DELTRIAN

EPD Hub

Environmental product declaration.

IN ACCORDANCE WITH EN 15804+A2 & ISO 14025

TNWES-1-90 ePM1 90%

EPD HUB, HUB-4178
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Life Cycle Assessment study has been performed in accordance with the requirements of EN 15804, EPD Hub PCR version 1.2 (24 Mar 2025) and JRC characterization factors EF 3.1.

One Click LCA

General information.

MANUFACTURER

Manufacturer	Deltrian International
Address	rue du Berlaimont 21a, 6220 Fleurus, Belgium
Contact details	filtration@deltrian.com
Website	www.deltrian.com

EPD STANDARDS, SCOPE AND VERIFICATION

Program operator	EPD Hub, hub@epdhub.com
Reference standard	EN 15804+A2:2019 and ISO 14025 and ISO 14025
PCR	EPD Hub Core PCR Version 1.2, 24 Mar 2025
Sector	Construction product
Category of EPD	Third party verified EPD
Parent EPD number	-
Scope of the EPD	Cradle to gate with options, A4-A5, B1, B6, and modules C1-C4, D
EPD author	Delphine Donis
EPD verification	Independent verification of this EPD and data, according to ISO 14025: ☐ Internal verification ☑ External verification
EPD verifier	Haiha Nguyen, as an authorized verifier acting for EPD Hub Limited

This EPD is intended for business-to-business and/or business-to-consumer communication. 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	TNWES-1-90
Additional labels	TNWES-1-90-6/350/10 ; TNWES-1-90-6/450/10 -; TNWES-1-90-6/500/10 ; TNWES-1-90-6/600/10
Product reference	1776370
Place(s) of raw material origin	Frame, rivet, hot melt glue and mastic : Slovakia : Thread : Hungary ; Media : Germany
Place of production	Kežmarok, Slovakia
Place(s) of installation and use	Belgium - Europe
Period for data	Calendar year 2024
Averaging in EPD	Multiple products
Variation in GWP-fossil for A1-A3 (%)	-5,63% ; +8,10%
GTIN (Global Trade Item Number)	-
NOBB (Norwegian Building Product Database)	-
A1-A3 Specific data (%)	5,23

ENVIRONMENTAL DATA SUMMARY

Declared unit	1 filter used to filter air with this efficiency during a year
Declared unit mass	3,17 kg
Mass of packaging	0,619 Kg
GWP-fossil, A1-A3 ($kgCO_2e$)	1,17E+01
GWP-total, A1-A3 ($kgCO_2e$)	1,09E+01
Secondary material, inputs (%)	0,67
Secondary material, outputs (%)	0
Total energy use, A1-A3 (kWh)	50
Net freshwater use, A1-A3 (m^3)	0,22

Product and manufacturer.

DELTRIAN

About the manufacturer.

Specialized in air filtration, Deltrian offers advanced technological solutions for all sectors of activity. Thanks to its expertise and know-how, Deltrian is today an expert in air quality control. Thanks to its strategic vision and successful development, Deltrian is expanding internationally and rising to every challenge. More information on the organization is available on the website in the About Deltrian section.

Product description.

TNWES1-90 ePM1 90% – F9 bag filter, fine performance and energy efficiency. The TNWES-1-90 is a bag filter manufactured by Deltrian Slovakia, with a filtration class of ePM1 90% (F9) in compliance with ISO 16890. It features a robust galvanized steel frame and a polypropylene media, delivering fine and reliable filtration in HVAC systems.
This filter is used in a wide range of industrial, commercial, and healthcare applications where effective protection against fine particles is required.
It stands out for its energy performance, with an A+ energy rating, ensuring optimized consumption throughout its service life.
The filter lifespan varies depending on the installation type, operating conditions, and geographical location.

Further information can be found at **www.deltrian.com**

Headquarters.

Production.

EUROVENT CERTIFIED PERFORMANCE www.eurovent-certification.com
ISO 9001 QUALITY MANAGEMENT VINÇOTTE
ISO 14001 ENVIRONMENTAL MANAGEMENT VINÇOTTE

PRODUCT RAW MATERIAL MAIN COMPOSITION

Raw material category	Amount, mass- %	Material origin
Metals	65	Frame, Rivet : Slovakia
Minerals	/	-
Fossil materials	35	Thread: Hungary, Media: Germany , Hot melt glue and Mastic : Slovakia
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	0,25

FUNCTIONAL UNIT AND SERVICE LIFE

Declared unit	1 filter used to filter air with this efficiency during a year
Mass per declared unit	3,17 kg
Functional unit	-
Reference service life	1 year

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.

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

PRODUCT STAGE			CONSTRUCTION PROCESS STAGE		USAGE STAGE							END OF LIFE STAGE				RESOURCE RECOVERY STAGE
Raw materials	Transport	Manufacturing	Transport	Construction installa-tion	Use	Maintenance	Repaire	Replacement	Refurbishment	Operational energy use	Operational water use	De-construction de-molition	Transport	Waste processing	Disposal	Reuse-Recovery-Recy-cling-potential
A1	A2	A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
✓	✓	✓	✓	✓	✓	MND	MND	MND	MND	✓	NMD	✓	✓	✓	✓	✓

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.

A1 – Raw Material Supply : This stage includes the extraction and processing of raw materials, as well as the production of all materials and components used in the manufacturing of bag filters: filter media, galvanized steel frames, mastics, hot-melt adhesives, and wires.

A2 – Transport to Production Site : This stage covers the transportation of materials and components to the production site in Kežmarok, Slovakia.

A3 – Manufacturing of Bag Filters : This stage represents the complete manufacturing process of the bag filters at the Kežmarok site. It includes electricity consumption for both pocket assembly and final filter assembly, as well as general energy use for heating, lighting, and other factory operations.

- Pocket Assembly: Cutting and stitching of the rolled media to form filter pockets, including the use of thread and hot-melt adhesives.

- Final Filter Assembly: Integration of the assembled pockets into the galvanized frame to produce the finished filter.

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.

A4 – Transport to Customer : This stage covers the transportation of the finished bag filters to the end customer. The average transport distance considered is 1500 km, and the reference year for this data is 2024.

A5 – Packaging Waste Management : This stage includes the end-of-life treatment of cardboard packaging used for product delivery. Packaging waste follows different routes: a portion is incinerated, some is sent to a waste sorting center, and the remainder is recycled.

PRODUCT USE AND MAINTENANCE (B1-B7)

B1 – Filter Operation (Dust Accumulation) : This stage accounts for the accumulation of airborne particles within the filter during its operation, resulting in a progressive reduction of particles released into the air.

B6 – Operational Energy Use : This stage includes the electricity consumption associated with operating the bag filter for one year. The calculation of energy usage has been performed in accordance with Eurovent 21/04/2019. The energy mix considered for this assessment corresponds to the Belgian market.

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

PRODUCT END OF LIFE (C1-C4, D)

C1 – Filter Removal : This stage covers the manual removal of the used filter from the ventilation or air handling equipment at the end of its service life.

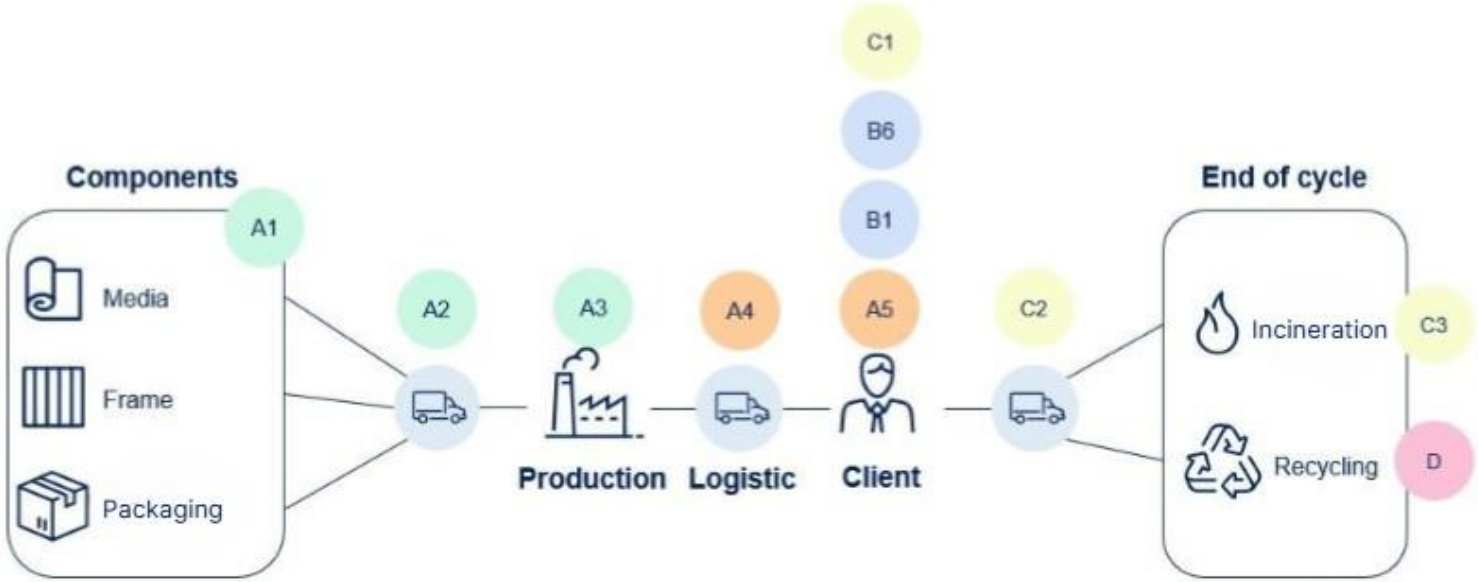
C2 – Transport to Waste Treatment : This stage includes the transportation of the used filter from the customer's site to a waste treatment facility. The average distance considered for this stage is 30 km.

C3 – Incineration with Energy Recovery : This stage represents the incineration process of the used filter, including the collected dust. The process is carried out with energy recovery, reducing the environmental burden of disposal.

C4 – Ash Disposal : This stage covers the final disposal of ash residues resulting from the incineration of the filter.

D – Energy Recovery Benefits : This module accounts for the potential environmental benefits derived from the energy recovered during the incineration process.

Manufacturing process.



PRODUCT STAGE			CONSTRUCTION PROCESS STAGE		USAGE STAGE							END OF LIFE STAGE				RESOURCE RECOVERY STAGE
Raw materials	Transport	Manufacturing	Transport	Construction installation	Use	Maintenance	Repaire	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
✓	✓	✓	✓	✓	✓	MND	MND	MND	MND	✓	NMD	✓	✓	✓	✓	✓

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.

The production of capital equipment, construction activities, and infrastructure, maintenance and operation of capital equipment, personnel-related activities, energy and water use related to company management and sales activities are excluded.

Life-Cycle Stages Excluded :

- The study does not take into account the impact of the production and maintenance of the infrastructure and equipment used to manufacture the products (since it was assumed to have a minor share per product). However, it does include the electricity used by this equipment.
- Business travel and travel to and from work of personnel.
- In the manufacturing stage (A3), the burdens associated with the incineration of media waste have been excluded. However, the media waste itself is included.
- In use (B1), only the carbon content of the collected dust was taken into account when estimating the total calorific value of the dust.
- In module C4, the landfilling of ash from filter incineration was excluded as it generates negligible environmental impact, assuming high process efficiency.

VALIDATION OF DATA

Data collection for production, transport, and packaging was conducted using time and site-specific information, as defined in the general information section on page 1 and 2. Upstream process calculations rely on generic data as defined in the Bibliography section. Manufacturer-provided specific and generic data were used for the product's manufacturing stage. The analysis was performed in One Click LCA EPD Generator, with the 'Cut-Off, EN 15804+A2' allocation method, and characterization factors according to EN 15804:2012+A2:2019/AC:2021 and JRC EF 3.1.

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	No allocation
Ancillary materials	Not applicable
Manufacturing energy and waste	Allocated by mass or volume

EPD Evaluation of a Bag Filter

As part of this EPD, we developed a calculation tool to accurately assess the quantities of raw materials and waste associated with the production of a bag filter. This tool is based on actual production data for the frame, filter media, adhesives, and seams. It enables the integration of nearly 100% of all materials used in the filter. To ensure reliability, theoretical values were compared with practical weighings. Material losses were assessed using the same approach.

Storage and Transport

For the logistics storage phase, we considered the average storage time in a warehouse, relative to the volume occupied by the filter and the energy required for its storage. For transport to the end user, the different modes of transport (truck, boat, etc.) were taken into account. The assessment was based on the volumetric footprint of the filters, which is more significant than their weight in this context

Use of the Filter by the Client

During the use phase, calculations were based on a standard air handling unit operating for one year. The Eurovent 4/21-2019 standard was applied to ensure a consistent and comparable unit of measure for energy consumption across applications.
Energy consumption (kWh) is calculated as follows:

$$\textbf{Energy (kWh)} = \frac{\text{Airflow} \times \text{Pressure drop} \times \text{Operating time}}{\text{Motor efficiency}} \times 1000$$

PRODUCT & MANUFACTURING SITES GROUPING

Type of average	Multiple products
Averaging method	Based on average results of product group - by total mass
Variation in GWP-fossil for A1-A3	-5,63% ; +8,10%

SCOPE AND REPRESENTATIVENESS

This Environmental Product Declaration (EPD) represents an average declaration for the TNWES-1-90 filter product range. It is valid for both the smallest and largest filter sizes within this range.

- The frame and filter media are identical across all TNWES-1-90 filters (dimension: 592 × 592 mm).
- Only the number of pockets and pocket length vary between models.

Product variants:

Medium size: 592 × 592 mm, pocket length 500 mm, 10 pockets, weight 3,17 kg
Maximum size: 592 × 592 mm, pocket length 600 mm, 10 pockets, weight 3,47 kg
Minimum size: 592 × 592 mm, pocket length 350 mm, 10 pockets, weight 2,96 kg

Variation in Modules A1–A3

The average environmental impact in Modules A1–A3 is 11,72.
- Maximum: 12,67 (+8,10%)
- Minimum: 11,06 (−5,63%)

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. The EPD Generator uses Ecoinvent v3.10.1 and One Click LCA databases as sources of environmental data. Allocation used in Ecoinvent 3.10.1 environmental data sources follow the methodology ‘allocation, Cut-off, EN 15804+A2‘.


Environmental effectiveness.

Environmental impact data.

A COMPREHENSIVE OVERVIEW OF EPD – DATA SUMMARY

This summary typically includes key information on energy consumption, emissions to air, water, and soil, resource use, and waste generation. It aims to provide stakeholders, including consumers, manufacturers, and policymakers, with a transparent, reliable, and standardized method to understand and compare the environmental performance of products. By synthesizing complex life cycle assessment (LCA) data into accessible insights, the EPD summary helps in making informed decisions that lead towards more sustainable consumption and production patterns.

	Category	Global Warming Potential total kg CO_2e	%
A1-A3	Product Stage	**10,93**	4,21
A4	Transport to the building site	**0,61**	0,24
A5	Installation into the building	**0,84**	0,32
B1	Use or application of the product	**0**	0
B6	Operational energy use	**244,14**	94,10
C1	Deconstruction	**/**	/
C2	Waste transport	**0,01**	0
C3	Waste processing	**2,88**	1,11
C4	Waste disposal	**0,04**	0,02
D	External impacts (excluded from totals)	**-2,46**	-0,95
	Total	**260,91 CO_2e**	100 %

Environmental impact data.

The estimated impact results are only relative statements which do not indicate the end points of the impact categories, exceeding threshold values, safety margins or risks.

CORE ENVIRONMENTAL IMPACT INDICATORS – EN 15804+A2, EF 3.1

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	1,02E+01	1,77E-01	5,97E-01	1,09E+01	6,12E-01	8,38E-01	0,00E+00	MND	MND	MND	MND	2,44E+02	MND	0,00E+00	1,01E-02	2,88E+00	4,05E-02	-2,46E+00
GWP – fossil	kg CO_2e	1,01E+01	1,77E-01	1,40E+00	1,17E+01	6,12E-01	1,66E-02	0,00E+00	MND	MND	MND	MND	2,43E+02	MND	0,00E+00	1,01E-02	2,88E+00	4,05E-02	-2,45E+00
GWP – biogenic	kg CO_2e	0,00E+00	0,00E+00	-8,22E-01	-8,22E-01	0,00E+00	8,22E-01	0,00E+00	MND	MND	MND	MND	0,00E+00	MND	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
GWP – LULUC	kg CO_2e	1,30E-02	7,93E-05	1,38E-02	2,69E-02	2,74E-04	1,22E-05	0,00E+00	MND	MND	MND	MND	6,73E-01	MND	0,00E+00	4,54E-06	8,61E-06	2,01E-05	-1,41E-02
Ozone depletion pot.	kg CFC-$_{11}$e	6,42E-07	2,62E-09	2,81E-08	6,72E-07	9,03E-09	1,23E-10	0,00E+00	MND	MND	MND	MND	1,02E-05	MND	0,00E+00	1,50E-10	3,96E-10	8,49E-10	-1,86E-08
Acidification potential	mol H^+e	1,93E-01	6,04E-04	7,98E-03	2,01E-01	2,09E-03	8,90E-05	0,00E+00	MND	MND	MND	MND	4,20E-01	MND	0,00E+00	3,46E-05	3,68E-04	2,30E-04	-1,77E-02
EP-freshwater[2)]	kg Pe	8,31E-04	1,38E-05	9,64E-04	1,81E-03	4,76E-05	3,94E-06	0,00E+00	MND	MND	MND	MND	2,57E-02	MND	0,00E+00	7,90E-07	3,92E-06	2,65E-05	-1,29E-03
EP-marine	kg Ne	1,48E-02	1,98E-04	1,72E-03	1,67E-02	6,86E-04	4,99E-05	0,00E+00	MND	MND	MND	MND	1,41E-01	MND	0,00E+00	1,14E-05	1,79E-04	8,73E-05	-2,77E-03
EP-terrestrial	mol Ne	7,49E-01	2,16E-03	1,49E-02	7,66E-01	7,46E-03	2,82E-04	0,00E+00	MND	MND	MND	MND	1,38E+00	MND	0,00E+00	1,24E-04	1,89E-03	9,53E-04	-2,57E-02
POCP ("smog")[3)]	kg NMVOCe	4,40E-02	8,90E-04	4,66E-03	4,96E-02	3,08E-03	8,89E-05	0,00E+00	MND	MND	MND	MND	4,35E-01	MND	0,00E+00	5,10E-05	4,68E-04	3,30E-04	-7,66E-03
ADP-minerals & metals[4)]	kg Sbe	2,28E-02	4,94E-07	4,74E-06	2,28E-02	1,71E-06	1,35E-07	0,00E+00	MND	MND	MND	MND	9,98E-04	MND	0,00E+00	2,83E-08	7,62E-08	1,14E-07	-4,20E-07
ADP-fossil resources	MJ	1,90E+02	2,57E+00	2,82E+01	2,21E+02	8,88E+00	1,44E-01	0,00E+00	MND	MND	MND	MND	1,02E+04	MND	0,00E+00	1,47E-01	2,83E-01	6,85E-01	-2,78E+01
Water use[5)]	m^3e depr.	3,94E+00	1,27E-02	7,89E-01	4,74E+00	4,39E-02	8,22E-03	0,00E+00	MND	MND	MND	MND	9,96E+01	MND	0,00E+00	7,27E-04	7,36E-02	5,26E-03	-2,69E-01

1) GWP = Global Warming Potential; 2) EP = Eutrophication potential. Required characterisation method and data are in kg P-eq. Multiply by 3,07 to get PO4e; 3) POCP = Photochemical ozone formation; 4) ADP = Abiotic depletion potential; 5) EN 15804+A2 disclaimer for Abiotic depletion and Water use and optional indicators except Particulate matter and Ionizing radiation, human health. The results of these environmental impact indicators shall be used with care as the uncertainties on these results are high or as there is limited experience with the indicator.

ADDITIONAL (OPTIONAL) ENVIRONMENTAL IMPACT INDICATORS – EN 15804+A2, EF 3.1

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	1,63E-06	1,77E-08	1,37E-07	1,79E-06	6,13E-08	4,01E-09	-1,20E-05	MND	MND	MND	MND	4,39E-06	MND	0,00E+00	1,02E-09	1,90E-09	7,27E-09	-1,08E-07
Ionizing radiation[6)]	kBq U235e	5,25E-01	2,24E-03	6,56E-01	1,18E+00	7,73E-03	5,50E-04	0,00E+00	MND	MND	MND	MND	3,91E+02	MND	0,00E+00	1,28E-04	3,18E-04	7,85E-04	-2,22E-01
Ecotoxicity (freshwater)	CTUe	3,40E+02	3,64E-01	5,38E+00	3,46E+02	1,26E+00	5,28E-01	0,00E+00	MND	MND	MND	MND	3,71E+02	MND	0,00E+00	2,08E-02	5,42E-01	5,46E-01	-5,67E+00
Human toxicity, cancer	CTUh	3,61E-08	2,92E-11	4,98E-10	3,67E-08	1,01E-10	3,04E-11	0,00E+00	MND	MND	MND	MND	4,41E-08	MND	0,00E+00	1,67E-12	8,51E-11	4,34E-11	-3,41E-10
Human tox. non-cancer	CTUh	4,68E-07	1,66E-09	1,48E-08	4,84E-07	5,75E-09	1,25E-09	0,00E+00	MND	MND	MND	MND	1,39E-06	MND	0,00E+00	9,53E-11	4,09E-09	3,15E-10	-1,73E-08
SQP[7)]	-	2,35E+01	2,59E+00	6,91E+01	9,52E+01	8,94E+00	1,07E-01	0,00E+00	MND	MND	MND	MND	1,80E+03	MND	0,00E+00	1,48E-01	7,56E-02	8,54E-01	1,88E+01

6) EN 15804+A2 disclaimer for Ionizing radiation, human health. 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; 7) SQP = Land use related impacts/soil quality.

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	9,65E+00	3,52E-02	9,73E+00	1,94E+01	1,22E-01	-1,00E+01	0,00E+00	MND	MND	MND	MND	1,34E+03	MND	0,00E+00	2,02E-03	6,92E-03	1,31E-02	3,66E+00
Renew. PER as material	MJ	0,00E+00	0,00E+00	6,79E+00	6,79E+00	0,00E+00	-6,79E+00	0,00E+00	MND	MND	MND	MND	0,00E+00	MND	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
Total use of renew. PER	MJ	9,65E+00	3,52E-02	1,65E+01	2,62E+01	1,22E-01	-1,68E+01	0,00E+00	MND	MND	MND	MND	1,34E+03	MND	0,00E+00	2,02E-03	6,92E-03	1,31E-02	3,66E+00
Non-re. PER as energy	MJ	1,30E+02	2,57E+00	2,79E+01	1,60E+02	8,88E+00	1,44E-01	0,00E+00	MND	MND	MND	MND	1,02E+04	MND	0,00E+00	1,47E-01	-4,23E+01	6,85E-01	-2,83E+01
Non-re. PER as material	MJ	5,86E+01	0,00E+00	-6,97E+00	5,17E+01	0,00E+00	-3,86E-01	0,00E+00	MND	MND	MND	MND	0,00E+00	MND	0,00E+00	0,00E+00	-5,13E+01	0,00E+00	0,00E+00
Total use of non-re. PER	MJ	1,89E+02	2,57E+00	2,09E+01	2,12E+02	8,88E+00	-2,41E-01	0,00E+00	MND	MND	MND	MND	1,02E+04	MND	0,00E+00	1,47E-01	-9,36E+01	6,85E-01	-2,83E+01
Secondary materials	kg	2,11E-02	1,09E-03	3,88E-02	6,10E-02	3,78E-03	3,23E-04	0,00E+00	MND	MND	MND	MND	8,06E-01	MND	0,00E+00	6,27E-05	4,81E-04	8,22E-04	-4,96E-01
Renew. secondary fuels	MJ	7,38E-05	1,39E-05	1,21E-01	1,21E-01	4,80E-05	1,78E-06	0,00E+00	MND	MND	MND	MND	2,91E-03	MND	0,00E+00	7,96E-07	2,01E-06	1,40E-05	5,47E-02
Non-ren. secondary fuels	MJ	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	MND	MND	MND	MND	0,00E+00	MND	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
Use of net fresh water	m^3	1,96E-01	3,80E-04	2,35E-02	2,20E-01	1,31E-03	1,27E-04	0,00E+00	MND	MND	MND	MND	2,80E+00	MND	0,00E+00	2,18E-05	5,22E-04	4,87E-04	-1,95E-02

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	1,51E+00	4,36E-03	8,36E-02	1,60E+00	1,50E-02	2,96E-03	0,00E+00	MND	MND	MND	MND	6,46E+00	MND	0,00E+00	2,49E-04	2,36E-02	2,28E-03	-2,15E-01
Non-hazardous waste	kg	2,62E+01	8,06E-02	4,91E+00	3,11E+01	2,78E-01	1,48E-01	0,00E+00	MND	MND	MND	MND	1,51E+02	MND	0,00E+00	4,62E-03	1,16E+00	4,78E+00	-5,53E+00
Radioactive waste	kg	2,55E-04	5,48E-07	1,60E-04	4,16E-04	1,89E-06	1,35E-07	0,00E+00	MND	MND	MND	MND	9,46E-02	MND	0,00E+00	3,14E-08	7,98E-08	1,94E-07	-5,68E-05

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	0,00E+00	0,00E+00	1,55E-01	1,55E-01	0,00E+00	0,00E+00	0,00E+00	MND	MND	MND	MND	0,00E+00	MND	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
Materials for recycling	kg	0,00E+00	0,00E+00	1,89E-01	1,89E-01	0,00E+00	5,32E-01	0,00E+00	MND	MND	MND	MND	0,00E+00	MND	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
Materials for energy rec	kg	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	8,05E-02	0,00E+00	MND	MND	MND	MND	0,00E+00	MND	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
Exported energy	MJ	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	6,80E-01	0,00E+00	MND	MND	MND	MND	0,00E+00	MND	0,00E+00	0,00E+00	3,74E+01	0,00E+00	0,00E+00
Exported energy – Electricity	MJ	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	1,02E-01	0,00E+00	MND	MND	MND	MND	0,00E+00	MND	0,00E+00	0,00E+00	5,64E+00	0,00E+00	0,00E+00
Exported energy – Heat	MJ	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	5,78E-01	0,00E+00	MND	MND	MND	MND	0,00E+00	MND	0,00E+00	0,00E+00	3,18E+01	0,00E+00	0,00E+00

ENVIRONMENTAL IMPACTS – EN 15804+A1, CML

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	1,01E+01	1,76E-01	1,43E+00	1,17E+01	6,09E-01	3,92E-02	0,00E+00	MND	MND	MND	MND	2,43E+02	MND	0,00E+00	1,01E-02	2,88E+00	4,02E-02	-2,45E+00
Ozone depletion Pot.	kg $CFC._{11}e$	5,74E-07	2,09E-09	2,27E-08	5,99E-07	7,21E-09	1,05E-10	0,00E+00	MND	MND	MND	MND	8,25E-06	MND	0,00E+00	1,20E-10	3,31E-10	6,80E-10	-1,64E-08
Acidification	kg SO_2e	1,16E-01	4,61E-04	6,59E-03	1,23E-01	1,59E-03	6,86E-05	0,00E+00	MND	MND	MND	MND	3,19E-01	MND	0,00E+00	2,64E-05	2,57E-04	1,70E-04	-1,50E-02
Eutrophication	kg PO_4^3e	3,23E-02	1,12E-04	2,11E-03	3,46E-02	3,88E-04	3,22E-05	0,00E+00	MND	MND	MND	MND	7,53E-02	MND	0,00E+00	6,44E-06	8,54E-05	6,32E-05	-8,96E-04
POCP (“smog”)	kg C_2H_4e	4,18E-03	4,11E-05	4,99E-04	4,72E-03	1,42E-04	1,41E-05	0,00E+00	MND	MND	MND	MND	3,12E-02	MND	0,00E+00	2,35E-06	1,65E-05	1,99E-05	-7,63E-04
ADP-elements	kg Sbe	2,28E-02	4,82E-07	4,57E-06	2,28E-02	1,66E-06	1,31E-07	0,00E+00	MND	MND	MND	MND	9,95E-04	MND	0,00E+00	2,76E-08	5,99E-08	1,08E-07	-5,79E-07
ADP-fossil	MJ	1,88E+02	2,54E+00	1,62E+01	2,06E+02	8,76E+00	1,36E-01	0,00E+00	MND	MND	MND	MND	3,03E+03	MND	0,00E+00	1,45E-01	2,78E-01	6,73E-01	-2,41E+01

ADDITIONAL INDICATOR – GWP-GHG

Impact category	Unit	A1	A2	A3	A1-A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
GWP-GHG[9)]	kg CO_2e	1,02E+01	1,77E-01	1,42E+00	1,17E+01	6,12E-01	1,66E-02	0,00E+00	MND	MND	MND	MND	2,44E+02	MND	0,00E+00	1,01E-02	2,88E+00	4,05E-02	-2,46E+00

9) This indicator includes all greenhouse gases excluding biogenic carbon dioxide uptake and emissions and biogenic carbon stored in the product. In addition, the characterisation factors for the flows – CH4 fossil, CH4 biogenic and Dinitrogen monoxide – were updated. This indicator is identical to the GWP-total of EN 15804:2012+A2:2019 except that the characterisation factor for biogenic CO2 is set to zero.

Third-party 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.

HaiHa Nguyen, as an authorized verifier acting for EPD Hub Limited

17.10.2025

VERIFIED ISO 14025