epd-norge
Global program operatør

Environmental product declaration

in accordance with ISO 14025 and EN 15804+A2

TVT-D



TROX TECHNIK
The art of handling air

The Norwegian EPD Foundation

Owner of the declaration:
TROX Group

Product:
TVT-D

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:

Registration number:

Issue date:

Valid to:

EPD software:
LCAno EPD generator ID: 167685

General information

Product

TVT-D

Owner of the declaration:

TROX Group
Contact person: Alina Buchner
Phone: +49 2845 2020
e-mail: productsustainability-de@troxgroup.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:

TROX Group

Declaration number:

Place of production:

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

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

Management system:

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

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:

DE 120250070

Declared unit:

1 pcs TVT-D

Issue date:

Declared unit with option:

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

Valid to:

Year of study:

2022

Functional unit:

-

Comparability:

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

Developer of EPD: Philipp Ceulaers

Reviewer of company-specific input data and EPD: Alina Buchner

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)

Approved:

Product

Product description:

For normal and high volume flow rate ranges and low-leakage shut-off.
Rectangular air terminal units for standard applications in supply air or extract air systems with variable volume flow rates, suitable for low-leakage shut-off.

For more infomation see: https://www.trox.de/en/vav-terminal-units/tvt-2512f87247b59aee

Product specification

Rectangular VAV terminal units for variable and constant air volume systems, suitable for supply or extract air, available in 36 nominal sizes. High volume flow rate control accuracy. Ready-to-commission unit which consists of the mechanical parts and the electronic control components. Each unit contains an averaging effective pressure sensor for volume flow rate measurement and damper blades. Factory mounted control components complete with wiring and tubing. Effective pressure sensor with 3 mm measuring holes, hence resistant to contamination. Position of the damper blades indicated externally at the shaft extension. The damper blade is factory set to open position, which allows a ventilation airflow even without control; this does not apply to variants with defined safe position NC (normally closed).

This EPD includes the environmental data of the product series TVT-D.
The following represents a representative dataset of the most sold variant in the declared sales year (TVT-D/300x200/BCO).

Materials	kg	%
Electronic - Unspecified	0,73	5,46
Insulation, Mineral based	0,17	1,29
Metal - Aluminium	0,69	5,19
Metal - Galvanized Steel	10,66	79,76
Metal - Stainless steel	0,53	3,95
Plastic - Acrylonitrile butadiene styrene (ABS)	0,34	2,51
Plastic - Polybutylene terephthalate (PBT)	0,00	0,03
Plastic - Polycarbonate (PC)	0,10	0,78
Plastic - Polyethylene	0,10	0,78
Plastic - Polypropylene (PP)	0,01	0,10
Plastic - Polyurethane (PUR)	0,02	0,15
Total	13,37	100,00

Packaging	kg	%
Packaging - Cardboard	0,75	28,57
Packaging - Pallet	1,75	66,67
Packaging - Paper	0,13	4,76
Total incl. packaging	15,99	100,00

Technical data:

Nominal sizes: 200 × 100 to 1000 × 600 mm
Volume flow rate range: 45 – 6100 l/s or 162 – 21960 m^3 /h
Volume flow rate control range (unit with dynamic differential pressure measurement): Approx. 20 to 100 % of the nominal volume flow rate
Minimum differential pressure: 5 – 40 Pa
Maximum differential pressure: 1000 Pa
Operating temperature: 10 – 50 °C

For more technical data see: https://cdn.trox.de/508ea8afc1967cc4/0c538160c9af/TVT_PD_2022_01_17_DE_enpdf.pdf

The distribution of materials in the products is approximately the same; only the total weight varies. The EPD is created for TVT-D/300x200. The factors in the table below can be used to scale LCA data for a new dimension.

Product	Weight (kg)	Factor
TVT-D/200x100	9	0,60
TVT-D/300x100	11	0,73
TVT-D/400x100	12	0,80
TVT-D/500x100	14	0,93
TVT-D/600x100	15	1
TVT-D/200x200	14	0,93
TVT-D/300x200	15	1
TVT-D/400x200	17	1,13
TVT-D/500x200	18	1,20
TVT-D/600x200	20	1,33
TVT-D/700x200	21	1,40
TVT-D/800x200	23	1,53
TVT-D/300x300	15	1
TVT-D/400x300	17	1,13
TVT-D/500x300	18	1,20
TVT-D/600x300	20	1,33
TVT-D/700x300	22	1,47
TVT-D/800x300	24	1,60
TVT-D/900x300	26	1,73
TVT-D/1000x300	29	1,93
TVT-D/400x400	21	1,40
TVT-D/500x400	23	1,53
TVT-D/600x400	24	1,60
TVT-D/700x400	26	1,73
TVT-D/900x400	29	1,93
TVT-D/1000x400	32	2,13
TVT-D/500x500	28	1,87
TVT-D/600x500	30	2,00
TVT-D/700x500	32	2,13
TVT-D/800x500	35	2,33
TVT-D/900x500	37	2,47
TVT-D/1000x500	39	2,60
TVT-D/600x600	29	1,93
TVT-D/800x600	35	2,33
TVT-D/1000x600	41	2,73

Market:

Europe

Reference service life, product

25 years

Reference service life, building or construction works

60 years

LCA: Calculation rules

Declared unit:

1 pcs TVT-D

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:

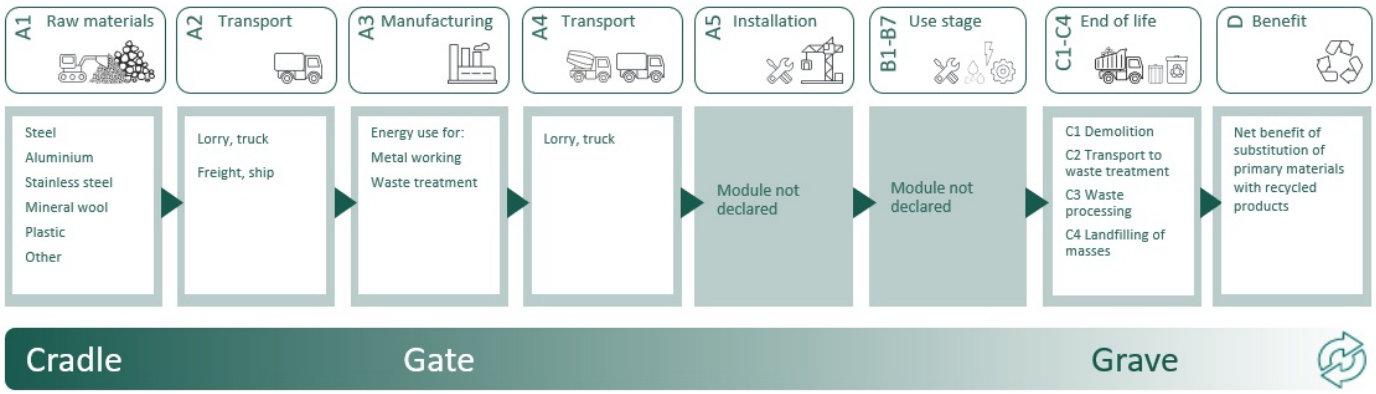
Specific data for the product composition are provided by the manufacturer. The data represent the production of the declared product and were collected for EPD development in the year of study. Background data is based on EPDs according to EN 15804 and different LCA databases. The data quality of the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

Materials	Source	Data quality	Year
Electronic - Unspecified	ecoinvent 3.6	Database	2019
Insulation, Mineral based	ecoinvent 3.6	Database	2019
Metal - Aluminium	ecoinvent 3.6	database	2019
Metal - Galvanized Steel	ecoinvent 3.6	Database	2020
Metal - Stainless steel	ecoinvent 3.6	Database	2019
Packaging - Cardboard	ecoinvent 3.6	Database	2019
Packaging - Pallet	ecoinvent 3.6	Database	2019
Packaging - Paper	ecoinvent 3.6	Database	2019
Plastic - Acrylonitrile butadiene styrene (ABS)	ecoinvent 3.6	Database	2019
Plastic - Polybutylene terephthalate (PBT)	ecoinvent 3.6	Database	2019
Plastic - Polycarbonate (PC)	ecoinvent 3.6	Database	2019
Plastic - Polyethylene	ecoinvent 3.6	Database	2019
Plastic - Polypropylene (PP)	ecoinvent 3.6	Database	2019
Plastic - Polyurethane (PUR)	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:

Rectangular air terminal units for standard applications in supply air or extract air systems with variable volume flow rates, suitable for low-leakage shut-off.
For volume flow rate ranges up to 28836 m^3/h or 8010 l/s.
Suitable for the control of volume flow rate, room pressure or duct pressure.
Electronic control components for different applications (Easy, Compact, Universal, and LABCONTROL).
High control accuracy.
Closed blade air leakage to EN 1751, class 3.
Casing air leakage to EN 1751, up to class C.

Optional equipment and accessories.
Acoustic cladding for the reduction of case-radiated noise.
Secondary silencer Type TX for the reduction of air-regenerated noise.
Hot water heat exchanger of Type WT for reheating the airflow.

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	13,37			

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			
Materials to recycling (kg)	kg	10,72			
Waste treatment per kg Electronic scrap, incineration (kg)	kg	0,73			
Waste treatment per kg plastic, industrial electronics, municipal incineration with fly ash extraction (kg)	kg	0,13			
Waste treatment per kg Plastics, incineration (kg)	kg	0,10			
Waste treatment per kg Polyethylene (PE), incineration (kg)	kg	0,05			
Waste treatment per kg Polypropylene (PP), incineration (kg)	kg	0,01			

Disposal (C4)	Unit	Value			
Landfilling of ashes from incineration of Electronic scrap, process of ashes and residues (kg)	kg	0,51			
Landfilling of ashes from incineration of Plastics, process per kg ashes and residues (kg)	kg	0,00			
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	0,00			
Landfilling of ashes from incineration per kg plastic, industrial electronics, From municipal incineration with fly ash extraction (kg)	kg	0,01			
Waste, aluminium, to landfill (kg)	kg	0,05			
Waste, mineral wool, to landfil (kg)	kg	0,17			
Waste, plastic, mixture, to landfill (kg)	kg	0,29			
Waste, scrap steel, to landfill (kg)	kg	1,12			

Benefits and loads beyond the system boundaries (D)	Unit	Value			
Substitution of electricity (MJ)	MJ	0,33			
Substitution of primary aluminium with net scrap (kg)	kg	0,62			
Substitution of primary steel with net scrap (kg)	kg	2,55			
Substitution of thermal energy, district heating (MJ)	MJ	4,97			

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	9,14E+01	2,09E+00	1,76E-02	1,31E-01	1,58E+00	1,01E-01	-8,48E+00
	GWP-fossil	kg CO_2 -eq	9,00E+01	2,09E+00	1,76E-02	1,31E-01	1,58E+00	1,01E-01	-8,35E+00
	GWP-biogenic	kg CO_2 -eq	1,10E+00	8,65E-04	3,30E-06	5,41E-05	1,23E-04	1,03E-04	-2,70E-02
	GWP-luluc	kg CO_2 -eq	2,33E-01	7,44E-04	1,39E-06	4,65E-05	3,00E-05	2,57E-05	-1,07E-01
	ODP	kg CFC11 -eq	7,85E-06	4,73E-07	3,81E-09	2,96E-08	6,03E-09	6,58E-09	-2,10E-03
	AP	mol H+ -eq	7,90E-01	6,01E-03	1,84E-04	3,75E-04	4,37E-04	1,97E-04	-5,15E-02
	EP-FreshWater	kg P -eq	8,87E-03	1,67E-05	6,42E-08	1,04E-06	1,11E-06	8,46E-07	-3,88E-04
	EP-Marine	kg N -eq	1,05E-01	1,19E-03	8,14E-05	7,43E-05	1,94E-04	9,31E-05	-7,67E-03
	EP-Terrestial	mol N -eq	2,14E+00	1,33E-02	8,93E-04	8,31E-04	1,97E-03	6,51E-04	-8,22E-02
	POCP	kg NMVOC -eq	3,58E-01	5,09E-03	2,46E-04	3,18E-04	4,81E-04	1,90E-04	-3,18E-02
	ADP-minerals&metals[1]	kg Sb-eq	5,41E-02	5,77E-05	2,70E-08	3,61E-06	4,10E-07	3,53E-07	-4,01E-05
	ADP-fossil[1]	MJ	1,22E+03	3,16E+01	2,43E-01	1,97E+00	4,58E-01	5,44E-01	-9,42E+01
	WDP[1]	m^3	7,49E+03	3,06E+01	5,15E-02	1,91E+00	1,33E+00	2,18E+00	-3,02E+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	C1	C2	C3	C4	D
	PM	Disease incidence	7,19E-06	1,28E-07	4,88E-09	8,00E-09	2,35E-09	2,87E-09	-6,32E-07
	IRP[2]	kgBq U235 -eq	5,26E+00	1,38E-01	1,04E-03	8,63E-03	1,57E-03	2,42E-03	-2,98E-01
	ETP-fw[1]	CTUe	4,66E+03	2,34E+01	1,33E-01	1,46E+00	3,18E+00	3,20E+01	-2,42E+02
	HTP-c[1]	CTUh	3,64E-07	0,00E+00	0,00E+00	0,00E+00	1,19E-10	1,50E-11	-2,75E-08
	HTP-nc[1]	CTUh	5,10E-06	2,56E-08	1,20E-10	1,60E-09	1,01E-08	7,53E-10	1,28E-07
	SQP[1]	dimensionless	7,82E+02	2,21E+01	3,08E-02	1,38E+00	1,48E-01	1,06E+00	-5,12E+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	1,76E+02	4,52E-01	1,31E-03	2,83E-02	2,91E-02	2,92E-02	-2,99E+01
	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	2,08E+02	4,52E-01	1,31E-03	2,83E-02	2,91E-02	2,92E-02	-2,99E+01
	PENRE	MJ	1,21E+03	3,16E+01	2,43E-01	1,97E+00	4,58E-01	5,44E-01	-9,42E+01
	PENRM	MJ	2,37E+01	0,00E+00	0,00E+00	0,00E+00	-2,23E+01	0,00E+00	0,00E+00
	PENRT	MJ	1,23E+03	3,16E+01	2,43E-01	1,97E+00	-2,18E+01	5,44E-01	-9,42E+01
	SM	kg	8,61E+00	0,00E+00	1,19E-04	0,00E+00	0,00E+00	3,88E-05	0,00E+00
	RSF	MJ	4,55E+00	1,62E-02	3,23E-05	1,01E-03	7,23E-04	6,78E-04	9,03E-02
	NRSF	MJ	2,06E+01	5,79E-02	4,75E-04	3,62E-03	-4,56E-04	5,11E-04	2,83E+00
	FW	m^3	1,16E+00	3,38E-03	1,25E-05	2,11E-04	1,99E-03	1,64E-03	-1,48E-01

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	6,75E-01	1,63E-03	7,14E-06	1,02E-04	2,43E-03	2,46E-02	8,69E-03
	NHWD	kg	2,59E+01	1,54E+00	2,87E-04	9,60E-02	3,45E-01	1,99E+00	-2,76E+00
	RWD	kg	4,54E-03	2,15E-04	1,68E-06	1,35E-05	1,39E-06	1,90E-06	-2,81E-04

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	7,51E-01	0,00E+00	1,17E-04	0,00E+00	1,07E+01	3,25E-05	0,00E+00
	MER	kg	2,99E-02	0,00E+00	3,63E-07	0,00E+00	1,90E-01	6,90E-07	0,00E+00
	EEE	MJ	2,16E-02	0,00E+00	1,24E-06	0,00E+00	7,39E-01	4,18E-05	0,00E+00
	EET	MJ	3,27E-01	0,00E+00	1,88E-05	0,00E+00	1,12E+01	6,32E-04	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	Source	Amount	Unit
Electricity, market mix (kWh) - Germany	ecoinvent 3.6	585,93	g CO2-eq/kWh

Dangerous substances

The product contains dangerous substances, more than 0,1% by weight, given by the REACH Candidate List, see table:

Name	CASNo	Amount
Lead	7439-92-1	> 0.1% w/w
Perfluorobutane sulfonic acid (PFBS) and its salts		> 0.1% w/w and < 0.3% w/w
2-methylimidazole	693-98-1	> 0.1% w/w
Potassium 1,1,2,2,3,3,4,4,4-nonafluorobutane-1-sulphonate	29429-49-3	> 0.1% w/w
Lead monoxide (lead oxide)	1317-36-8	> 0.1% w/w
Diboron trioxide	1303-86-2	> 0.1% w/w
Lead titanium trioxide	12060-00-3	> 0.1% w/w

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	9,13E+01	2,09E+00	1,76E-02	1,31E-01	1,58E+00	1,01E-01	-9,62E+00

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.
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TROX® TECHNIK The art of handling air	**Owner of the declaration:** TROX Group Heinrich-Trox-Platz 1, 47506 Neukirchen-Vluyn	Phone: +49 2845 2020 e-mail: productsustainability-de@troxgroup.com web: https://www.trox.de/en
LCA.no	**Author of the Life Cycle Assessment** LCA.no AS Dokka 6A, 1671	Phone: +47 916 50 916 e-mail: post@lca.no web: www.lca.no
LCA.no	**Developer of EPD generator** LCA.no AS Dokka 6B,1671 Kråkerøy	Phone: +47 916 50 916 e-mail: post@lca.no web: www.lca.no
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