database	2019
Packaging - Cardboard	ecoinvent 3.6	Database	2019
Packaging - Pallet	ecoinvent 3.6	Database	2019
Packaging - Plastic	ecoinvent 3.6	Database	2019
Plastic - Polyethylene	ecoinvent 3.6	Database	2019
Plastic - Polystyrene (PS)	ecoinvent 3.6	Database	2019
Plastic - Polyvinyl chloride (PVC)	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	MND	MND	MND	MND	MND	MND	MND	MND	X	X	X	X	X

System boundary:



Additional technical information:

Pocket filters for the separation of fine dust.

Filter groups ePM10 and ePM1 (fine dust filters).
Performance tested to ISO 16890.
Eurovent certification for fine dust filters.
Meets the hygiene requirements of VDI 6022.
High energy efficiency class according to Eurovent.
NanoWave® medium, sewn.
Enlarged filter area due to filter pockets.
NanoWave® medium with extremely low initial differential pressure and highest possible dust holding capacity, ideal flow conditions due to wedge-shaped filter pockets.
Different numbers of pockets and pocket depths.
Quick installation and filter changing times due to easy, safe handling.
Fitting into standard cell frames for filter walls (type SIF) or into universal casings (type UCA) for duct installation.

Optional equipment and accessories:

Front frame made of plastic or galvanised sheet steel.

ATEX construction for protection zones 1 and 2 as well as 21 and 22.

Filter lifetime:

Filters should work optimally and efficiently during their entire life cycle. This duration depends on the specific characteristics of the filter as well as the individual operating conditions.
A method for determining this service life is described in standard EN 13053. The service life is reached when the pressure difference of the filter has either increased by 100 Pa to the respective initial pressure drop (initial pressure drop + 100 Pa) or when three times the value of the initial pressure drop has been reached (initial pressure drop × 3). The rule that occurs first determines the filter change. These values are valid with ePM10, ePM2.5 and ePM1 filters. In combination with Coarse filters the value of 100 Pa is replaced by 50 Pa.
VDI guideline 6022 recommends changing the filter according to its operating time. The first filter stage should be replaced after one year and those in further filter stages after two years at the latest. If DIN 1946 Part 4 is applied, the third filter stage (min. H13) can be in use for up to ten years, depending on the final pressure drop and the manufacturer's specifications.
However, this service life can be shortened, e.g. for hygienic reasons or because of a defect, likewise for energy reasons.

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 %	800	0,043	l/tkm	34,40

De-construction demolition (C1)	Unit	Value			
Demolition of building per kg of ventilation product (kg)	kg/DU	1,65			

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 %	50	0,043	l/tkm	2,15

Waste processing (C3)	Unit	Value			
Waste treatment per kg Plastics, incineration (kg)	kg	0,36			
Waste treatment per kg Polyethylene (PE), incineration (kg)	kg	0,01			
Waste treatment per kg Polypropylene (PP), incineration (kg)	kg	0,43			
Waste treatment per kg Polyvinylchloride (PVC), incineration with fly ash extraction (kg)	kg	0,02			

Disposal (C4)	Unit	Value			
Landfilling of ashes from incineration of Plastics, process per kg ashes and residues (kg)	kg	0,01			
Landfilling of ashes from incineration of Polyethylene (PE), process per kg ashes and residues (kg)	kg	0,00			
Landfilling of ashes from incineration of Polypropylene (PP), process per kg ashes and residues (kg)	kg	0,01			
Landfilling of ashes from incineration of Polyvinylchloride (PVC), process per kg ashes and residues (kg)	kg	0,00			
Waste, plastic, mixture, to landfill (kg)	kg	0,82			

Benefits and loads beyond the system boundaries (D)	Unit	Value			
Substitution of electricity (MJ)	MJ	0,74			
Substitution of thermal energy, district heating (MJ)	MJ	11,14			

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	C1	C2	C3	C4	D
	GWP-total	kg CO_2 -eq	7,24E+00	2,68E-01	2,18E-03	1,68E-02	2,01E+00	9,50E-02	-6,69E-02
	GWP-fossil	kg CO_2 -eq	7,21E+00	2,68E-01	2,18E-03	1,67E-02	2,01E+00	9,50E-02	-6,46E-02
	GWP-biogenic	kg CO_2 -eq	2,59E-02	1,11E-04	4,08E-07	6,93E-06	5,41E-05	9,02E-06	-1,33E-04
	GWP-luluc	kg CO_2 -eq	5,17E-03	9,53E-05	1,71E-07	5,96E-06	1,81E-05	2,01E-06	-2,22E-03
	ODP	kg CFC11 -eq	3,15E-07	6,07E-08	4,70E-10	3,79E-09	7,50E-09	2,68E-09	-4,70E-03
	AP	mol H+ -eq	2,97E-02	7,70E-04	2,28E-05	4,81E-05	2,81E-04	6,99E-05	-5,32E-04
	EP-FreshWater	kg P -eq	2,17E-04	2,14E-06	7,92E-09	1,34E-07	7,46E-07	1,02E-07	-5,74E-06
	EP-Marine	kg N -eq	5,05E-03	1,52E-04	1,00E-05	9,52E-06	1,18E-04	1,22E-04	-1,74E-04
	EP-Terrestial	mol N -eq	5,63E-02	1,70E-03	1,10E-04	1,06E-04	1,23E-03	2,80E-04	-1,88E-03
	POCP	kg NMVOC -eq	2,11E-02	6,53E-04	3,03E-05	4,08E-05	3,00E-04	9,91E-05	-5,19E-04
	ADP-minerals&metals[1]	kg Sb -eq	6,18E-05	7,40E-06	3,34E-09	4,62E-07	3,30E-07	6,79E-08	-6,42E-07
	ADP-fossil[1]	MJ	1,66E+02	4,05E+00	2,99E-02	2,53E-01	2,62E-01	1,99E-01	-9,24E-01
	WDP[1]	m^3	2,48E+02	3,92E+00	6,36E-03	2,45E-01	1,54E+00	1,72E+00	-1,15E+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

Additional environmental impact indicators									
Indicator		**Unit**	A1-A3	A4	C1	C2	C3	C4	D
	PM	Disease incidence	2,34E-07	1,64E-08	6,02E-10	1,03E-09	1,46E-09	1,35E-09	-3,22E-08
	IRP[2]	kgBq U235 -eq	2,27E-01	1,77E-02	1,28E-04	1,11E-03	8,95E-04	9,60E-04	-5,90E-03
	ETP-fw[1]	CTUe	5,55E+01	3,00E+00	1,64E-02	1,88E-01	4,36E+00	2,49E-01	-5,02E+00
	HTP-c[1]	CTUh	2,34E-09	0,00E+00	0,00E+00	0,00E+00	1,00E-10	9,00E-12	-9,10E-11
	HTP-nc[1]	CTUh	4,53E-08	3,28E-09	1,50E-11	2,05E-10	2,88E-09	1,85E-10	-4,81E-09
	SQP[1]	dimensionless	7,68E+01	2,83E+00	3,80E-03	1,77E-01	5,33E-02	7,43E-01	-6,17E+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 = Potential Soil Quality Index (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	C1	C2	C3	C4	D
	PERE	MJ	9,03E+00	5,80E-02	1,62E-04	3,62E-03	2,16E-02	9,42E-03	-5,70E+00
	PERM	MJ	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
	PERT	MJ	1,44E+01	5,80E-02	1,62E-04	3,62E-03	2,16E-02	9,42E-03	-5,70E+00
	PENRE	MJ	1,36E+02	4,05E+00	2,99E-02	2,53E-01	2,62E-01	1,99E-01	-9,23E-01
	PENRM	MJ	6,95E+01	0,00E+00	0,00E+00	0,00E+00	-6,76E+01	0,00E+00	0,00E+00
	PENRT	MJ	1,66E+02	4,05E+00	2,99E-02	2,53E-01	-6,74E+01	1,99E-01	-9,23E-01
	SM	kg	1,68E-02	0,00E+00	1,47E-05	0,00E+00	0,00E+00	9,00E-05	0,00E+00
	RSF	MJ	2,26E-01	2,07E-03	3,98E-06	1,30E-04	5,12E-04	1,98E-04	-9,99E-04
	NRSF	MJ	6,04E-02	7,42E-03	5,86E-05	4,64E-04	0,00E+00	1,95E-03	-3,38E-01
	FW	m^3	9,06E-02	4,33E-04	1,54E-06	2,71E-05	1,41E-03	2,48E-04	-6,87E-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	C1	C2	C3	C4	D
	HWD	kg	1,75E-01	2,09E-04	8,81E-07	1,31E-05	0,00E+00	1,15E-02	-4,34E-05
	NHWD	kg	5,26E-01	1,97E-01	3,55E-05	1,23E-02	0,00E+00	8,29E-01	-2,18E-02
	RWD	kg	2,04E-04	2,76E-05	2,08E-07	1,72E-06	0,00E+00	1,29E-06	-4,83E-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	C1	C2	C3	C4	D
	CRU	kg	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
	MFR	kg	7,40E-02	0,00E+00	1,44E-05	0,00E+00	0,00E+00	7,36E-05	0,00E+00
	MER	kg	7,58E-02	0,00E+00	4,48E-08	0,00E+00	4,57E-01	1,80E-06	0,00E+00
	EEE	MJ	5,01E-03	0,00E+00	1,53E-07	0,00E+00	7,36E-01	1,17E-04	0,00E+00
	EET	MJ	7,58E-02	0,00E+00	2,32E-06	0,00E+00	1,11E+01	1,77E-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).

Electricity mix	Data source	Amount	Unit
Electricity, Czech Republic (kWh)	ecoinvent 3.6	942,91	g CO2-eq/kWh

Dangerous substances

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

Indoor environment

Additional Environmental Information

Additional environmental impact indicators required in NPCR Part A for construction products								
Indicator	**Unit**	A1-A3	A4	C1	C2	C3	C4	D
GWPIOBC	kg CO_2 -eq	7,22E+00	2,68E-01	2,18E-03	1,68E-02	2,01E+00	9,61E-02	-6,60E-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.
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NPCR 030 Part B for Ventilation components, Ver. 1.0, 18.05.2021, EPD Norway.

EN ISO 9001:2015 - Quality management systems.
EN ISO 14001:2015 - Environmental management systems.
EN ISO 50001:2018 - Energy management systems.

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