

Environmental product declaration

in accordance with ISO 14025 and EN 15804+A2

StoArmat Fortix



The Norwegian EPD Foundation

Owner of the declaration:

Sto SE & Co. KGaA

Product:

StoArmat Fortix

Declared unit:

1 kg

This declaration is based on Product Category Rules:

CEN Standard EN 15804:2012+A2:2019 serves as core PCR

NPCR 009:2021 Part B for Technical - Chemical products for building and construction industry

Program operator:

The Norwegian EPD Foundation

Declaration number:

NEPD-9473-9139

Registration number:

NEPD-9473-9139

Issue date:

27.03.2025

Valid to:

27.03.2030

EPD software:

LCAno EPD generator ID: 872635

General information

Product

StoArmat Fortix

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-9473-9139

This declaration is based on Product Category Rules:

CEN Standard EN 15804:2012+A2:2019 serves as core PCR
NPCR 009:2021 Part B for Technical - Chemical products for building
and construction industry

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 kg StoArmat Fortix

Declared unit with option:

A1, A2, A3, A4, A5, 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. NEPD73

Third party verifier:

Linda Høibye, Life Cycle Assessment Consulting

(no signature required)

Owner of the declaration:

Sto SE & Co. KGaA
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Manufacturer:

Sto Scandinavia AB
Gesällgatan 6
SE-582 77 Linköping, Sweden

Place of production:

Linköping
Gesällgatan 6
SE-582 77 Linköping, Sweden

Management system:

ISO 14001; ISO 50001; ISO 9001

Organisation no:

DE142834082

Issue date:

27.03.2025

Valid to:

27.03.2030

Year of study:

2024

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.
NEPD7143

Developer of EPD: Angelica Hultin

Reviewer of company-specific input data and EPD: Karin Bromoe

Approved:



Håkon Hauan, CEO EPD-Norge

Product

Product description:

StoArmat Fortix is a mineral reinforcing mortar that can be used both in- and outdoors. It is primarily used outdoors as a base coat in the facade system StoNordic.

StoArmat Fortix has the following properties:

- good adhesion on mineral surfaces
- weatherproof
- high water repellency
- high water vapor permeability
- fire class: A2-s1, d0 according to EN 13501-1, non-combustible

Product specification

The material composition is stated below:

Materials	Value	Unit
Cement	10-20	%
Pigments and Fillers	70-80	%
Binders	1-5	%
Additives	<1	%
Packaging	1-5	%

Technical data:

The product complies with the harmonized standard EN 998-1:2016.

Information regarding the technical properties can be found in the Technical Data Sheet available on www.sto.se.

Market:

Main market is the Nordic countries.

Reference service life, product

A reference service life (RSL) as per ISO 15686-1, -2, -7, and -8 is not declared. In this LCA an RSL of 50 years has been declared, equal to the useful life of the building (according to standard 15804+A2).

Reference service life, building

50

LCA: Calculation rules

Declared unit:

1 kg StoArmat Fortix

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. Incoming energy and 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
Additives	CEPE RM Database v3.0	Database	2016
Additives	Ecoinvent 3.6	Database	2019
Aggregate	ecoinvent 3.6	Database	2019
Binders and Resins	CEPE RM Database v3.0	Database	2016
Cement	NEPD-5375-4689-EN	EPD	2023
Chemical	ecoinvent 3.6	Database	2019
Fillers	ecoinvent 3.6	Database	2019
Packaging - Plastic	ecoinvent 3.6	Database	2019
Packaging - Wood	Modified ecoinvent 3.6	Database	2019
Pigments and Fillers	CEPE RM Database v3.0	Database	2016

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	X	MND	MND	MND	MND	MND	MND	MND		X	X	X	X	X

System boundary:

The approach is "cradle-to-grave" but with exclusion of the use stage (B1-B7). Stage B1-B7 is not applicable for this cement based product. StoArmat Fortix does not require any actions or maintenance operations during the use stages. The following modules have been considered:

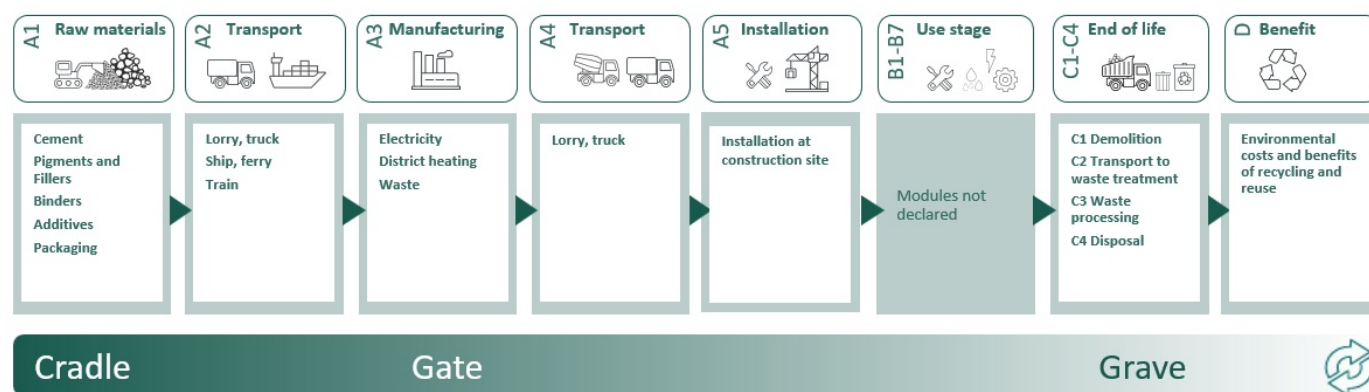
A1, A2, A3 (Product stages): Extraction and transport of raw materials, including packaging, and manufacturing process

A4 (Transport to market): Transportation from manufacturing site to customer

A5 (Assembly): Installation at construction site

C1, C2, C3, C4 (End of life stages): Deconstruction, demolition, transport to waste processing, waste processing for reuse, recovery and/or recycling and disposal

D (Benefits and loads beyond the system boundaries): Reuse/recovery/recycling potential



Additional technical information:

The waste code for unused product is 17 09 03* Other construction and demolition wastes (including mixed waste) containing hazardous substances. See MSDS section 13.

Hardened product is not classified as dangerous waste.

LCA: Scenarios and additional technical information

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

A1-A3 (Product stages): The raw materials are produced by and transported from the supplier to the production site in Linköping. The raw materials are filled in weighting containers and thereafter mixed together. Quality control checks the quality and technical properties of the product. The finished product is filled into bags and stored at the production warehouse. The product is thereafter transported on pallets and delivered to the customer.

A4 (Transport to market/building site): Most of our transports are from the production site in Linköping to customers in Stockholm. We have therefore taken this distance as an average. This gives the value of 200 km. Transport method is Lorries (Trucks) in the tonnage range 16-32 t.

A5 (Installation): The product is mixed with water at installation site according to specifications on the technical data sheet. Application of the mortar is either by hand or with a mixer pump together with a plaster gun. Electricity for application with machine has been taken into account in this LCA. Outputs are small amounts of waste from the product itself (assumed to be less than 5%) and waste from packaging materials.

C1 (De-construction, demolition): The product is demolished together with the facade/structure it is placed on. In this LCA we have assumed a scenario where StoArmat Fortix is demolished with the whole building.

C2 (Transport end of life): This stage includes the transportation effects of demolished waste to a waste processing area. The distance between the demolishing area and a waste processing area is assumed to be quite short (less than 100 km). The distance varies depending on the type of waste processing.

C3 (Waste processing): In this LCA we have assumed a typical waste scenario for concrete waste (cement-based products) that estimates that 10% of the product is recycled. StoArmat Fortix can be used as filling masses in for instance road construction. The most part is assumed to be put on landfill (90%).

C4 (Final disposal): Mineral construction waste is categorized as non-hazardous waste. StoArmat Fortix can therefore be used in landfills. The degree of landfill and possibility to recycle the mineral waste is taken into account when disposing of StoArmat Fortix. The degree of landfill is assumed to be 90% and the rest is assumed to be recycled.

D (Environmental costs and benefits of recycling and reuse): It is preferable if mineral construction waste can be recycled, since this would save resources such as raw materials and also save energy during production. 10% of the product is estimated to be recycled.

Stages not included:

Once installation is completed, no actions or technical operations are required during the use stage until the end of life stage. Stages B1-B7 are therefore not included.

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 (kgkm)	36,7 %	200	0,043	l/tkm	8,60
Assembly (A5)	Unit	Value			
Waste, packaging, plastic film (LDPE), to average treatment (kg)	kg	0,00015			
Waste, packaging, pallet, EUR wooden pallet, reusable, average treatment (kg)	kg	0,023			
Waste, packaging, plastic, Big bag, 1000kg, to average treatment (kg)	kg	0,0022			
Material loss, including waste treatment (psc)	Units	0,050			
Electricity, Nordic (kWh)	kWh	0,0027			
Tap water (kg)	kg	0,19			
De-construction demolition (C1)	Unit	Value			
Demolition of building per kg of cement-based product, C1 (kg)	kg	1.00			
Transport to waste processing (C2)	Capacity utilisation (incl. return) %	Distance (km)	Fuel/Energy Consumption	Unit	Value (Liter/tonne)
Truck, 16-32 tonnes, EURO 6 (kgkm)	36,7 %	100	0,043	l/tkm	4,30
Waste processing (C3)	Unit	Value			
Waste treatment of cement-based product after demolition to recycling (kg)	kg	0,10			
Disposal (C4)	Unit	Value			
Waste, inert waste, to landfill (kg)	kg	0,90			

Benefits and loads beyond the system boundaries (D)	Unit	Value			
Substitution of electricity (MJ)	MJ	0,00079			
Substitution of thermal energy, district heating (MJ)	MJ	0,012			
Substitution of primary aggregates with crushed recycled cement-based products (kg)	kg	0,10			

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	A2	A3	A4	A5	C1	C2	C3	C4	D
	GWP-total	kg CO ₂ -eq	3,40E-01	3,05E-02	2,38E-03	3,35E-02	5,46E-02	0,00E+00	1,68E-02	7,20E-05	7,39E-03	-3,06E-04
	GWP-fossil	kg CO ₂ -eq	3,74E-01	3,04E-02	2,20E-03	3,35E-02	2,14E-02	0,00E+00	1,67E-02	7,10E-05	7,38E-03	-2,99E-04
	GWP-biogenic	kg CO ₂ -eq	-3,47E-02	1,44E-05	5,39E-05	1,39E-05	3,31E-02	0,00E+00	6,93E-06	6,13E-07	8,62E-06	-4,71E-06
	GWP-luluc	kg CO ₂ -eq	5,95E-05	1,26E-05	1,32E-04	1,19E-05	2,39E-05	0,00E+00	5,96E-06	9,83E-08	1,81E-06	-2,55E-06
	ODP	kg CFC 11 -eq	6,06E-09	6,91E-09	1,01E-09	7,59E-09	8,86E-10	0,00E+00	3,79E-09	1,40E-11	2,80E-09	-5,07E-06
	AP	mol H ⁺ -eq	9,16E-04	3,03E-04	1,40E-05	9,63E-05	5,65E-05	0,00E+00	4,81E-05	5,75E-07	6,57E-05	-2,63E-06
	EP-FreshWater	kg P -eq	4,34E-06	2,58E-07	1,51E-07	2,68E-07	2,66E-07	0,00E+00	1,34E-07	4,49E-09	8,37E-08	-1,23E-08
	EP-Marine	kg N -eq	2,61E-04	7,43E-05	2,54E-06	1,90E-05	1,59E-05	0,00E+00	9,52E-06	1,68E-07	2,44E-05	-9,02E-07
	EP-Terrestrial	mol N -eq	2,79E-03	8,26E-04	3,30E-05	2,13E-04	1,70E-04	0,00E+00	1,07E-04	1,94E-06	2,69E-04	-1,04E-05
	POCP	kg NMVOC -eq	7,69E-04	2,38E-04	7,51E-06	8,16E-05	4,81E-05	0,00E+00	4,08E-05	5,20E-07	7,71E-05	-2,78E-06
	ADP-minerals&metals ¹	kg Sb-eq	4,09E-06	4,72E-07	8,34E-08	9,25E-07	2,63E-07	0,00E+00	4,63E-07	9,01E-10	6,65E-08	-2,10E-08
	ADP-fossil ¹	MJ	4,38E+00	4,69E-01	2,39E-01	5,06E-01	2,67E-01	0,00E+00	2,53E-01	2,21E-03	2,03E-01	-4,87E-03
	WDP ¹	m ³	2,78E+01	4,01E-01	2,41E+01	4,90E-01	2,28E+00	0,00E+00	2,45E-01	2,43E-01	1,25E+00	-1,94E-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	A2	A3	A4	A5	C1	C2	C3	C4	D
 PM	Disease incidence	1,92E-06	2,34E-09	6,99E-08	2,05E-09	9,99E-08	0,00E+00	1,03E-09	9,00E-12	1,40E-09	-7,80E-11
 IRP ²	kgBq U235 -eq	2,05E+01	2,06E-03	8,14E-03	2,21E-03	1,03E+00	0,00E+00	1,11E-03	3,70E-05	9,27E-04	-4,19E-05
 ETP-fw ¹	CTUe	1,30E+00	3,36E-01	1,25E-01	3,75E-01	1,04E-01	0,00E+00	1,88E-01	1,56E-03	1,11E-01	-9,40E-03
 HTP-c ¹	CTUh	1,50E-10	0,00E+00	4,00E-12	0,00E+00	8,00E-12	0,00E+00	0,00E+00	0,00E+00	5,00E-12	0,00E+00
 HTP-nc ¹	CTUh	3,48E-09	3,48E-10	8,70E-11	4,10E-10	2,13E-10	0,00E+00	2,05E-10	1,00E-12	8,00E-11	-1,00E-11
 SQP ¹	dimensionless	5,11E-01	4,37E-01	1,05E-01	3,54E-01	9,17E-02	0,00E+00	1,77E-01	1,25E-03	7,82E-01	2,14E-03

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	A2	A3	A4	A5	C1	C2	C3	C4	D
	PERE	MJ	8,74E-01	6,74E-03	1,15E-01	7,25E-03	5,45E-02	0,00E+00	3,62E-03	1,14E-03	7,27E-03	-7,05E-03
	PERM	MJ	3,19E-01	0,00E+00	0,00E+00	0,00E+00	-3,03E-01	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
	PERT	MJ	1,19E+00	6,74E-03	1,15E-01	7,25E-03	-2,49E-01	0,00E+00	3,62E-03	1,14E-03	7,27E-03	-7,05E-03
	PENRE	MJ	4,16E+00	4,69E-01	2,39E-01	5,06E-01	2,56E-01	0,00E+00	2,53E-01	2,21E-03	2,03E-01	-5,08E-03
	PENRM	MJ	9,27E-01	0,00E+00	0,00E+00	0,00E+00	-8,15E-02	0,00E+00	0,00E+00	-8,41E-01	0,00E+00	0,00E+00
	PENRT	MJ	5,09E+00	4,69E-01	2,39E-01	5,06E-01	1,74E-01	0,00E+00	2,53E-01	-8,39E-01	2,03E-01	-5,08E-03
	SM	kg	3,55E-06	0,00E+00	0,00E+00	0,00E+00	1,77E-07	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
	RSF	MJ	5,77E-02	2,76E-04	4,42E-04	2,59E-04	3,02E-03	0,00E+00	1,30E-04	0,00E+00	1,51E-04	-1,96E-05
	NRSF	MJ	3,45E-01	6,30E-04	1,40E-03	9,27E-04	1,73E-02	0,00E+00	4,64E-04	0,00E+00	3,26E-04	-3,83E-04
	FW	m ³	4,11E-01	5,44E-05	2,59E-04	5,42E-05	2,08E-02	0,00E+00	2,71E-05	3,78E-06	2,50E-04	-1,50E-04

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	A2	A3	A4	A5	C1	C2	C3	C4	D
	HWD	kg	1,58E-04	2,59E-05	4,19E-05	2,61E-05	1,21E-05	0,00E+00	1,31E-05	2,20E-07	0,00E+00	-9,80E-07
	NHWD	kg	1,29E+00	3,18E-02	8,04E-04	2,46E-02	1,13E-01	0,00E+00	1,23E-02	6,96E-06	9,00E-01	-5,18E-05
	RWD	kg	1,05E-05	3,20E-06	3,96E-06	3,45E-06	8,33E-07	0,00E+00	1,72E-06	2,33E-08	0,00E+00	-3,59E-08

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	A2	A3	A4	A5	C1	C2	C3	C4	D
	CRU	kg	0,00E+00	0,00E+00	0,00E+00	0,00E+00	2,19E-02	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
	MFR	kg	0,00E+00	0,00E+00	1,54E-02	0,00E+00	6,97E-03	0,00E+00	0,00E+00	1,00E-01	0,00E+00	0,00E+00
	MER	kg	0,00E+00	0,00E+00	1,26E-05	0,00E+00	1,14E-03	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
	EEE	MJ	0,00E+00	0,00E+00	1,82E-05	0,00E+00	8,08E-04	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
	EET	MJ	0,00E+00	0,00E+00	2,75E-04	0,00E+00	1,22E-02	0,00E+00	0,00E+00	0,00E+00	0,00E+00	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	9,51E-03

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, Sweden (kWh)	ecoinvent 3.6	54,94	g CO ₂ -eq/kWh

Dangerous substances

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

Indoor environment

No emission tests have been carried out for interior use.

Additional Environmental Information

Additional environmental impact indicators required in NPCR Part A for construction products											
Indicator	Unit	A1	A2	A3	A4	A5	C1	C2	C3	C4	D
GWPIOBC	kg CO ₂ -eq	3,74E-01	3,05E-02	2,37E-03	3,35E-02	2,16E-02	0,00E+00	1,68E-02	7,11E-05	7,39E-03	-3,16E-04

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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