epd-norge
Global program operatør

Environmental product declaration

in accordance with ISO 14025 and EN 15804+A2

HHFlex 08.04 PHE

systemair

systemair

The Norwegian EPD Foundation

Owner of the declaration:
Systemair B.V.

Product:
HHFlex 08.04 PHE

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-6682-5722-EN

Registration number:

NEPD-6682-5722-EN

Issue date: 27.05.2024

Valid to: 27.05.2029

EPD software:
LCAno EPD generator ID: 197257

General information

Product

HHFlex 08.04 PHE

Owner of the declaration:

Systemair B.V.
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Program operator:

The Norwegian EPD Foundation
Post Box 5250 Majorstuen, 0303 Oslo, Norway
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web: www.epd-norge.no

Manufacturer:

Systemair B.V.

Declaration number:

NEPD-6682-5722-EN

Place of production:

Systemair B.V.
Zanddonkweg 7A
5144NX Waalwijk, Netherlands

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

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:

N1001219947801

Declared unit:

1 pcs HHFlex 08.04 PHE

Issue date:

27.05.2024

Declared unit with option:

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

Valid to:

27.05.2029

Year of study:

2022

Functional unit:

HHFlex air handling units have a modular platform design, enabling you to tailor the unit to your project, based on required airflow and specific demands. Ideal for hospitals, industry, marine and offshore.

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: Anthony Musters

Reviewer of company-specific input data and EPD: Andy Bijmans

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:

This EDP is generated for the HHFlex air handling unit size 08.04 with a Plate Heat Exchanger configuration. [PHE]

Product specification

The HHFlex is manufactured with high-quality components, depending on the selected customizable configuration:

Heat recovery systems
Humidifiers
Filters
Heat exchangers (heating and/or cooling)
Sound attenuators

Materials	kg	%
Adhesive	1,80	0,13
Cardboard	0,08	0,01
Electronic - Wire	40,00	2,82
Filter, mineral based	11,00	0,78
Hydronic coil (50% AL, 50%CU)	66,00	4,65
Insulation, Mineral based	91,60	6,45
Metal - Aluminium	135,61	9,56
Metal - Brass	0,30	0,02
Metal - Copper	0,80	0,06
Metal - Galvanized Steel	803,70	56,63
Metal - Stainless steel	61,15	4,31
Metal - Steel	10,18	0,72
Metal - Steel with aluzinc coating	10,30	0,73
Motor	78,00	5,50
Plastic - Acrylonitrile butadiene styrene (ABS)	7,97	0,56
Plastic - Polyamide	2,50	0,18
Plastic - Polyethylene	0,12	0,01
Plastic - Polypropylene (PP)	12,48	0,88
Plastic - Polyvinyl chloride (PVC)	33,48	2,36
Plastics	0,90	0,06
Rubber, synthetic	1,16	0,08
Wood	50,00	3,52
Total	1419,13	100,00

Packaging	kg	%
Packaging - Paper	0,04	1,06
Packaging - Plastic	3,91	98,94
Total incl. packaging	1423,08	100,00

Technical data:

Please refer to our product website for additional information.

Market:

Europe

Reference service life, product

Dependent on the application of the product

Reference service life, building or construction works

Not declared

LCA: Calculation rules

Declared unit:

1 pcs HHFlex 08.04 PHE

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:

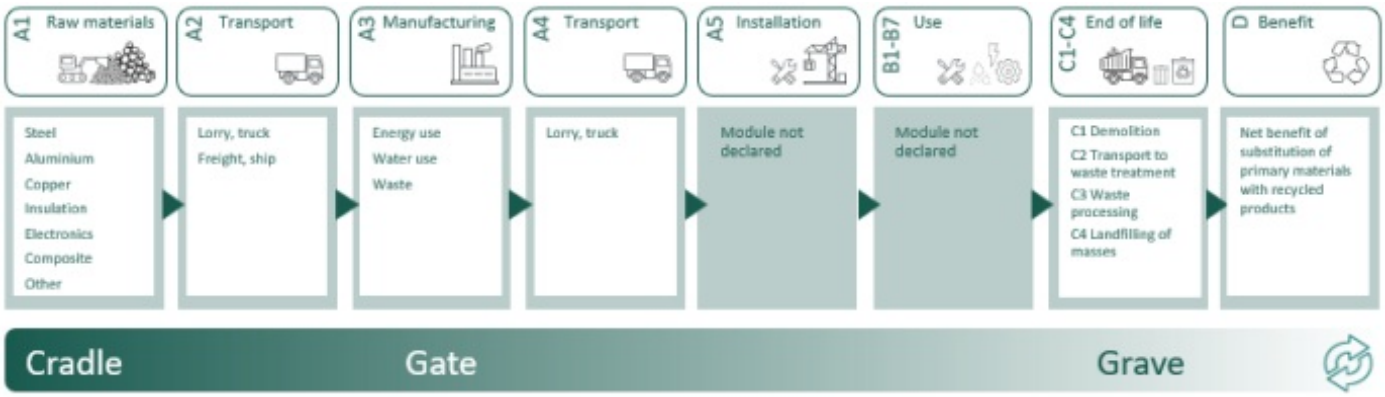
Specific data for the product composition are provided by the manufacturer. The data represent the production of the declared product and were collected for EPD development in the year of study. Background data is based on EPDs according to EN 15804 and different LCA databases. The data quality of the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

Materials	Source	Data quality	Year
Adhesive	ecoinvent 3.6	Database	2019
Cardboard	ecoinvent 3.6	database	2019
Electronic - Wire	Product composition + ecoinvent 3.6	Supplier data + database	2019
Filter, mineral based	ecoinvent 3.6	Database	2019
Hydronic coil (50% AL, 50%CU)	ecoinvent 3.6	Database	2019
Insulation, Mineral based	ecoinvent 3.6	Database	2019
Metal - Aluminium	ecoinvent 3.6	Database	2019
Metal - Aluminium	Modified ecoinvent 3.6	Database	2019
Metal - Brass	ecoinvent 3.6	Database	2019
Metal - Copper	ecoinvent 3.6	Database	2019
Metal - Galvanized Steel	Modified ecoinvent 3.6	Database	2019
Metal - Stainless steel	Modified ecoinvent 3.6	Database	2019
Metal - Steel	ecoinvent 3.6	Database	2019
Metal - Steel with aluzinc coating	Modified ecoinvent 3.6	Database	2019
Motor	ecoinvent 3.6	Database	2019
Packaging - Paper	ecoinvent 3.6	Database	2019
Packaging - Plastic	ecoinvent 3.6	Database	2019
Plastic - Acrylonitrile butadiene styrene (ABS)	ecoinvent 3.6	Database	2019
Plastic - Polyamide	ecoinvent 3.6	Database	2019
Plastic - Polyethylene	ecoinvent 3.6	Database	2019
Plastic - Polypropylene (PP)	ecoinvent 3.6	Database	2019
Plastic - Polyvinyl chloride (PVC)	ecoinvent 3.6	Database	2019
Plastics	ecoinvent 3.6	Database	2019
Rubber, synthetic	ecoinvent 3.6	Database	2019
Wood	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:

Complete project specific technical information and documentation is generated using our online product selection software. Please refer to the Systemair website for more information.

LCA: Scenarios and additional technical information

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

For A4 a generic transportation distance (EURO6 truck) of 300 km is declared.
True transportation distance can be provided in project specific EPD.

For C2 a generic transportation distance (EURO6 truck) of 50 km is declared.
True transportation distance can be provided in project specific 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 %	300	0,043	l/tkm	12,90

De-construction demolition (C1)	Unit	Value			
Demolition of building per kg of ventilation product (kg)	kg/DU	1423,00			

Transport to waste processing (C2)	Capacity utilisation (incl. return) %	Distance (km)	Fuel/Energy Consumption	Unit	Value (Liter/tonne)
Truck, 16-32 tonnes, EURO 6 (km)	36,7 %	50	0,043	l/tkm	2,15

Waste processing (C3)	Unit	Value			
Materials to recycling (kg)	kg	1074,86			
Waste treatment per kg bulk waste, excluding reinforcement, sorting plant (kg)	kg	78,00			
Waste treatment per kg Hazardous waste, incineration (kg)	kg	1,80			
Waste treatment per kg Paperboard, incineration (kg)	kg	0,08			
Waste treatment per kg plastic, industrial electronics, incineration (kg)	kg	3,99			
Waste treatment per kg Plastics, from incineration (kg)	kg	1,70			
Waste treatment per kg Polyethylene (PE), incineration (kg)	kg	0,06			
Waste treatment per kg Polypropylene (PP), incineration (kg)	kg	6,24			
Waste treatment per kg Polyvinylchloride (PVC), incineration (kg)	kg	16,74			
Waste treatment per kg Rubber, incineration (kg)	kg	1,16			
Waste treatment per kg wire plastic, municipal incineration (kg)	kg	8,80			
Waste treatment per kg Wood, incineration (kg)	kg	50,00			

Disposal (C4)	Unit	Value			
Landfilling of ashes from incineration of Paperboard, process per kg ashes and residues (kg)	kg	0,00			
Landfilling of ashes from incineration of Plastics, process per kg ashes and residues (kg)	kg	0,04			
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	0,19			
Landfilling of ashes from incineration of Polyvinylchloride (PVC), process per kg ashes and residues (kg)	kg	2,67			
Landfilling of ashes from incineration of Rubber, process per kg ashes and residues (kg)	kg	0,06			
Landfilling of ashes from incineration of Wood, process per kg ashes and residues (kg)	kg	1,29			
Landfilling of ashes from incineration per kg Hazardous waste, process per kg ashes and residues (kg)	kg	0,34			
Landfilling of ashes from incineration per kg plastic, industrial electronics, process per kg ashes and residues (kg)	kg	0,27			
Landfilling of ashes from incineration per kg wire plastic, process per kg ashes and residues (kg)	kg	1,31			
Waste, aluminium, to landfill (kg)	kg	12,29			
Waste, brass, to landfill (kg)	kg	0,03			
Waste, copper, to landfill (kg)	kg	6,87			
Waste, mineral wool, to landfil (kg)	kg	102,60			
Waste, plastic, mixture, to landfill (kg)	kg	37,53			
Waste, stainless steel, to landfill (kg)	kg	6,12			
Waste, steel, to landfill (kg)	kg	88,27			

Benefits and loads beyond the system boundaries (D)	Unit	Value			
Substitution of electricity (MJ)	MJ	116,09			
Substitution of primary aluminium with net scrap (kg)	kg	41,82			
Substitution of primary Brass with net scrap (kg)	kg	0,14			
Substitution of primary copper with net scrap (kg)	kg	50,28			
Substitution of primary other ferrous metals with net scrap (kg)	kg	-6,12			
Substitution of primary steel with net scrap (kg)	kg	109,29			
Substitution of thermal energy, district heating (MJ)	MJ	1756,39			

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	5,97E+03	6,98E+01	1,88E+00	1,16E+01	1,77E+02	6,66E+00	-6,26E+02
	GWP-fossil	kg CO_2 -eq	5,96E+03	6,97E+01	1,88E+00	1,16E+01	9,35E+01	6,66E+00	-6,16E+02
	GWP-biogenic	kg CO_2 -eq	-4,26E+01	2,89E-02	3,52E-04	4,81E-03	8,35E+01	2,63E-03	-2,35E+00
	GWP-luluc	kg CO_2 -eq	4,96E+01	2,48E-02	1,48E-04	4,14E-03	4,96E-03	6,09E-04	-7,58E+00
	ODP	kg CFC11 -eq	4,97E-04	1,58E-05	4,06E-07	2,63E-06	2,05E-06	6,90E-07	-7,42E-01
	AP	mol H+ -eq	5,69E+01	2,00E-01	1,96E-02	3,34E-02	4,81E-02	1,73E-02	-2,34E+01
	EP-FreshWater	kg P -eq	4,04E-01	5,57E-04	6,83E-06	9,29E-05	2,52E-04	3,32E-05	-1,59E-01
	EP-Marine	kg N -eq	6,38E+00	3,97E-02	8,66E-03	6,61E-03	1,50E-02	1,04E-02	-1,29E+00
	EP-Terrestial	mol N -eq	1,21E+02	4,44E-01	9,51E-02	7,39E-02	1,60E-01	6,60E-02	-1,79E+01
	POCP	kg NMVOC -eq	2,50E+01	1,70E-01	2,61E-02	2,83E-02	4,22E-02	1,97E-02	-5,33E+00
	ADP-minerals&metals[1]	kg Sb-eq	2,01E+00	1,93E-03	2,88E-06	3,21E-04	1,26E-04	3,73E-05	-1,18E-01
	ADP-fossil[1]	MJ	7,53E+04	1,05E+03	2,58E+01	1,76E+02	8,69E+01	5,01E+01	-6,90E+03
	WDP[1]	m^3	7,26E+05	1,02E+03	5,49E+00	1,70E+02	1,14E+03	3,04E+02	-2,02E+05

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

This air handling unit uses electric energy for fan drive and recovers thermal energy via a plate heat exchanger.
These factors are highly project specific and vary depending on:

o Climate / outdoor conditions
o Air flow
o External pressure
o Supply temperature
o Extract temperature
o Operating hours
o Electricity origin
o Etc.

Energy use and heat recovery are fundamental in determining the environmental impact of this product and must be calculated with project specific values. This can be done using our AHU calculation software Blizzard, please refer to our website for more information.

Additional environmental impact indicators									
Indicator		Unit	A1-A3	A4	C1	C2	C3	C4	D
	PM	Disease incidence	4,94E-04	4,27E-06	5,19E-07	7,12E-07	3,83E-07	3,06E-07	-8,09E-05
	IRP[2]	kgBq U235 -eq	2,51E+02	4,61E+00	1,11E-01	7,68E-01	3,90E-01	2,30E-01	-2,24E+01
	ETP-fw[1]	CTUe	3,42E+05	7,82E+02	1,41E+01	1,30E+02	2,89E+03	7,71E+03	-1,99E+05
	HTP-c[1]	CTUh	3,15E-05	0,00E+00	0,00E+00	0,00E+00	1,42E-08	1,62E-07	-4,13E-06
	HTP-nc[1]	CTUh	4,37E-04	8,54E-07	1,28E-08	1,42E-07	9,05E-07	1,10E-05	-2,25E-04
	SQP[1]	dimensionless	2,80E+04	7,37E+02	3,28E+00	1,23E+02	3,06E+01	1,48E+02	-3,45E+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-A3	A4	C1	C2	C3	C4	D
	PERE	MJ	1,43E+04	1,51E+01	1,40E-01	2,52E+00	1,11E+01	1,87E+00	-3,12E+03
	PERM	MJ	7,01E+02	0,00E+00	0,00E+00	0,00E+00	-7,01E+02	0,00E+00	0,00E+00
	PERT	MJ	1,50E+04	1,51E+01	1,40E-01	2,52E+00	-6,89E+02	1,87E+00	-3,12E+03
	PENRE	MJ	7,43E+04	1,05E+03	2,58E+01	1,76E+02	8,69E+01	5,01E+01	-6,90E+03
	PENRM	MJ	2,21E+03	0,00E+00	0,00E+00	0,00E+00	-1,73E+03	0,00E+00	0,00E+00
	PENRT	MJ	7,65E+04	1,05E+03	2,58E+01	1,76E+02	-1,64E+03	5,01E+01	-6,90E+03
	SM	kg	1,31E+02	0,00E+00	1,27E-02	0,00E+00	8,60E-04	9,17E-03	3,51E+01
	RSF	MJ	2,89E+02	5,40E-01	3,44E-03	9,00E-02	2,12E-01	4,11E-02	6,57E+00
	NRSF	MJ	3,05E+02	1,93E+00	5,06E-02	3,22E-01	9,14E-04	5,42E-01	7,58E+01
	FW	m^3	9,15E+01	1,13E-01	1,33E-03	1,88E-02	1,62E+00	5,66E-02	-1,36E+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	4,01E+01	5,44E-02	7,60E-04	9,06E-03	9,97E-05	1,96E+00	-3,98E-01
	NHWD	kg	2,06E+03	5,13E+01	3,06E-02	8,55E+00	1,80E+00	2,59E+02	-2,16E+02
	RWD	kg	2,41E-01	7,18E-03	1,79E-04	1,20E-03	1,01E-05	1,91E-04	-2,10E-02

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	6,73E+01	0,00E+00	1,25E-02	0,00E+00	1,07E+03	8,06E-03	-1,38E+00
	MER	kg	4,81E+01	0,00E+00	3,86E-05	0,00E+00	8,89E+01	1,45E-04	-1,82E-01
	EEE	MJ	3,76E+01	0,00E+00	1,32E-04	0,00E+00	8,14E+01	5,72E-03	-4,48E-01
	EET	MJ	5,69E+02	0,00E+00	2,00E-03	0,00E+00	1,23E+03	8,65E-02	-6,78E+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	2,28E+01
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, Netherlands (kWh)	ecoinvent 3.6	651,66	g CO2-eq/kWh

Dangerous substances

The product contains no substances on the REACH Candidate list at or above 100 ppm, 0,01 % by weight.

Indoor environment

The air handling unit is an essential component for obtaining good thermal and atmospheric conditions. An optimally sized and well-functioning AHU will have direct positive effects on human health, wellbeing, and productivity and is a crucial prerequisite for achieving a healthy 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	6,05E+03	6,98E+01	1,88E+00	1,16E+01	9,37E+01	6,70E+00	-6,01E+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

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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.

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