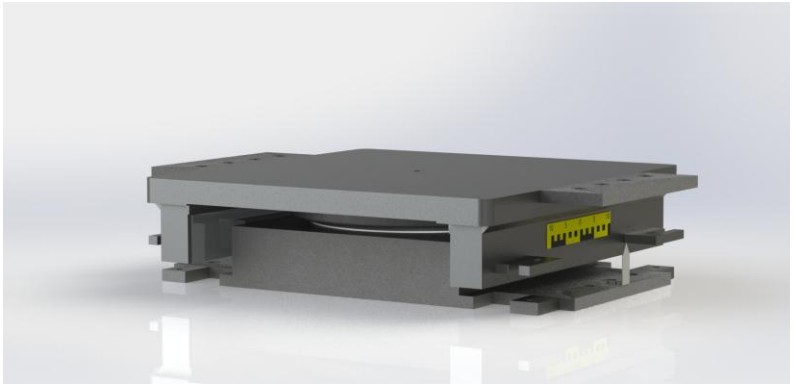
ENVIRONMENTAL PRODUCT DECLARATION

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

RESTON SPHERICAL bearing
mageba Services & Technologies AG



EPD HUB, HUB-2481
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GENERAL INFORMATION

MANUFACTURER

Manufacturer	mageba Services & Technologies AG
Address	Trafostrasse 1, 8180 Bülach, Switzerland
Contact details	info@mageba-group.com
Website	mageba-group.com

EPD STANDARDS, SCOPE AND VERIFICATION

Program operator	EPD Hub, hub@epdhub.com
Reference standard	EN 15804:2012+A2:2019 + AC:2021, ISO 14025:2006 and ISO 21930:2017
PCR	EPD Hub Core PCR Version 1.1, 5 Dec 2023
Sector	Construction product
Category of EPD	Third party verified EPD
Scope of the EPD	Cradle to gate with modules C1-C4, D
EPD author	Victoria Morales, mageba Services & Technologies AG
EPD verification	Independent verification of this EPD and data, according to ISO 14025: ☐ Internal verification ☑ External verification
EPD verifier	Imane Uald lamkaddam, 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	RESTON SPHERICAL bearing
Additional labels	Spherical bearing
Product reference	-
Place of production	Nyírtelek, Hungary
Period for data	2023 calendar year
Averaging in EPD	No averaging
Variation in GWP-fossil for A1-A3	-

ENVIRONMENTAL DATA SUMMARY

Declared unit	1 kg of spherical bearing
Declared unit mass	1 kg
GWP-fossil, A1-A3 ($kgCO_2e$)	3.93
GWP-total, A1-A3 ($kgCO_2e$)	3.90
Secondary material, inputs (%)	33.1
Secondary material, outputs (%)	85.7
Total energy use, A1-A3 (kWh)	13.6
Net freshwater use, A1-A3 (m^3)	0.02

PRODUCT AND MANUFACTURER

ABOUT THE MANUFACTURER

mageba is a globally present company from Switzerland. It is one of the world's leading suppliers of high-end structural bearings, expansion joints, seismic protection devices and structural monitoring systems for infrastructure, buildings and industrial structures. The company was established in 1963 and today employs more than 1000 people worldwide, including more than 150 engineers. Around 120 people work at the headquarters in Switzerland. To date mageba supplied high-quality products to over 25,000 structures around the world. More information can be found at: mageba-group.com

PRODUCT DESCRIPTION

RESTON SPHERICAL bearing is designed for structures requiring the transfer of loads between the superstructure and substructure, particularly where space for bearings is limited. The referenced product is a RESTON SPHERICAL bearing type KE 9.6 MN, its total weight is 470.5 kg and is mainly made of steel. These bearings allow for guided sliding along one horizontal axis and resist forces in a perpendicular direction. The indicative service life is of 75 years as per European Technical Approval ETA-23/0831.

The product includes a convex curved element, matching a concave surface. Combined with ROBO®SLIDE 75, a modified ultrahigh molecular weight polyethylene sliding material, it efficiently transfers vertical loads, while allowing rotations. The bearing is connected to the superstructure and substructure by various anchorage systems (not included in the scope of this EPD), which can be, depending on the design, anchor dowels, threaded sleeves, or anchor plates with shear studs. The product complies with the European standard for structural bearings, EN 1337, in combination with the European Technical Approval ETA-23/0831. More information can be found at: RESTON-SPHERICAL – mageba

PRODUCT RAW MATERIAL MAIN COMPOSITION

Raw material category	Amount, mass %	Material origin
Metals	98.2%	Global
Minerals	0.2%	EU
Fossil materials	1.6%	EU mainly, global
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	0.0105

FUNCTIONAL UNIT AND SERVICE LIFE

Declared unit	1 kg of spherical bearing
Mass per declared unit	1 kg
Functional unit	-
Reference service life	-

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	MND	MND	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	Deconstruction/ demolition	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 spherical bearing is made of low alloyed steel, stainless steel, ultra-high molecular weight polyethylene sliding material, lubricating grease and plastic parts. The components are manufactured in Europe mainly and delivered to the manufacturers site. Raw material is assumed to have a global origin. The manufacturing process requires electricity and a non-significant fuel consumption for powering the production equipment. Lubricating oil and cooling liquid are used in maintenance of manufacturing machines and/or to ensure smooth factory process. Wastewater treatment is also considered. A wooden pallet and steel wrapping tape are used as packaging materials for transportation to the dedicated market places.

TRANSPORT AND INSTALLATION (A4-A5)

The transport and installation are not accounted into the assessment.

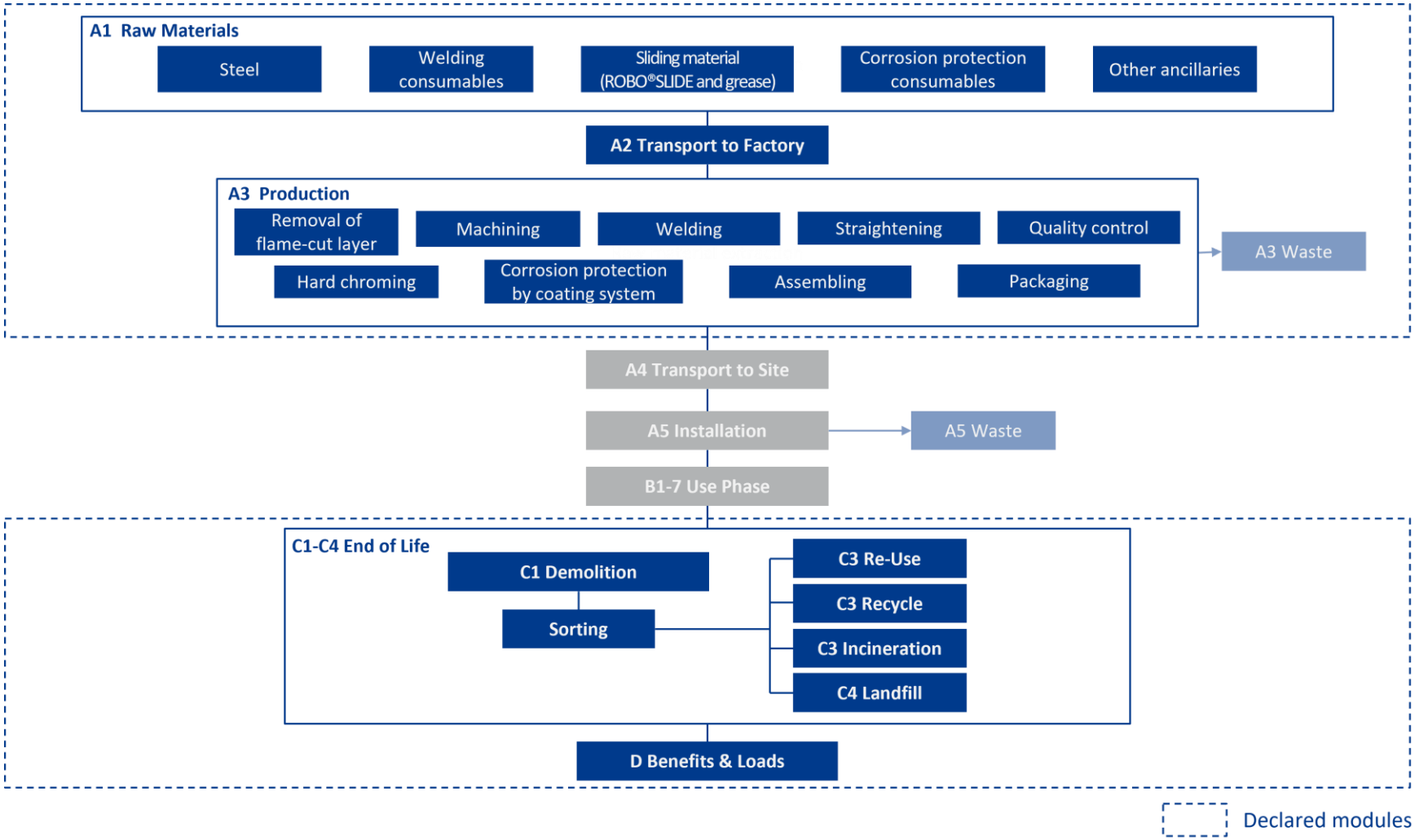
PRODUCT USE AND MAINTENANCE (B1-B7)

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

PRODUCT END OF LIFE (C1-C4, D)

A consumption of 0.01 kWh/kg of bearing is assumed to be used in deconstruction. It is assumed that the waste is collected separately and transported to the waste treatment facility. Transportation distance to waste treatment plant is assumed to be 50 km and the transportation method is assumed to be lorry (C2). Module C3 accounts for energy and resource inputs for sorting and treating of steel, plastic materials and wooden pallet for recycling and incineration with energy recovery with efficiency greater than 60%. Additionally, waste that is incinerated without energy recovery or landfilled is included in Module C4. Due to the material and energy recovery potential of parts in the product and in packaging, recycled raw materials lead to avoided virgin material production and the energy recovered from incineration replaces electricity and heat from primary sources. Benefits and loads from 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 material	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
Variation in GWP-fossil for A1-A3	-

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 14040:2006 / ISO 14044:2006. The EPD Generator uses Ecoinvent v3.10 and One Click LCA databases 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	3.40E+00	1.26E-01	3.75E-01	3.90E+00	MND	MND	MND	MND	MND	MND	MND	MND	MND	3.61E-03	5.61E-03	4.97E-02	1.61E-02	-6.07E-01
GWP – fossil	kg CO_2e	3.39E+00	1.26E-01	4.13E-01	3.93E+00	MND	MND	MND	MND	MND	MND	MND	MND	MND	3.61E-03	5.61E-03	2.58E-02	1.43E-03	-5.97E-01
GWP – biogenic	kg CO_2e	0.00E+00	0.00E+00	-3.86E-02	-3.86E-02	MND	MND	MND	MND	MND	MND	MND	MND	MND	0.00E+00	0.00E+00	2.39E-02	1.47E-02	-1.00E-02
GWP – LULUC	kg CO_2e	1.74E-03	4.29E-05	2.57E-04	2.04E-03	MND	MND	MND	MND	MND	MND	MND	MND	MND	3.13E-07	2.23E-06	1.63E-05	4.94E-07	1.13E-05
Ozone depletion pot.	kg $CFC\text{-}_{11}$e	2.31E-07	2.49E-09	1.08E-08	2.45E-07	MND	MND	MND	MND	MND	MND	MND	MND	MND	5.52E-11	8.38E-11	1.12E-10	2.74E-11	-3.11E-09
Acidification potential	mol H^+e	1.10E-02	3.86E-04	1.93E-03	1.33E-02	MND	MND	MND	MND	MND	MND	MND	MND	MND	3.25E-05	1.91E-05	1.18E-04	6.74E-06	-2.04E-03
EP-freshwater[2)]	kg Pe	1.03E-04	1.01E-06	2.39E-05	1.28E-04	MND	MND	MND	MND	MND	MND	MND	MND	MND	1.27E-08	5.09E-08	1.12E-06	1.08E-08	6.20E-05
EP-marine	kg Ne	2.26E-03	1.26E-04	3.21E-04	2.71E-03	MND	MND	MND	MND	MND	MND	MND	MND	MND	1.51E-05	6.19E-06	4.16E-05	2.57E-06	-2.57E-04
EP-terrestrial	mol Ne	2.49E-02	1.39E-03	3.42E-03	2.97E-02	MND	MND	MND	MND	MND	MND	MND	MND	MND	1.65E-04	6.82E-05	3.48E-04	2.81E-05	-5.94E-03
POCP ("smog")[3)]	kg NMVOCe	8.51E-03	6.01E-04	1.29E-03	1.04E-02	MND	MND	MND	MND	MND	MND	MND	MND	MND	4.93E-05	2.81E-05	1.15E-04	1.01E-05	-1.85E-03
ADP-minerals & metals[4)]	kg Sbe	1.25E-05	4.51E-07	7.05E-07	1.36E-05	MND	MND	MND	MND	MND	MND	MND	MND	MND	1.29E-09	1.57E-08	3.33E-07	1.54E-09	-1.09E-05
ADP-fossil resources	MJ	3.38E+01	1.76E+00	1.02E+01	4.58E+01	MND	MND	MND	MND	MND	MND	MND	MND	MND	4.72E-02	8.13E-02	1.56E-01	2.32E-02	-5.84E+00
Water use[5)]	m^3e depr.	8.15E-01	8.88E-03	1.30E-01	9.54E-01	MND	MND	MND	MND	MND	MND	MND	MND	MND	1.15E-04	3.90E-04	4.04E-03	6.97E-05	1.23E-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, 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	1.43E-07	9.10E-09	7.39E-09	1.60E-07	MND	MND	MND	MND	MND	MND	MND	MND	MND	9.25E-10	5.55E-10	5.49E-09	1.54E-10	-1.43E-08
Ionizing radiation[6]	kBq U235e	4.08E-02	8.96E-04	8.09E-02	1.23E-01	MND	MND	MND	MND	MND	MND	MND	MND	MND	8.20E-06	2.83E-05	3.25E-04	5.81E-06	-1.73E-03
Ecotoxicity (freshwater)	CTUe	4.96E+01	4.99E-01	9.99E-01	5.11E+01	MND	MND	MND	MND	MND	MND	MND	MND	MND	6.68E-03	1.97E-02	6.20E-01	3.71E-03	-8.13E+01
Human toxicity, cancer	CTUh	1.43E-07	8.93E-10	1.16E-09	1.45E-07	MND	MND	MND	MND	MND	MND	MND	MND	MND	1.41E-11	2.83E-11	2.63E-10	4.38E-12	-3.44E-07
Human tox. non-cancer	CTUh	3.38E-08	1.12E-09	2.49E-09	3.74E-08	MND	MND	MND	MND	MND	MND	MND	MND	MND	6.40E-12	5.36E-11	9.57E-10	6.12E-12	4.90E-08
SQP[7]	-	5.48E+00	9.59E-01	4.42E+00	1.09E+01	MND	MND	MND	MND	MND	MND	MND	MND	MND	3.30E-03	8.05E-02	7.38E-01	4.58E-02	-2.49E+00

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	2.66E+00	3.32E-02	8.01E-01	3.50E+00	MND	MND	MND	MND	MND	MND	MND	MND	MND	2.89E-04	1.08E-03	-3.09E-01	2.19E-04	-9.05E-01
Renew. PER as material	MJ	0.00E+00	0.00E+00	3.38E-01	3.38E-01	MND	MND	MND	MND	MND	MND	MND	MND	MND	0.00E+00	0.00E+00	-2.09E-01	-1.28E-01	9.00E-02
Total use of renew. PER	MJ	2.66E+00	3.32E-02	1.14E+00	3.83E+00	MND	MND	MND	MND	MND	MND	MND	MND	MND	2.89E-04	1.08E-03	-5.18E-01	-1.28E-01	-8.15E-01
Non-re. PER as energy	MJ	3.35E+01	1.76E+00	1.01E+01	4.54E+01	MND	MND	MND	MND	MND	MND	MND	MND	MND	4.72E-02	8.13E-02	2.02E-03	-3.61E-02	-5.84E+00
Non-re. PER as material	MJ	2.15E-01	0.00E+00	2.22E-02	2.38E-01	MND	MND	MND	MND	MND	MND	MND	MND	MND	0.00E+00	0.00E+00	-1.72E-01	-6.55E-02	5.87E-02
Total use of non-re. PER	MJ	3.37E+01	1.76E+00	1.02E+01	4.56E+01	MND	MND	MND	MND	MND	MND	MND	MND	MND	4.72E-02	8.13E-02	-1.70E-01	-1.02E-01	-5.79E+00
Secondary materials	kg	3.31E-01	8.44E-04	2.45E-03	3.35E-01	MND	MND	MND	MND	MND	MND	MND	MND	MND	1.96E-05	3.47E-05	2.70E-04	5.96E-06	4.76E-01
Renew. secondary fuels	MJ	2.53E-04	1.01E-05	1.14E-02	1.17E-02	MND	MND	MND	MND	MND	MND	MND	MND	MND	5.12E-08	4.40E-07	2.06E-05	1.22E-07	-8.99E-05
Non-ren. secondary fuels	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00	MND	MND	MND	MND	MND	MND	MND	MND	MND	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Use of net fresh water	m^3	2.01E-02	2.45E-04	3.42E-03	2.37E-02	MND	MND	MND	MND	MND	MND	MND	MND	MND	3.06E-06	1.17E-05	5.70E-05	1.86E-05	-2.30E-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	5.73E-01	2.58E-03	1.94E-02	5.95E-01	MND	MND	MND	MND	MND	MND	MND	MND	MND	5.27E-05	1.38E-04	1.77E-03	2.76E-05	-4.19E-01
Non-hazardous waste	kg	6.95E+00	5.70E-02	1.89E+00	8.90E+00	MND	MND	MND	MND	MND	MND	MND	MND	MND	7.20E-04	2.56E-03	1.11E-01	7.59E-03	9.95E+00
Radioactive waste	kg	1.16E-04	6.37E-07	6.59E-05	1.83E-04	MND	MND	MND	MND	MND	MND	MND	MND	MND	5.18E-09	1.79E-08	2.00E-07	3.66E-09	-3.18E-06

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	0.00E+00	0.00E+00	MND	MND	MND	MND	MND	MND	MND	MND	MND	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Materials for recycling	kg	3.77E-06	0.00E+00	2.50E-01	2.50E-01	MND	MND	MND	MND	MND	MND	MND	MND	MND	0.00E+00	0.00E+00	8.54E-01	0.00E+00	0.00E+00
Materials for energy rec	kg	6.57E-10	0.00E+00	0.00E+00	6.57E-10	MND	MND	MND	MND	MND	MND	MND	MND	MND	0.00E+00	0.00E+00	2.53E-03	0.00E+00	0.00E+00
Exported energy	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00	MND	MND	MND	MND	MND	MND	MND	MND	MND	0.00E+00	0.00E+00	1.11E-01	0.00E+00	0.00E+00

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	3.33E+00	1.25E-01	4.11E-01	3.87E+00	MND	MND	MND	MND	MND	MND	MND	MND	MND	3.59E-03	5.58E-03	5.20E-02	1.42E-03	-5.93E-01
Ozone depletion Pot.	kg $CFC_{-11}e$	2.10E-08	1.98E-09	9.21E-09	3.22E-08	MND	MND	MND	MND	MND	MND	MND	MND	MND	4.37E-11	6.68E-11	9.47E-11	2.18E-11	-3.63E-09
Acidification	kg SO_2e	1.12E-02	2.95E-04	1.62E-03	1.31E-02	MND	MND	MND	MND	MND	MND	MND	MND	MND	2.29E-05	1.46E-05	9.22E-05	4.99E-06	-1.59E-03
Eutrophication	kg PO_4^3e	2.47E-03	7.53E-05	5.02E-04	3.05E-03	MND	MND	MND	MND	MND	MND	MND	MND	MND	5.35E-06	3.55E-06	5.04E-05	1.62E-06	4.27E-04
POCP (“smog”)	kg C_2H_4e	1.32E-03	2.82E-05	1.06E-04	1.46E-03	MND	MND	MND	MND	MND	MND	MND	MND	MND	1.71E-06	1.30E-06	2.27E-05	4.94E-07	-4.27E-04
ADP-elements	kg Sbe	2.19E-05	4.40E-07	6.92E-07	2.30E-05	MND	MND	MND	MND	MND	MND	MND	MND	MND	1.26E-09	1.53E-08	3.31E-07	1.50E-09	-1.08E-05
ADP-fossil	MJ	3.74E+01	1.76E+00	1.02E+01	4.94E+01	MND	MND	MND	MND	MND	MND	MND	MND	MND	4.72E-02	8.13E-02	1.56E-01	2.32E-02	-5.84E+00

VERIFICATION STATEMENT

VERIFICATION PROCESS FOR THIS EPD

This EPD has been verified in accordance with ISO 14025:2006 by an independent, third-party verifier by reviewing results, documents and compliancy with reference standard, ISO 14025:2006 and ISO 14040:2006 / ISO 14044:2006 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.

Imane Uald lamkaddam, as an authorized verifier acting for EPD Hub Limited
27.12.2024