ENVIRONMENTAL PRODUCT DECLARATION

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

INSQAIR® Reactive Supply Air Diffusers, Lindinvent AB

EPD HUB, HUB-0059
Publishing date 20 June 2022, last updated date 20 June 2022, valid until 20 June 2027

SOLENCO LCA Author

LINDINVENT

GENERAL INFORMATION

MANUFACTURER

Manufacturer	Lindinvent AB
Address	Skiffervägen 39, S-224 78 Lund
Contact details	info@lindinvent.se
Website	www.lindinvent.se

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-A5, and modules C1-C4 and D
EPD author	Jenny Knutsson, Solenco AB
EPD verification	Independent verification of this EPD and data, according to ISO 14025: ☐ Internal certification ☑ External verification
EPD verifier	Elma Avdyli, EPD Hub

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	ISQ-M
Additional product	ISQ-FM
Place of production	Serbia
Period for data	2021
Averaging in EPD	Multiple products
Variation in GWP-fossil for A1-A3	< 10%

ENVIRONMENTAL DATA SUMMARY

Declared unit	1 kg
Declared unit mass	1 kg
GWP-fossil, A1-A3 (kg CO_2e)	3,92E0
GWP-total, A1-A3 (kg CO_2e)	3,57E0
Secondary material, inputs (%)	5,44E1
Secondary material, outputs (%)	8,54E1
Total energy use, A1-A3 (kWh)	1,61E1
Total water use, A1-A3 (m^3e)	3,34E-2

PRODUCT AND MANUFACTURER

ABOUT THE MANUFACTURER

Lindinvent AB was founded in 1995 following a sales order for protective ventilation control equipment to a major Biomedical Center. Soon after the successful project the founder Herman Lindborg together with his sons Thomas and Mats developed the unique active supply air diffuser with built-in sensors. Today the company has about 100 employees with headquarter in Lund, Sweden. The Lindinvent system for energy saving indoor climate control is by now well-known and integrated in thousands of commercial buildings and hospitals. All products are designed to meet the requirements for efficient climate control from architects, installers, integrators, property owners, tenants and operating technicians. The production is located in Serbia.

Further information can be found at www.lindinvent.se

PRODUCT DESCRIPTION

ISQ-M is a reactive supply air diffuser unit, completely without electronics, and intended for mounting in a suspended ceiling framework. The diffuser valve in ISQ-M is manually set in a fixed position. Total variable airflow is evenly distributed over several diffuser units. ISQ-M is included in the product series INSQAIR® (INnovative Smart Quiet AIR). All products in this series share a range of technical solutions for high comfort and energy efficient supply air distribution.
ISQ-FM which is included in this EPD is the fully visible version of ISQ-M.

PRODUCT RAW MATERIAL MAIN COMPOSITION

Raw material category	Amount, mass- %	Material origin
Metals	90	EU
Minerals	-	-
Fossil materials	10	EU
Bio-based materials	-	-

BIOGENIC CARBON CONTENT

Product's biogenic carbon content at the factory gate	
Biogenic carbon content in product, kg C	0
Biogenic carbon content in packaging, kg C	0.103

FUNCTIONAL UNIT AND SERVICE LIFE

Declared unit	1 kg
Mass per declared unit	1 kg

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	MND	MND	MND	MND	MND	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 product is made of primarily metals with some smaller amounts of plastics and paint. The materials are delivered to Lindinvent's production facility in Serbia, where they are being welded, shaped, painted and assembled before final packaging. The finished product is packaged in cardboard boxes with metal handles and polyethylene film and leaves the manufacturing facility on a wooden pallet. The manufacturing process requires electricity and fuels for the different equipment. Certain ancillary materials are also included.

The entire amount of waste generated during production is directed to recycling.

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.

Average distance of transportation from production plant to building site is assumed as 2150 km and the transportation method is assumed to be lorry. Vehicle capacity utilization volume factor is assumed to be 100% which means full load. Empty returns are not taken into account as it is assumed that return trip is used by the transportation company to serve the needs of other clients.

The impacts of energy consumption and the use of ancillary materials during installation are considered negligible since installation is performed manually or with minimal use of power tools.

Environmental impacts from installation into the building include waste packaging materials (A5) and release of biogenic carbon dioxide from wood pallets and cardboard.

The wood pallet and cardboard are processed and sent to incineration for energy recovery while the polyethylene film is recycled.

PRODUCT USE AND MAINTENANCE (B1-B7)

This EPD does not cover the use phase.

Air, soil, and water impacts during the use phase have not been studied.

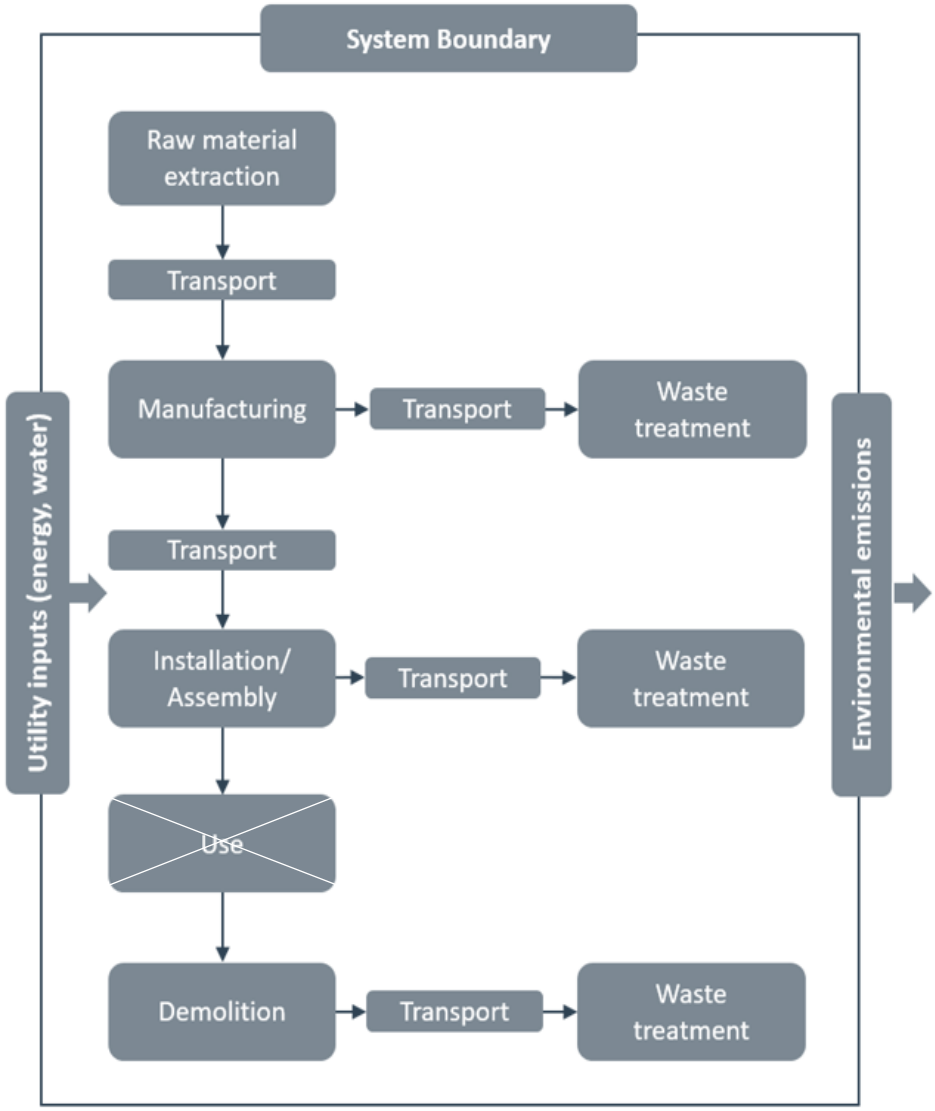
PRODUCT END OF LIFE (C1-C4, D)

Energy consumption during demolition is assumed to be negligible since the process is performed manually or with minimal use of power tools (C1).

It is assumed that 100% of the waste is collected separately and transported to the waste treatment center. Transportation distance to closest waste treatment facility is assumed as 20 km and the transportation method is assumed to be lorry (C2). The recoverable waste is separated for recycling and directed to further use (C3). It is assumed that only metal waste will be recycled. At end of life, 95% of metal waste is recycled while the remaining 5% non-recoverable waste is landfilled (C4).

Benefits of recycling and incinerating waste generated in module A5 and C3 are considered in module D. The recycled metals and plastics have been modelled to avoid use of primary materials. Certain percentage of materials are incinerated, and the generated energy can replace the need for electricity and heat production based on their energy content.

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.
All industrial processes from raw material acquisition and pre-processing, production, product distribution and installation, and end-of-life management are included.

ALLOCATION, ESTIMATES AND ASSUMPTIONS

Allocation is required if some material, energy, and waste data cannot be measured separately for the product under investigation. In this study, as per the reference standard, allocation is conducted in the following order:

1. Allocation should be avoided
2. Allocation should be based on physical properties (e.g., mass, volume) when the difference in revenue is small
3. Allocation should be based on economic values

In this study allocation could not be avoided for raw materials, packaging, ancillary material, energy consumption and waste production as the information was only measured on factory level. The inputs were allocated to studied product based on annual production volume. The values for 1 kg of the product are calculated by considering the total product weight per annual production. In the factory, several kinds of products are manufactured; since the production processes of these products are similar, the annual production percentages are taken into consideration for allocation.
This LCA study is conducted in accordance with all methodological considerations, such as performance, system boundaries, data quality, allocation procedures, and decision rules to evaluate inputs and outputs Allocation used in environmental data sources is aligned with the above.

AVERAGES AND VARIABILITY

Primary data represents the manufacturing of products ISQ-M and ISQ-FM.
The data was used to calculate average impacts for the products. The variability of the primary data or the emissions between the products did not amount to more than 10% of the relevant data. The primary data was averaged by calculating a weighted average of the products consumption of raw materials, energy, and production of wastes.

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	kg CO_2e	2,68E0	1,39E-1	7,59E-1	3,57E0	2,47E-1	7,65E-1	MND	MND	MND	MND	MND	MND	MND	0E0	1,82E-3	9,6E-2	1,65E-1	-1,21E0
GWP – fossil	kg CO_2e	2,65E0	1,45E-1	1,12E0	3,92E0	2,49E-1	6,41E-3	MND	MND	MND	MND	MND	MND	MND	0E0	1,82E-3	9,72E-2	1,65E-1	-1,2E0
GWP – biogenic	kg CO_2e	1,62E-2	-6,77E-3	-3,69E-1	-3,6E-1	1,81E-4	7,59E-1	MND	MND	MND	MND	MND	MND	MND	0E0	1,32E-6	-1,2E-3	9,44E-6	2,32E-4
GWP – LULUC	kg CO_2e	8,82E-3	1,17E-4	3,83E-3	1,28E-2	7,5E-5	2,07E-6	MND	MND	MND	MND	MND	MND	MND	0E0	5,47E-7	2,44E-5	6,94E-7	-9,71E-3
Ozone depletion pot.	kg CFC_{-11}e	4,22E-7	2,66E-8	4,3E-8	4,92E-7	5,86E-8	5,63E-10	MND	MND	MND	MND	MND	MND	MND	0E0	4,27E-10	3,21E-9	3,61E-10	-8,14E-8
Acidification potential	mol H^+e	1,45E-2	1,08E-3	1,11E-2	2,67E-2	1,05E-3	5,24E-5	MND	MND	MND	MND	MND	MND	MND	0E0	7,63E-6	2,73E-4	2,76E-5	-7,31E-3
EP-freshwater	kg Pe	2,19E-4	2,19E-6	2,16E-4	4,37E-4	2,03E-6	9,07E-8	MND	MND	MND	MND	MND	MND	MND	0E0	1,48E-8	1,47E-6	3,29E-8	-6,64E-5
EP-marine	kg Ne	2,65E-3	3,87E-4	8,81E-4	3,92E-3	3,15E-4	2,31E-5	MND	MND	MND	MND	MND	MND	MND	0E0	2,3E-6	6,46E-5	1,25E-5	-1,06E-3
EP-terrestrial	mol Ne	2,81E-2	4,26E-3	9,78E-3	4,22E-2	3,48E-3	2,46E-4	MND	MND	MND	MND	MND	MND	MND	0E0	2,54E-5	7,38E-4	1,31E-4	-1,2E-2
POCP (“smog”)	kg NMVOCe	1,17E-2	1,2E-3	3,17E-3	1,6E-2	1,12E-3	6,21E-5	MND	MND	MND	MND	MND	MND	MND	0E0	8,17E-6	1,99E-4	3,24E-5	-4,93E-3
ADP-minerals & metals	kg Sbe	5,36E-5	5,72E-6	6,72E-6	6,6E-5	4,25E-6	8,58E-8	MND	MND	MND	MND	MND	MND	MND	0E0	3,1E-8	1,19E-6	3,65E-8	-1,28E-5
ADP-fossil resources	MJ	3,56E1	1,71E0	1,42E1	5,15E1	3,87E0	5,97E-2	MND	MND	MND	MND	MND	MND	MND	0E0	2,83E-2	3,06E-1	2,81E-2	-1,36E1
Water use	m^3e depr.	1,24E0	1,21E-2	1,88E-1	1,44E0	1,44E-2	-1,18E-3	MND	MND	MND	MND	MND	MND	MND	0E0	1,05E-4	7,83E-3	4,02E-3	-3,37E-1

ADDITIONAL 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	2,09E-7	6,53E-9	3,84E-8	2,54E-7	2,25E-8	6,04E-10	MND	MND	MND	MND	MND	MND	MND	0E0	1,64E-10	3,3E-9	1,89E-10	-8,66E-8
Ionizing radiation	kBq U235e	1,15E-1	7,79E-3	5,48E-2	1,78E-1	1,69E-2	1,4E-4	MND	MND	MND	MND	MND	MND	MND	0E0	1,24E-4	1,48E-3	7,17E-5	-7,83E-2
Ecotoxicity (freshwater)	CTUe	9,25E1	2,22E0	1,27E1	1,07E2	2,96E0	2,2E-1	MND	MND	MND	MND	MND	MND	MND	0E0	2,16E-2	1,4E0	1,86E-1	-4,69E1
Human toxicity, cancer	CTUh	1,59E-8	9,71E-11	8,94E-10	1,69E-8	7,58E-11	1,39E-11	MND	MND	MND	MND	MND	MND	MND	0E0	5,53E-13	3,71E-11	1,21E-10	-4,01E-9
Human tox. non-cancer	CTUh	1,95E-7	4,26E-9	2,13E-8	2,21E-7	3,51E-9	6,45E-10	MND	MND	MND	MND	MND	MND	MND	0E0	2,56E-11	1,72E-9	6,11E-10	7,23E-8
SQP	-	5,98E0	1,41E0	9,16E-1	8,31E0	5,85E0	3,12E-2	MND	MND	MND	MND	MND	MND	MND	0E0	4,27E-2	7,67E-2	1,82E-2	-1,96E0

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	MJ	4,23E0	1,42E-1	3,52E0	7,89E0	4,88E-2	1,91E-3	MND	MND	MND	MND	MND	MND	MND	0E0	3,56E-4	4,63E-2	7,95E-4	-4,01E0
Renew. PER as material	MJ	0E0	0E0	3,62E0	3,62E0	0E0	-3,62E0	MND	MND	MND	MND	MND	MND	MND	0E0	0E0	0E0	0E0	0E0
Total use of renew. PER	MJ	4,23E0	1,42E-1	7,14E0	1,15E1	4,88E-2	-3,62E0	MND	MND	MND	MND	MND	MND	MND	0E0	3,56E-4	4,63E-2	7,95E-4	-4,01E0
Non-re. PER as energy	MJ	3,43E1	1,71E0	1,4E1	5E1	3,87E0	5,97E-2	MND	MND	MND	MND	MND	MND	MND	0E0	2,83E-2	3,06E-1	2,81E-2	-1,36E1
Non-re. PER as material	MJ	1,31E0	0E0	2,01E-1	1,51E0	0E0	-2,01E-1	MND	MND	MND	MND	MND	MND	MND	0E0	0E0	-1,16E0	-1,5E-1	0E0
Total use of non-re. PER	MJ	3,56E1	1,71E0	1,42E1	5,15E1	3,87E0	-1,41E-1	MND	MND	MND	MND	MND	MND	MND	0E0	2,83E-2	-8,56E-1	-1,21E-1	-1,36E1
Secondary materials	kg	5,26E-1	0E0	1,87E-2	5,44E-1	0E0	0E0	MND	MND	MND	MND	MND	MND	MND	0E0	0E0	0E0	0E0	3E-1
Renew. secondary fuels	MJ	0E0	0E0	0E0	0E0	0E0	0E0	MND	MND	MND	MND	MND	MND	MND	0E0	0E0	0E0	0E0	0E0
Non-ren. secondary fuels	MJ	0E0	0E0	0E0	0E0	0E0	0E0	MND	MND	MND	MND	MND	MND	MND	0E0	0E0	0E0	0E0	0E0
Use of net fresh water	m^3	2,59E-2	3,77E-4	7,11E-3	3,34E-2	8,07E-4	1,13E-4	MND	MND	MND	MND	MND	MND	MND	0E0	5,89E-6	2,46E-4	1,58E-4	-6,99E-3

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	7,24E-1	5,63E-3	5,62E-2	7,86E-1	3,77E-3	1,78E-3	MND	MND	MND	MND	MND	MND	MND	0E0	2,75E-5	0E0	2,23E-3	-3,45E-1
Non-hazardous waste	kg	6,83E0	1,26E-1	1E1	1,7E1	4,17E-1	2,76E-1	MND	MND	MND	MND	MND	MND	MND	0E0	3,04E-3	0E0	1,12E-1	-3,24E0
Radioactive waste	kg	1,02E-4	1,03E-5	4,2E-5	1,55E-4	2,66E-5	1,85E-7	MND	MND	MND	MND	MND	MND	MND	0E0	1,94E-7	0E0	1E-7	-5,39E-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	MND	MND	MND	MND	MND	MND	0E0	0E0	0E0	0E0	0E0
Materials for recycling	kg	0E0	0E0	6,28E-2	6,28E-2	0E0	4,74E-2	MND	MND	MND	MND	MND	MND	MND	0E0	0E0	8,54E-1	0E0	0E0
Materials for energy rec.	kg	0E0	0E0	0E0	0E0	0E0	0E0	MND	MND	MND	MND	MND	MND	MND	0E0	0E0	0E0	0E0	0E0
Exported energy	MJ	0E0	0E0	0E0	0E0	0E0	2,69E0	MND	MND	MND	MND	MND	MND	MND	0E0	0E0	8,27E-1	5,81E-1	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	2,58E0	1,27E-1	1,12E0	3,82E0	2,47E-1	6,28E-3	MND	MND	MND	MND	MND	MND	MND	0E0	1,8E-3	9,68E-2	1,65E-1	-1,17E0
Ozone depletion Pot.	kg CFC_{-11}e	2,01E-7	1,83E-8	4,38E-8	2,64E-7	4,65E-8	4,89E-10	MND	MND	MND	MND	MND	MND	MND	0E0	3,4E-10	2,76E-9	3,46E-10	-7,96E-8
Acidification	kg SO_2e	1,18E-2	7,24E-4	9,84E-3	2,23E-2	5,07E-4	3,59E-5	MND	MND	MND	MND	MND	MND	MND	0E0	3,7E-6	1,71E-4	1,91E-5	-6,23E-3
Eutrophication	kg PO_4^3e	6,18E-3	2,03E-4	6,81E-3	1,32E-2	1,02E-4	3,74E-5	MND	MND	MND	MND	MND	MND	MND	0E0	7,47E-7	7,3E-5	1,45E-5	-2,77E-3
POCP (“smog”)	kg C_2H_4e	1,34E-3	3,09E-5	4,43E-4	1,82E-3	3,21E-5	1,09E-6	MND	MND	MND	MND	MND	MND	MND	0E0	2,34E-7	7,71E-6	4,92E-7	-6,78E-4
ADP-elements	kg Sbe	5,36E-5	5,72E-6	6,72E-6	6,6E-5	4,25E-6	8,58E-8	MND	MND	MND	MND	MND	MND	MND	0E0	3,1E-8	1,19E-6	3,65E-8	-1,28E-5
ADP-fossil	MJ	3,56E1	1,71E0	1,42E1	5,15E1	3,87E0	5,97E-2	MND	MND	MND	MND	MND	MND	MND	0E0	2,83E-2	3,06E-1	2,81E-2	-1,36E1

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 ED 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.

Elma Avdyli as an authorized verifier acting for EPD Hub Limited

09.06.2022

VERIFIED ISO 14025