

Environmental product declaration

in accordance with ISO 14025 and EN 15804+A2

TVM



TROX[®] TECHNIK
The art of handling air

The Norwegian EPD Foundation

Owner of the declaration:

TROX Group

Product:

TVM

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-8057-7733-EN

Registration number:

NEPD-8057-7733-EN

Issue date: 13.11.2024

Valid to: 13.11.2029

EPD software:

LCAno EPD generator ID: 279806

General information

Product

TVM

Program operator:

The Norwegian EPD Foundation
Post Box 5250 Majorstuen, 0303 Oslo, Norway
Phone: +47 977 22 020
web: www.epd-norge.no

Declaration number:

NEPD-8057-7733-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 TVM

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 EPD-Norway'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: Alina Buchner
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 GmbH - Werk Anholt
Gendringer Str. 85
46419 Isselburg, Germany

Management system:

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

Organisation no:

DE 120250070

Issue date:

13.11.2024

Valid to:

13.11.2029

Year of study:

2023

Comparability:

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

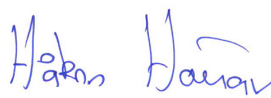
Development and verification of EPD:

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: Philipp Ceulaers

Reviewer of company-specific input data and EPD: Phil Niklas

Approved:



Håkon Hauan
Managing Director of EPD-Norway

Product

Product description:

For dual duct systems.

VAV dual duct terminal units for dual duct systems with variable volume flows in buildings with demanding acoustic requirements.

For more information see: <https://www.trox.de/en/vav-terminal-units/tvm-cabf03cfe0a0c086>

Product specification

Rectangular VAV dual duct terminal units for dual duct systems with variable and constant volume flows, available in 6 nominal sizes. Connecting spigots for warm and cold air arranged at an angle of 90°. Up to nominal size 200, an angle of 60° is also possible and is therefore ideal for the refurbishment of older systems with dual duct units. High control accuracy (even with upstream bend $R = 1D$). Ready-to-commission unit which consists of the mechanical parts and the electronic control components. Each unit contains two averaging effective pressure sensors for volume flow rate measurement, one in the cold air flow and one in the total air flow, two damper blades, and an integral sound attenuator. Factory-mounted control components complete with wiring and tubing. Effective pressure sensor with 3 mm measuring holes, hence resistant to contamination. Spigot on the fan end with groove for double lip seal, suitable for ducts according to EN 1506 or EN 13180. Room end suitable for the connection of flanges. Two baffle plates, one fitted after each damper blade for optimum acoustic and aerodynamic performance. Casing with acoustic and thermal insulation. Position of the damper blade can be seen from the outside at the shaft extension. Closed blade air leakage to EN 1751, class 4 (nominal sizes 125 and 160, class 3). Casing leakage according to EN 1751, class B. Meets the hygiene requirements of VDI 6022, EN 16798, Part 3, VDI 3803 as well as DIN 1946 Part 4.

This EPD includes the environmental data of the product series TVM.

The following represents a representative dataset of the most sold variant in the declared sales year (TVM/160/BC0).

Materials	kg	%
Electronic - Unspecified	0,90	3,17
Glass fibre reinforced plastic, polyamide	0,04	0,13
Insulation, Mineral based	3,30	11,61
Metal - Galvanized Steel	20,63	72,56
Plastic	0,01	0,04
Plastic - Acrylonitrile butadiene styrene (ABS)	0,03	0,11
Plastic - Polyethylene	0,01	0,02
Plastic - Polyoxymethylene (POM)	0,01	0,03
Plastic - Polypropylene (PP)	0,01	0,02
Plastic - Polystyrene (PS)	0,00	0,01
Plastic - Polyurethane (PUR)	0,04	0,13
Rubber, synthetic	0,18	0,65
Metal - Aluminium	0,22	0,76
Metal - Stainless steel	0,01	0,04
Metal - Steel	0,30	1,05
Total	25,68	90,33

Packaging	kg	%
Packaging - Cardboard	1,00	3,52
Packaging - Pallet	1,75	6,16
Total incl. packaging	28,43	9,67

Technical data:

Volume flow rate range: 50 – 2108 l/s or 210 – 7591 m³/h.

Volume flow rate control range: Approx. 30 to 100 % of the nominal volume flow rate.

Minimum differential pressure: Up to 202 Pa (without secondary silencer TS).

Maximum differential pressure: 1000 Pa.

Operating temperature: 10 to 50 °C.

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 TVM

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:

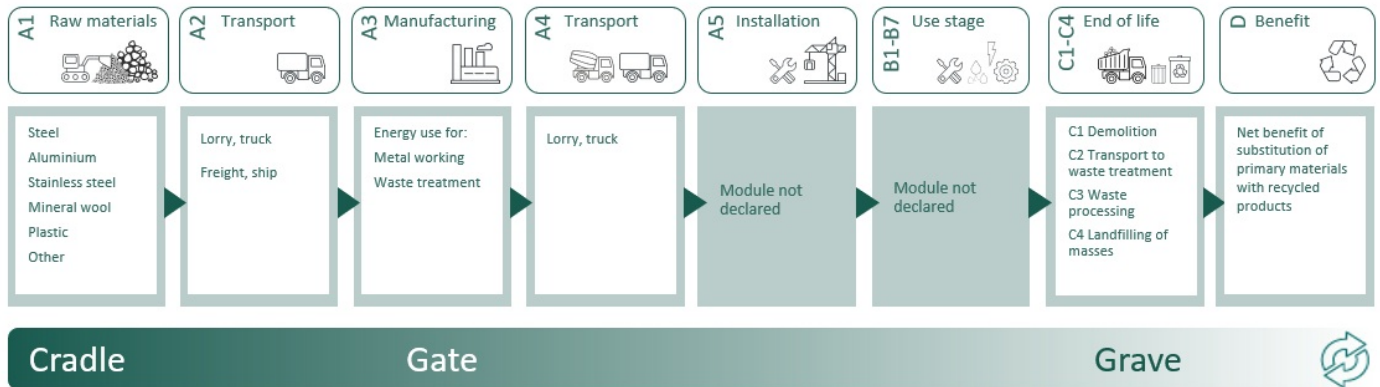
Specific data for the product composition are provided by the manufacturer. The data represent the production of the declared product and were collected for EPD development in the year of study. Background data is based on EPDs according to EN 15804 and different LCA databases. The data quality of the 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
Insulation, Mineral based	ecoinvent 3.6	Database	2019
Metal - Aluminium	ecoinvent 3.6	database	2019
Metal - Galvanized Steel	ecoinvent 3.6	Database	2020
Metal - Galvanized Steel	Modified ecoinvent 3.6	Database	2019
Metal - Stainless steel	ecoinvent 3.6	Database	2019
Metal - Steel	ecoinvent 3.6	Database	2019
Packaging - Cardboard	ecoinvent 3.6	Database	2019
Packaging - Pallet	ecoinvent 3.6	Database	2019
Plastic	ecoinvent 3.6	Database	2019
Plastic - Acrylonitrile butadiene styrene (ABS)	ecoinvent 3.6	Database	2019
Plastic - Polyethylene	ecoinvent 3.6	Database	2019
Plastic - Polyoxymethylene (POM)	ecoinvent 3.6	Database	2019
Plastic - Polypropylene (PP)	ecoinvent 3.6	Database	2019
Plastic - Polystyrene (PS)	ecoinvent 3.6	Database	2019
Plastic - Polyurethane (PUR)	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:

Individual temperature control for each room or zone.
Highly effective integral attenuator.
Electronic control components for various applications.
Closed blade air leakage to EN 1751, up to class 4.
Casing leakage to EN 1751, Class B.

Optional equipment and accessories:

Acoustic cladding for the reduction of case-radiated noise
Secondary silencer Type TS for the reduction of air-regenerated noise














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	25,68		
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	19,04		
Waste treatment per kg Polyoxymethylene (POM), incineration with fly ash extraction (kg)		kg	0,00		
Waste treatment per kg Plastics, incineration (kg)		kg	0,04		
Waste treatment per kg Polyethylene (PE), incineration (kg)		kg	0,00		
Waste treatment per kg plastic, industrial electronics, municipal incineration with fly ash extraction (kg)		kg	0,02		
Waste treatment per kg Electronic scrap, incineration (kg)		kg	0,90		
Waste treatment per kg Polypropylene (PP), incineration (kg)		kg	0,00		
Waste treatment per kg Rubber, municipal incineration with fly ash extraction (kg)		kg	0,09		
Disposal (C4)		Unit	Value		
Waste, scrap steel, to landfill (kg)		kg	2,02		
Waste, aluminium, to landfill (kg)		kg	0,08		
Landfilling of ashes from incineration of Polyoxymethylene (POM), process per kg ashes and residues (kg)		kg	0,00		
Waste, plastic, mixture, to landfill (kg)		kg	0,16		
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 per kg plastic, industrial electronics, From municipal incineration with fly ash extraction (kg)		kg	0,00		
Landfilling of ashes from incineration of Electronic scrap, process of ashes and residues (kg)		kg	0,63		
Landfilling of ashes from incineration of Polypropylene (PP), 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		
Waste, mineral wool, to landfil (kg)		kg	3,30		
Benefits and loads beyond the system boundaries (D)		Unit	Value		
Substitution of primary steel with net scrap (kg)		kg	4,53		
Substitution of primary aluminium with net scrap (kg)		kg	0,19		
Substitution of electricity (MJ)		MJ	0,17		
Substitution of thermal energy, district heating (MJ)		MJ	2,55		

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	1,35E+02	3,72E+00	3,39E-02	2,32E-01	1,42E+00	1,22E-01	-6,77E+00	
 GWP-fossil	kg CO ₂ -eq	1,33E+02	3,71E+00	3,39E-02	2,32E-01	1,42E+00	1,21E-01	-6,72E+00	
 GWP-biogenic	kg CO ₂ -eq	1,82E+00	1,54E-03	6,35E-06	9,61E-05	1,42E-04	1,40E-04	-1,07E-02	
 GWP-luluc	kg CO ₂ -eq	1,98E-01	1,32E-03	2,67E-06	8,26E-05	3,38E-05	3,64E-05	-3,55E-02	
 ODP	kg CFC11 -eq	1,18E-05	8,41E-07	7,32E-09	5,26E-08	5,90E-09	1,56E-08	-1,08E-03	
 AP	mol H+ -eq	1,26E+00	1,07E-02	3,54E-04	6,67E-04	4,20E-04	4,11E-04	-3,66E-02	
 EP-FreshWater	kg P -eq	1,24E-02	2,97E-05	1,23E-07	1,85E-06	1,20E-06	1,23E-06	-3,75E-04	
 EP-Marine	kg N -eq	1,60E-01	2,11E-03	1,56E-04	1,32E-04	1,76E-04	1,50E-04	-6,64E-03	
 EP-Terrestrial	mol N -eq	3,66E+00	2,36E-02	1,72E-03	1,48E-03	1,80E-03	1,44E-03	-6,90E-02	
 POCP	kg NMVOC -eq	5,51E-01	9,05E-03	4,72E-04	5,66E-04	4,45E-04	4,15E-04	-3,06E-02	
 ADP-minerals&metals ¹	kg Sb-eq	9,33E-02	1,03E-04	5,19E-08	6,41E-06	4,49E-07	5,95E-07	-8,35E-05	
 ADP-fossil ¹	MJ	1,79E+03	5,62E+01	4,66E-01	3,51E+00	4,94E-01	1,18E+00	-6,41E+01	
 WDP ¹	m ³	9,78E+03	5,43E+01	9,90E-02	3,40E+00	1,56E+00	2,83E+00	-7,31E+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	1,15E-05	2,27E-07	9,37E-09	1,42E-08	2,44E-09	6,84E-09	-5,42E-07
 IRP ²	kgBq U235 -eq	7,80E+00	2,45E-01	2,00E-03	1,53E-02	1,78E-03	5,07E-03	-7,87E-02
 ETP-fw ¹	CTUe	6,63E+03	4,16E+01	2,55E-01	2,60E+00	3,60E+00	5,52E+01	-3,05E+02
 HTP-c ¹	CTUh	5,66E-07	0,00E+00	0,00E+00	0,00E+00	9,60E-11	2,70E-11	-2,84E-08
 HTP-nc ¹	CTUh	8,08E-06	4,55E-08	2,31E-10	2,84E-09	8,60E-09	1,14E-09	4,69E-07
 SQP ¹	dimensionless	1,03E+03	3,93E+01	5,91E-02	2,46E+00	1,74E-01	2,41E+00	-4,74E+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	2,14E+02	8,04E-01	2,52E-03	5,03E-02	3,27E-02	4,01E-02	-1,26E+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	2,14E+02	8,04E-01	2,52E-03	5,03E-02	3,27E-02	4,01E-02	-1,26E+01	
 PENRE	MJ	1,79E+03	5,62E+01	4,66E-01	3,51E+00	4,94E-01	1,18E+00	-6,41E+01	
 PENRM	MJ	9,91E+00	0,00E+00	0,00E+00	0,00E+00	-9,91E+00	0,00E+00	0,00E+00	
 PENRT	MJ	1,80E+03	5,62E+01	4,66E-01	3,51E+00	-9,41E+00	1,18E+00	-6,41E+01	
 SM	kg	1,60E+01	0,00E+00	2,29E-04	0,00E+00	0,00E+00	0,00E+00	0,00E+00	
 RSF	MJ	7,01E+00	2,88E-02	6,20E-05	1,80E-03	8,02E-04	9,27E-04	1,77E-01	
 NRSF	MJ	3,94E+01	1,03E-01	9,12E-04	6,43E-03	-5,63E-04	1,19E-03	5,18E+00	
 FW	m ³	1,56E+00	6,01E-03	2,40E-05	3,75E-04	2,42E-03	2,57E-03	-5,54E-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	1,12E+00	2,90E-03	1,37E-05	1,81E-04	2,99E-03	2,37E-02	-1,87E-02
 NHWD	kg	3,64E+01	2,73E+00	5,52E-04	1,71E-01	4,25E-01	6,01E+00	-2,54E+00
 RWD	kg	6,72E-03	3,83E-04	3,24E-06	2,39E-05	1,71E-06	5,01E-06	-7,69E-05

HWD = Hazardous waste disposed; NHWD = Non-hazardous waste disposed; RWD = Radioactive waste disposed

*Reading example: 9,0 E-03 = $9,0 \cdot 10^{-3} = 0,009$

*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	7,61E-01	0,00E+00	2,25E-04	0,00E+00	1,90E+01	1,38E-04	0,00E+00
 MER	kg	2,48E-01	0,00E+00	6,97E-07	0,00E+00	1,19E-01	1,36E-06	0,00E+00
 EEE	MJ	1,47E-01	0,00E+00	2,39E-06	0,00E+00	6,75E-01	3,19E-05	0,00E+00
 EET	MJ	2,23E+00	0,00E+00	3,61E-05	0,00E+00	1,02E+01	4,83E-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 = $9,0 \cdot 10^{-3} = 0,009$

*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 CO ₂ -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
Lead titanium trioxide	12060-00-3	> 0.1% w/w
Diboron trioxide	1303-86-2	> 0.1% w/w
2-methylimidazole	693-98-1	> 0.1% w/w
Lead monoxide (lead oxide)	1317-36-8	> 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	1,35E+02	3,72E+00	3,39E-02	2,32E-01	1,42E+00	1,22E-01	-9,16E+00

GWPI-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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