ENVIRONMENTAL PRODUCT DECLARATION

IN ACCORDANCE WITH EN 15804+A2 & ISO 14025 / ISO 21930

RVP-C - Variable air volume damper
Klimaoprema d.d.

EPD HUB, HUB-0246
Publishing date 20 January 2023, last updated date 20 January 2023, valid until 20 January 2028

Created with One Click LCA

GENERAL INFORMATION

MANUFACTURER

Manufacturer	Klimaoprema d.d.
Address	Gradna 78a, 10430 Samobor, Hrvatska
Contact details	info@klimaoprema.com
Website	https://www.klimaoprema.com/

EPD STANDARDS, SCOPE AND VERIFICATION

Program operator	EPD Hub, hub@epdhub.com
Reference standard	EN 15804+A2:2019 and ISO 14025
PCR	EPD Hub Core PCR version 1.0, 1 Feb 2022
Sector	Construction product
Category of EPD	Third party verified EPD
Scope of the EPD	Cradle to gate with options, A4-B7, and modules C1-C4, D
EPD author	Marko Kokolić, Klimaoprema d.d.
EPD verification	Independent verification of this EPD and data, according to ISO 14025: ☐ Internal certification ☑ External verification
EPD verifier	N.C, as an authorized verifier acting for EPD Hub Limited

The manufacturer has the sole ownership, liability, and responsibility for the EPD. EPDs within the same product category but from different programs may not be comparable. EPDs of construction products may not be comparable if they do not comply with EN 15804 and if they are not compared in a building context.

PRODUCT

Product name	RVP-C - Variable air volume damper
Product reference	2006
Place of production	Industrijski Park 19, 35400 Nova Gradiška, Croatia
Period for data	August 2021- September 2022.
Averaging in EPD	No averaging

ENVIRONMENTAL DATA SUMMARY

Declared unit	1 unit of VAV damper with an electric actuator
Declared unit mass	1.25155 kg
GWP-fossil, A1-A3 (kgCO2e)	1,51E1
GWP-total, A1-A3 (kgCO2e)	1,49E1
Secondary material, inputs (%)	32.2
Secondary material, outputs (%)	64.4
Total energy use, A1-A3 (kWh)	58.6
Total water use, A1-A3 (m3e)	0.225

PRODUCT AND MANUFACTURER

ABOUT THE MANUFACTURER

Klimaoprema is a manufacturing technology solution company in the field of cleanrooms and HVAC systems.

PRODUCT DESCRIPTION

RVP-C or VAV cylindrical damper is used to control a variable or constant airflow volume in duct ventilation systems. All VAV dampers are equipped with compact VAV actuator, which has in-built pressure differential sensor and PID logic control. Actuator sensor is connected with rubber hoses to the measuring cross which is used for measuring the duct airflow. By having a real time information about the volume airflow in the duct, VAV's can dynamically respond to the changes in the setpoint (temperature, CO2 or humidity) and ensure optimized ventilation with lowest possible energy consumption.

VAV damper casing is manufactured from galvanized steel sheet, but on demand can be produced out of:
- Galvanized steel and powder coated
- Stainless steel EN 1.4301/EN 1.4404 (AISI304/316L)
- Stainless steel EN 1.4301/ EN 1.4404 (AISI 304/316L) and powder coated

Technical specifications:
Diameter: d100 - d630 [mm]
Casing length: 400-850 mm
Casing air leakage: Class C, according to EN1751
Closed blade air leakage: Class 3, according to EN 1751

Further information can be found at https://www.klimaoprema.com/.

PRODUCT RAW MATERIAL MAIN COMPOSITION

Raw material category	Amount, mass- %	Material origin
Metals	79,3	EU
Minerals	-	
Fossil materials	20,7	EU
Bio-based materials	-	-

BIOGENIC CARBON CONTENT

Product's biogenic carbon content at the factory gate

Biogenic carbon content in product, kg C	-
Biogenic carbon content in packaging, kg C	0.0891

FUNCTIONAL UNIT AND SERVICE LIFE

Declared unit	1 unit of VAV damper with an electric actuator
Mass per declared unit	1.25155 kg
Reference service life	20

SUBSTANCES, REACH - VERY HIGH CONCERN

The product does not contain any REACH SVHC substances in amounts greater than 0,1 % (1000 ppm).

PRODUCT LIFE-CYCLE

SYSTEM BOUNDARY

This EPD covers the life-cycle modules listed in the following table.

Product stage			Assembly stage		Use stage							End of life stage				Beyond the system boundaries		
A1	A2	A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D		
x	x	x	x	x	MND	x	MND	MND	MND	x	MND	x	x	x	x	x		
Raw materials	Transport	Manufacturing	Transport	Assembly	Use	Maintenance	Repair	Replacement	Refurbishment	Operational energy use	Operational water use	Deconstr./demol.	Transport	Waste processing	Disposal	Reuse	Recovery	Recycling

Modules not declared = MND. Modules not relevant = MNR.

MANUFACTURING AND PACKAGING (A1-A3)

The environmental impacts considered for the product stage cover the manufacturing of raw materials used in the production as well as packaging materials and other ancillary materials. Also, fuels used by machines, and handling of waste formed in the production processes at the manufacturing facilities are included in this stage. The study also considers the material losses occurring during the manufacturing processes as well as losses during electricity transmission.

The reference product consists of the main product (product frame: casing and damper blade) and the electric actuator. Casing and damper blade are made of galvanized steel sheet. The electric actuator is made of plastic and galvanized sheet steel. The materials are transported to the production facility of Klimaoprema d.d. The production facility is located in Nova Gradiška, address: Industrijski Park 19, 35400 Nova Gradiška, Croatia. In the production facility, the galvanized sheet undergoes laser cutting, stamping, rolling and profiling. Plastic parts are purchased, so there is no plastic waste. Electrical devices and tools are used in the production process. Production energy is taken based on the place/country of electricity production. Each part of the production process is considered separately, and disposal of process waste is calculated based on waste distribution at the factory level. The finished product is packed in cardboard boxes and tied to wooden pallets with plastic strips before shipping.

TRANSPORT AND INSTALLATION (A4-A5)

Transportation impacts occurred from final products delivery to construction site (A4) cover fuel direct exhaust emissions, environmental impacts of fuel production, as well as related infrastructure emissions.

The transport distance is defined according to the PCR. To define the distribution of the product to the customer, the weighted average of the five largest customers is considered. It is assumed that the average transportation distance from the production facility to the construction site is 1175,6 km. It is assumed that the volume factor of vehicle capacity utilization is 100%, which means full load. It may vary, but since the role of traffic emissions in the overall results is small, it is assumed that the diversity in cargo is negligible. Empty returns are not considered as it is assumed that the transport company uses the return journey for the needs of other customers. Transportation does not cause losses because the products are properly packed. It is also assumed that the volume capacity utilization factor is 100% for nested packaged products.

Environmental impacts from building installation include waste packaging material (A5) and the release of biogenic carbon dioxide from waste from the processing of wooden pallets. The product can be installed without electricity consumption.

PRODUCT USE AND MAINTENANCE (B1-B7)

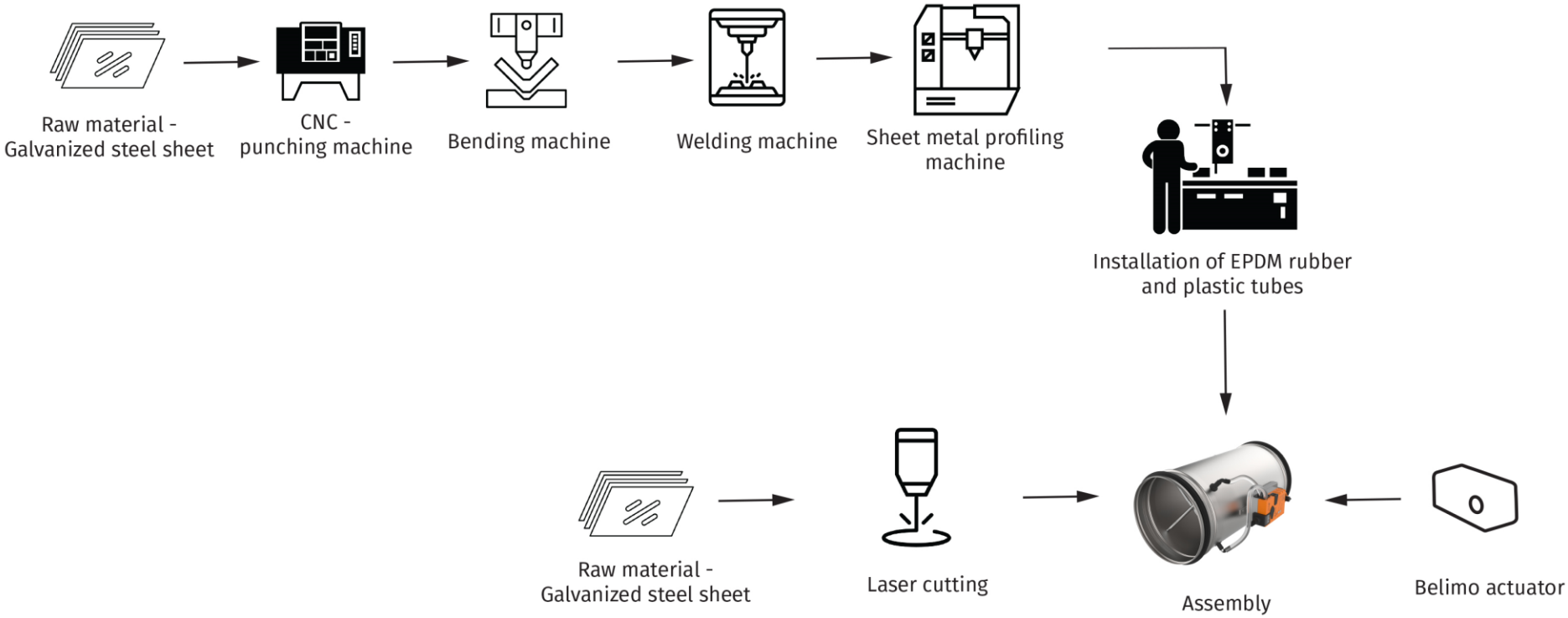
The product does not require maintenance. Electricity consumption is calculated for a period of 20 years, and the product is in standby mode, which consumes 0.5 W. Replacement of components or parts is not included.
Air, soil, and water impacts during the use phase have not been studied.

PRODUCT END OF LIFE (C1-C4, D)

Consumption of energy and natural resources in the demolition process is assumed to be negligible. It is assumed that the waste is collected separately and transported to the waste treatment plant. Transportation distance to treatment is assumed as 50 km and the transportation method is assumed to be lorry (C2). According to EN 50693:2019, the sequence of treatment operations occurring to the product shall include de-pollution, fractions separation and preparation (dismantling, crushing, shredding, sorting), recycling, other material recovery, energy recovery and disposal. In this study, the default values from table G.4 of EN 50693 are used for treating materials in different waste treatment methods.

Module C3 accounts for energy and resource inputs for sorting and treating these waste streams for recycling and incineration with energy recovery. As per the used standard, 20% of steel, 30% of brass, 40% of copper and 40-50% of plastic waste go to landfill. Due to the material and energy recovery potential of parts in the end-of-life product and packaging, recycled raw materials leads to avoided virgin material production, while the energy recovered from incineration displaces electricity and heat production (D). The benefits and loads of incineration and recycling are included in Module D.

MANUFACTURING PROCESS



LIFE-CYCLE ASSESSMENT

CUT-OFF CRITERIA

The study does not exclude any modules or processes which are stated mandatory in the reference standard and the applied PCR. The study does not exclude any hazardous materials or substances. The study includes all major raw material and energy consumption. All inputs and outputs of the unit processes, for which data is available for, are included in the calculation. There is no neglected unit process more than 1% of total mass or energy flows. The module specific total neglected input and output flows also do not exceed 5% of energy usage or mass.

ALLOCATION, ESTIMATES AND ASSUMPTIONS

Allocation is required if some material, energy, and waste data cannot be measured separately for the product under investigation. All allocations are done as per the reference standards and the applied PCR. In this study, allocation has been done in the following ways:

Data type	Allocation
Raw materials	No allocation
Packaging materials	Allocated by mass or volume
Ancillary materials	Allocated by mass or volume
Manufacturing energy and waste	Allocated by mass or volume

AVERAGES AND VARIABILITY

Type of average	No averaging
Averaging method	Not applicable

This EPD is product and factory specific and does not contain average calculations.

LCA SOFTWARE AND BIBLIOGRAPHY

This EPD has been created using One Click LCA EPD Generator. The LCA and EPD have been prepared according to the reference standards and ISO 14040/14044. Ecoinvent and One Click LCA databases were used as sources of environmental data.

ENVIRONMENTAL IMPACT DATA

CORE ENVIRONMENTAL IMPACT INDICATORS – EN 15804+A2, PEF

Impact category	Unit	A1	A2	A3	A1-A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
GWP – total[1)]	kg CO_2e	1,46E1	9,24E-2	2,2E-1	1,49E1	1,69E-1	6,68E-1	MND	0E0	MND	MND	MND	3,84E1	MND	0E0	5,69E-3	3,67E-1	1,81E-2	-1,72E0
GWP – fossil	kg CO_2e	1,45E1	9,23E-2	5,46E-1	1,51E1	1,71E-1	4,45E-2	MND	0E0	MND	MND	MND	3,71E1	MND	0E0	5,69E-3	3,68E-1	1,81E-2	-1,75E0
GWP – biogenic	kg CO_2e	4,47E-2	6,52E-5	-3,26E-1	-2,81E-1	1,24E-4	6,24E-1	MND	0E0	MND	MND	MND	1,13E0	MND	0E0	4,13E-6	-1,11E-3	1,61E-5	3,2E-2
GWP – LULUC	kg CO_2e	2,25E-2	2,68E-5	1,06E-3	2,36E-2	5,14E-5	2,34E-5	MND	0E0	MND	MND	MND	8,65E-2	MND	0E0	1,71E-6	2,85E-5	1,01E-6	-2,63E-4
Ozone depletion pot.	kg CFC_{-11}e	1,21E-6	2,16E-8	3,3E-8	1,27E-6	4,02E-8	3,72E-9	MND	0E0	MND	MND	MND	3,15E-6	MND	0E0	1,34E-9	4,12E-9	8,56E-10	-6,61E-8
Acidification potential	mol H^+e	1,26E-1	4,28E-4	2,94E-3	1,29E-1	7,18E-4	1,61E-4	MND	0E0	MND	MND	MND	2,17E-1	MND	0E0	2,39E-5	3,1E-4	2,16E-5	-1,1E-2
EP-freshwater[2)]	kg Pe	2,62E-3	7,26E-7	4,37E-5	2,67E-3	1,39E-6	7,14E-7	MND	0E0	MND	MND	MND	4,02E-3	MND	0E0	4,63E-8	1,56E-6	3,75E-8	-1,08E-4
EP-marine	kg Ne	1,85E-2	1,37E-4	6,18E-4	1,92E-2	2,16E-4	5,25E-5	MND	0E0	MND	MND	MND	2,77E-2	MND	0E0	7,2E-6	8,06E-5	1,02E-5	-1,65E-3
EP-terrestrial	mol Ne	3E-1	1,51E-3	5,3E-3	3,07E-1	2,39E-3	5,67E-4	MND	0E0	MND	MND	MND	3,39E-1	MND	0E0	7,95E-5	9,14E-4	8E-5	-1,96E-2
POCP ("smog")[3)]	kg NMVOCe	5,84E-2	4,7E-4	1,75E-3	6,06E-2	7,68E-4	1,72E-4	MND	0E0	MND	MND	MND	8,61E-2	MND	0E0	2,56E-5	2,46E-4	2,69E-5	-7,98E-3
ADP-minerals & metals[4)]	kg Sbe	8,66E-3	1,51E-6	5,65E-6	8,67E-3	2,92E-6	6,15E-7	MND	0E0	MND	MND	MND	2,73E-4	MND	0E0	9,7E-8	1,3E-6	2,4E-8	-4,61E-5
ADP-fossil resources	MJ	1,83E2	1,43E0	1,36E1	1,98E2	2,66E0	4,46E-1	MND	0E0	MND	MND	MND	7,66E2	MND	0E0	8,85E-2	3,93E-1	6,16E-2	-2,27E1
Water use[5)]	m^3e depr.	4,82E0	5,15E-3	1,37E-1	4,96E0	9,89E-3	5,87E-3	MND	0E0	MND	MND	MND	9,6E0	MND	0E0	3,29E-4	2,94E-2	2,81E-3	-7,76E-1

ADDITIONAL (OPTIONAL) ENVIRONMENTAL IMPACT INDICATORS – EN 15804+A2, PEF

Impact category	Unit	A1	A2	A3	A1-A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
Particulate matter	Incidence	9,15E-7	8,06E-9	2,13E-8	9,44E-7	1,55E-8	2,61E-9	MND	0E0	MND	MND	MND	5,69E-7	MND	0E0	5,14E-10	3,58E-9	4,1E-10	-1,18E-7
Ionizing radiation[6)]	kBq U235e	6,65E-1	6,24E-3	4,83E-2	7,19E-1	1,16E-2	1,39E-3	MND	0E0	MND	MND	MND	6,71E0	MND	0E0	3,87E-4	1,69E-3	2,47E-4	-3,19E-2
Ecotoxicity (freshwater)	CTUe	1,23E3	1,08E0	1,33E1	1,25E3	2,03E0	5,03E-1	MND	0E0	MND	MND	MND	5,13E2	MND	0E0	6,76E-2	2,17E0	1,75E-1	-9,78E1
Human toxicity, cancer	CTUh	2,93E-8	2,72E-11	3,63E-10	2,97E-8	5,2E-11	4,99E-11	MND	0E0	MND	MND	MND	1,36E-8	MND	0E0	1,73E-12	4,97E-11	3,49E-10	-6,76E-9
Human tox. non-cancer	CTUh	7,78E-7	1,29E-9	7,61E-9	7,87E-7	2,41E-9	1,05E-9	MND	0E0	MND	MND	MND	4,63E-7	MND	0E0	8,01E-11	2,14E-9	2,39E-8	8,76E-8
SQP[7)]	-	6,12E1	2,08E0	7,07E-1	6,4E1	4,01E0	2,69E-1	MND	0E0	MND	MND	MND	2,87E1	MND	0E0	1,34E-1	1,3E-1	1,71E-1	-3,05E0

USE OF NATURAL RESOURCES

Impact category	Unit	A1	A2	A3	A1-A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
Renew. PER as energy[8)]	MJ	1,79E1	1,74E-2	2,33E0	2,03E1	3,35E-2	2E-2	MND	0E0	MND	MND	MND	1,49E2	MND	0E0	1,11E-3	4,85E-2	7,87E-4	-2,79E0
Renew. PER as material	MJ	0E0	0E0	3,13E0	3,13E0	0E0	-3,13E0	MND	0E0	MND	MND	MND	0E0	MND	0E0	0E0	0E0	0E0	-1,69E-1
Total use of renew. PER	MJ	1,79E1	1,74E-2	5,47E0	2,34E1	3,35E-2	-3,11E0	MND	0E0	MND	MND	MND	1,49E2	MND	0E0	1,11E-3	4,85E-2	7,87E-4	-2,96E0
Non-re. PER as energy	MJ	1,81E2	1,43E0	8,8E0	1,91E2	2,66E0	4,46E-1	MND	0E0	MND	MND	MND	7,66E2	MND	0E0	8,85E-2	3,93E-1	6,16E-2	-1,71E1
Non-re. PER as material	MJ	2,14E0	0E0	4,77E0	6,91E0	0E0	0E0	MND	0E0	MND	MND	MND	0E0	MND	0E0	0E0	-2,14E0	0E0	-5,65E0
Total use of non-re. PER	MJ	1,83E2	1,43E0	1,36E1	1,98E2	2,66E0	4,46E-1	MND	0E0	MND	MND	MND	7,66E2	MND	0E0	8,85E-2	-1,75E0	6,16E-2	-2,27E1
Secondary materials	kg	3,72E-1	0E0	3,04E-2	4,03E-1	0E0	0E0	MND	0E0	MND	MND	MND	0E0	MND	0E0	0E0	0E0	0E0	5,84E-1
Renew. secondary fuels	MJ	0E0	0E0	0E0	0E0	0E0	0E0	MND	0E0	MND	MND	MND	0E0	MND	0E0	0E0	0E0	0E0	0E0
Non-ren. secondary fuels	MJ	0E0	0E0	0E0	0E0	0E0	0E0	MND	0E0	MND	MND	MND	0E0	MND	0E0	0E0	0E0	0E0	0E0
Use of net fresh water	m^3	2,22E-1	2,9E-4	3,42E-3	0.225	5,54E-4	1,73E-4	MND	0E0	MND	MND	MND	2,3E-1	MND	0E0	1,84E-5	9,13E-4	6,85E-5	-9,94E-3

8) PER = Primary energy resources.

END OF LIFE – WASTE

Impact category	Unit	A1	A2	A3	A1-A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
Hazardous waste	kg	1,91E0	1,35E-3	2,82E-2	1,94E0	2,58E-3	3,22E-3	MND	0E0	MND	MND	MND	2,59E0	MND	0E0	8,6E-5	0E0	1,5E-2	-4,98E-1
Non-hazardous waste	kg	8,98E1	1,48E-1	1,57E0	9,15E1	2,86E-1	2,55E-1	MND	0E0	MND	MND	MND	1,81E2	MND	0E0	9,51E-3	0E0	3,09E-1	-5,71E0
Radioactive waste	kg	4,74E-4	9,82E-6	3,76E-5	5,22E-4	1,83E-5	1,8E-6	MND	0E0	MND	MND	MND	5,01E-3	MND	0E0	6,07E-7	0E0	3,87E-7	-3,14E-5

END OF LIFE – OUTPUT FLOWS

Impact category	Unit	A1	A2	A3	A1-A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
Components for re-use	kg	0E0	0E0	0E0	0E0	0E0	0E0	MND	0E0	MND	MND	MND	0E0	MND	0E0	0E0	0E0	0E0	0E0
Materials for recycling	kg	0E0	0E0	6,7E-2	6,7E-2	0E0	1,21E-1	MND	0E0	MND	MND	MND	0E0	MND	0E0	0E0	8,06E-1	0E0	0E0
Materials for energy rec	kg	0E0	0E0	0E0	0E0	0E0	0E0	MND	0E0	MND	MND	MND	0E0	MND	0E0	0E0	0E0	0E0	0E0
Exported energy	MJ	0E0	0E0	0E0	0E0	0E0	2,25E0	MND	0E0	MND	MND	MND	0E0	MND	0E0	0E0	4,07E0	0E0	0E0

ENVIRONMENTAL IMPACTS – EN 15804+A1, CML / ISO 21930

Impact category	Unit	A1	A2	A3	A1-A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
Global Warming Pot.	kg CO_2e	1,4E1	9,15E-2	5,23E-1	1,46E1	1,69E-1	4,39E-2	MND	0E0	MND	MND	MND	3,66E1	MND	0E0	5,64E-3	3,67E-1	1,31E-2	-1,67E0
Ozone depletion Pot.	kg CFC_{-11}e	1,42E-6	1,72E-8	3,52E-8	1,47E-6	3,19E-8	3,08E-9	MND	0E0	MND	MND	MND	3,74E-6	MND	0E0	1,06E-9	3,73E-9	6,8E-10	-6,09E-8
Acidification	kg SO_2e	9,62E-2	2,2E-4	2,46E-3	9,88E-2	3,48E-4	1,05E-4	MND	0E0	MND	MND	MND	1,88E-1	MND	0E0	1,16E-5	2E-4	1,81E-5	-9,21E-3
Eutrophication	kg PO_4^3e	6,5E-2	4,52E-5	1,31E-3	6,64E-2	7,03E-5	1,1E-4	MND	0E0	MND	MND	MND	1,27E-1	MND	0E0	2,34E-6	1,04E-4	5,96E-4	-4,43E-3
POCP (“smog”)	kg C_2H_4e	4,46E-3	1,26E-5	1,27E-4	4,6E-3	2,2E-5	7,75E-6	MND	0E0	MND	MND	MND	7,15E-3	MND	0E0	7,33E-7	9,15E-6	2,84E-6	-9,33E-4
ADP-elements	kg Sbe	8,66E-3	1,51E-6	5,65E-6	8,67E-3	2,92E-6	6,15E-7	MND	0E0	MND	MND	MND	2,73E-4	MND	0E0	9,7E-8	1,3E-6	2,4E-8	-4,61E-5
ADP-fossil	MJ	1,83E2	1,43E0	1,36E1	1,98E2	2,66E0	4,46E-1	MND	0E0	MND	MND	MND	7,66E2	MND	0E0	8,85E-2	3,93E-1	6,16E-2	-2,27E1

VERIFICATION STATEMENT

VERIFICATION PROCESS FOR THIS EPD

This EPD has been verified in accordance with ISO 14025 by an independent, third-party verifier by reviewing results, documents and compliancy with reference standard, ISO 14025 and ISO 14040/14044, following the process and checklists of the program operator for:

- This Environmental Product Declaration
- The Life-Cycle Assessment used in this EPD
- The digital background data for this EPD

Why does verification transparency matter? Read more online
This EPD has been generated by One Click LCA EPD generator, which has been verified and approved by the EPD Hub.

THIRD-PARTY VERIFICATION STATEMENT

I hereby confirm that, following detailed examination, I have not established any relevant deviations by the studied Environmental Product Declaration (EPD), its LCA and project report, in terms of the data collected and used in the LCA calculations, the way the LCA-based calculations have been carried out, the presentation of environmental data in the EPD, and other additional environmental information, as present with respect to the procedural and methodological requirements in ISO 14025:2010 and reference standard.

I confirm that the company-specific data has been examined as regards plausibility and consistency; the declaration owner is responsible for its factual integrity and legal compliance.

I confirm that I have sufficient knowledge and experience of construction products, this specific product category, the construction industry, relevant standards, and the geographical area of the EPD to carry out this verification.

I confirm my independence in my role as verifier; I have not been involved in the execution of the LCA or in the development of the declaration and have no conflicts of interest regarding this verification.

Neena Chandramathy, as an authorized verifier acting for EPD Hub Limited
20.01.2023

VERIFIED ISO 14025