epd-norge
Global program operatør

Environmental product declaration

in accordance with ISO 14025 and EN 15804+A2

TVE-Q

TROX® TECHNIK
The art of handling air

The Norwegian EPD Foundation

Owner of the declaration:
TROX Group

Product:
TVE-Q

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-5786-5068-EN

Registration number:

NEPD-5786-5068-EN

Issue date: 11.01.2024

Valid to: 11.01.2029

ver-190624

EPD software:
LCAno EPD generator ID: 110335

General information

Product

TVE-Q

Owner of the declaration:

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Program operator:

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Manufacturer:

TROX Group
Heinrich-Trox-Platz 1
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Declaration number:

NEPD-5786-5068-EN

Place of production:

TROX GmbH - Werk Anholt
Gendringer Str. 85
46419 Isselburg, 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 TVE-Q

Issue date:

11.01.2024

Declared unit with option:

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

Valid to:

11.01.2029

Year of study:

2023

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:

Håkon Hauan
Managing Director of EPD-Norway

Product

Product description:

Compact solution for low airflow velocities.
Angular air terminal units for use in variable air terminal systems at low air velocities, even under unfavourable upstream conditions.

For more information see: www.trox.de/en/428f30783cd80fe1

Product specification

VAV terminal units in rectangular design for variable and constant volume flow systems, for supply air or extract air, in several nominal sizes. High control accuracy of set volume flow rates, even in unfavourable upstream conditions. Control range at least 1:10. Differential pressure measurement and control via damper blade. Tubeless differential pressure transmission through differential pressure duct in axis Air leakage with closed damper blade according to EN 1751: Class 3. Casing air leakage according to EN 1751: Class C. Ready-to-commission unit which consists of the mechanical parts and the factory mounted electronic control component. Position of the damper blade indicated externally at the control component The damper blade is factory set to open position, which allows a ventilation airflow even without control. Meets the hygiene requirements of EN 16798, Part 3, of VDI 6022, Sheet 1, and of DIN 1964, Part 4.

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

Materials	kg	%
Electronic - Unspecified	0,62	10,78
Glass fibre reinforced plastic, polyamide	0,04	0,68
Metal - Aluminium	0,06	1,06
Metal - Galvanized Steel	4,96	86,17
Metal - Stainless steel	0,04	0,73
Plastic - Ethylene vinyl acetate (EVA)	0,00	0,01
Plastic - Polybutylene terephthalate (PBT)	0,00	0,08
Plastic - Polyurethane (PUR)	0,00	0,01
Product label - supercalendered	0,00	0,01
Rubber, synthetic	0,03	0,47
Total	5,75	100,00

Packaging	kg	%
Packaging - Cardboard	1,50	27,27
Packaging - Pallet	3,50	63,64
Packaging - Paper	0,50	9,09
Total incl. packaging	11,25	100,00

Technical data:

Nominal sizes: 200 × 100, 300 × 100, 200 × 200, 300 × 200, 400 × 200, 500 × 200, 600 × 200
Volume flow rate range: 16 - 960 l/s or 58 - 3456 m^3/h
Volume flow rate control range (controller with dynamic differential pressure measurements): approx. 10 - 100 % of the nominal volume flow rate
Minimum differential pressure: up to 50 Pa (without secondary silencer)
Maximum differential pressure: Control component with dynamic transducer: 900 Pa, Control component with static transducer: 600 Pa
Operating temperature: 10 to 50 °C

For more technical data see: www.trox.de/en/428f30783cd80fe1

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

Product	Weight (kg)	Factor
TVE-Q/200x100	3,3	0,63
TVE-Q/300x100	4,1	0,79
TVE-Q/200x200	4,2	0,81
TVE-Q/300x200	5,2	1
TVE-Q/400x200	6,1	1,17
TVE-Q/500x200	7,6	1,46
TVE-Q/600x200	8,3	1,60

Market:

Europe

Reference service life, product

20-25 years.

Reference service life, building or construction works

60 years.

LCA: Calculation rules

Declared unit:

1 pcs TVE-Q

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:

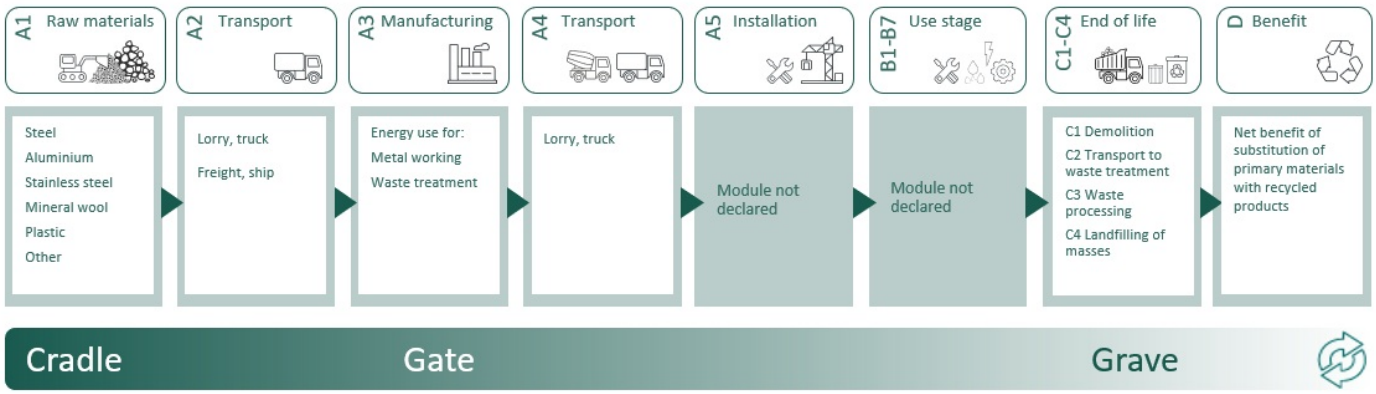
Specific data for the product composition are provided by the manufacturer. The data represent the production of the declared product and were collected for EPD development in the year of study. Background data is based on EPDs according to EN 15804 and different LCA databases. The data quality of the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

Materials	Source	Data quality	Year
Electronic - Unspecified	ecoinvent 3.6	Database	2019
Glass fibre reinforced plastic, polyamide	Modified 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 - Ethylene vinyl acetate (EVA)	ecoinvent 3.6	Database	2019
Plastic - Polybutylene terephthalate (PBT)	ecoinvent 3.6	Database	2019
Plastic - Polyurethane (PUR)	ecoinvent 3.6	Database	2019
Product label - supercalendered	ecoinvent 3.6	Database	2019
Rubber, synthetic	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:

Angular air terminal units for use in variable air terminal systems at low air velocities, even under unfavourable upstream conditions.
Tubeless differential pressure measurement via damper blade.
Differential pressure transmission through differential pressure duct in axis.
Connection terminals with protective cover, no junction box required.
Any airflow direction if dynamic transducer is used.
Suitable for air velocities from 0.8 - 8 m/s.
Compact dimensions for use in confined ceiling areas.
Plug-and-play solution in conjunction with X-AIRCONTROL room control.
Exact measurement even with low airflow velocities.
Any installation orientation also with static transducer.
Closed blade air leakage to EN 1751, at least class 3.
Casing air leakage to EN 1751, class C.
Volume flow rate range 1:10.

Optional equipment and accessories:
Secondary silencer to reduce air-regenerated noise.
Hot water heat exchanger 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	5,75			

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	4,56			
Waste treatment per kg Electronic scrap, incineration (kg)	kg	0,62			
Waste treatment per kg Hazardous waste, incineration (kg)	kg	0,00			
Waste treatment per kg Plastics, incineration (kg)	kg	0,02			
Waste treatment per kg Rubber, municipal incineration with fly ash extraction (kg)	kg	0,01			

Disposal (C4)	Unit	Value			
Landfilling of ashes from incineration of Electronic scrap, process of ashes and residues (kg)	kg	0,44			
Landfilling of ashes from incineration of Plastics, process per kg ashes and residues (kg)	kg	0,00			
Landfilling of ashes from incineration of Rubber, municipal incineration with fly ash extraction (kg)	kg	0,00			
Landfilling of ashes from incineration per kg Hazardous waste, from incineration (kg)	kg	0,00			
Waste, aluminium, to landfill (kg)	kg	0,00			
Waste, plastic, mixture, to landfill (kg)	kg	0,04			
Waste, scrap steel, to landfill (kg)	kg	0,50			

Benefits and loads beyond the system boundaries (D)	Unit	Value			
Substitution of electricity (MJ)	MJ	0,02			
Substitution of primary aluminium with net scrap (kg)	kg	0,05			
Substitution of primary steel with net scrap (kg)	kg	1,04			
Substitution of thermal energy, district heating (MJ)	MJ	0,28			

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	4,23E+01	1,47E+00	7,58E-03	9,20E-02	7,50E-01	5,82E-02	-1,65E+00
	GWP-fossil	kg CO_2 -eq	5,04E+01	1,47E+00	7,58E-03	9,19E-02	7,49E-01	5,81E-02	-1,64E+00
	GWP-biogenic	kg CO_2 -eq	-8,15E+00	6,08E-04	1,42E-06	3,80E-05	9,73E-05	8,16E-05	-2,87E-03
	GWP-luluc	kg CO_2 -eq	9,12E-02	5,23E-04	5,98E-07	3,27E-05	2,27E-05	2,05E-05	-9,78E-03
	ODP	kg CFC11 -eq	4,43E-06	3,33E-07	1,64E-09	2,08E-08	3,80E-09	3,48E-09	-1,18E-04
	AP	mol H+ -eq	4,42E-01	4,22E-03	7,93E-05	2,64E-04	2,56E-04	1,19E-04	-9,01E-03
	EP-FreshWater	kg P -eq	6,19E-03	1,17E-05	2,76E-08	7,34E-07	8,26E-07	6,58E-07	-8,96E-05
	EP-Marine	kg N -eq	6,25E-02	8,36E-04	3,50E-05	5,22E-05	1,07E-04	3,65E-05	-1,60E-03
	EP-Terrestial	mol N -eq	1,16E+00	9,35E-03	3,84E-04	5,84E-04	1,09E-03	3,58E-04	-1,67E-02
	POCP	kg NMVOC -eq	2,08E-01	3,58E-03	1,06E-04	2,24E-04	2,69E-04	1,00E-04	-7,31E-03
	ADP-minerals&metals[1]	kg Sb-eq	3,09E-02	4,06E-05	1,16E-08	2,54E-06	2,92E-07	2,53E-07	-1,91E-05
	ADP-fossil[1]	MJ	6,76E+02	2,22E+01	1,04E-01	1,39E+00	3,24E-01	3,13E-01	-1,59E+01
	WDP[1]	m^3	3,08E+03	2,15E+01	2,22E-02	1,34E+00	9,43E-01	9,48E-01	-2,19E+02

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	3,86E-06	9,00E-08	2,10E-09	5,63E-09	1,57E-09	1,47E-09	-1,30E-07
	IRP[2]	kgBq U235 -eq	2,79E+00	9,72E-02	4,47E-04	6,07E-03	1,19E-03	1,37E-03	-2,28E-02
	ETP-fw[1]	CTUe	3,30E+03	1,65E+01	5,70E-02	1,03E+00	2,16E+00	4,19E+00	-7,15E+01
	HTP-c[1]	CTUh	1,60E-07	0,00E+00	0,00E+00	0,00E+00	6,10E-11	1,10E-11	-6,76E-09
	HTP-nc[1]	CTUh	2,84E-06	1,80E-08	5,20E-11	1,13E-09	5,51E-09	5,47E-10	1,06E-07
	SQP[1]	dimensionless	9,82E+02	1,55E+01	1,32E-02	9,72E-01	1,18E-01	4,04E-01	-9,31E-01

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	1,19E+02	3,18E-01	5,64E-04	1,99E-02	2,24E-02	1,95E-02	-3,16E+00
	PERM	MJ	6,79E+01	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
	PERT	MJ	1,87E+02	3,18E-01	5,64E-04	1,99E-02	2,24E-02	1,95E-02	-3,16E+00
	PENRE	MJ	6,74E+02	2,22E+01	1,04E-01	1,39E+00	3,24E-01	3,14E-01	-1,59E+01
	PENRM	MJ	2,09E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
	PENRT	MJ	6,76E+02	2,22E+01	1,04E-01	1,39E+00	3,24E-01	3,14E-01	-1,59E+01
	SM	kg	4,52E+00	0,00E+00	5,12E-05	0,00E+00	0,00E+00	3,94E-06	0,00E+00
	RSF	MJ	2,86E+00	1,14E-02	1,39E-05	7,11E-04	5,45E-04	4,64E-04	4,06E-02
	NRSF	MJ	9,81E+00	4,07E-02	2,04E-04	2,54E-03	-3,88E-04	1,35E-04	1,20E+00
	FW	m^3	5,79E-01	2,38E-03	5,37E-06	1,49E-04	1,49E-03	1,22E-03	-1,48E-02

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	3,61E-01	1,15E-03	3,07E-06	7,16E-05	2,06E-03	1,37E-02	-3,93E-03
	NHWD	kg	1,24E+01	1,08E+00	1,24E-04	6,76E-02	2,94E-01	8,40E-01	-6,11E-01
	RWD	kg	2,38E-03	1,51E-04	7,25E-07	9,46E-06	1,18E-06	1,12E-06	-2,22E-05

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	5,03E-05	0,00E+00	4,56E+00	3,21E-06	0,00E+00
	MER	kg	1,01E-04	0,00E+00	1,56E-07	0,00E+00	1,43E-02	7,86E-08	0,00E+00
	EEE	MJ	2,20E-02	0,00E+00	5,35E-07	0,00E+00	3,67E-01	5,10E-06	0,00E+00
	EET	MJ	3,32E-01	0,00E+00	8,09E-06	0,00E+00	5,56E+00	7,72E-05	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	2,25E-04
Biogenic carbon content in accompanying packaging	kg C	2,38E+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

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	5,10E+01	1,47E+00	7,58E-03	9,19E-02	7,50E-01	5,19E-02	-2,20E+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.
Iversen et al., (2021) eEPD v2021.09 Background information for EPD generator tool system verification, LCA.no Report number: 07.21
Graafland and Iversen (2022) EPD generator for NPCR 030 Ventilation components, Background information for EPD generator application and LCA data, LCA.no report number: 12.22
NPCR Part A: Construction products and services. Ver. 2.0. April 2021, EPD-Norge.
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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