ENVIRONMENTAL PRODUCT DECLARATION

as per *ISO 14025* and *EN 15804+A2*

Owner of the Declaration	SWARCO AG
Publisher	Institut Bauen und Umwelt e.V. (IBU)
Programme holder	Institut Bauen und Umwelt e.V. (IBU)
Declaration number	EPD-SWA-20250518-CBA1-EN
Issue date	09.12.2025
Valid to	08.12.2030

SWARCO SOLIDPLUS retroreflective glass beads

SWARCO

Institut Bauen und Umwelt e.V.

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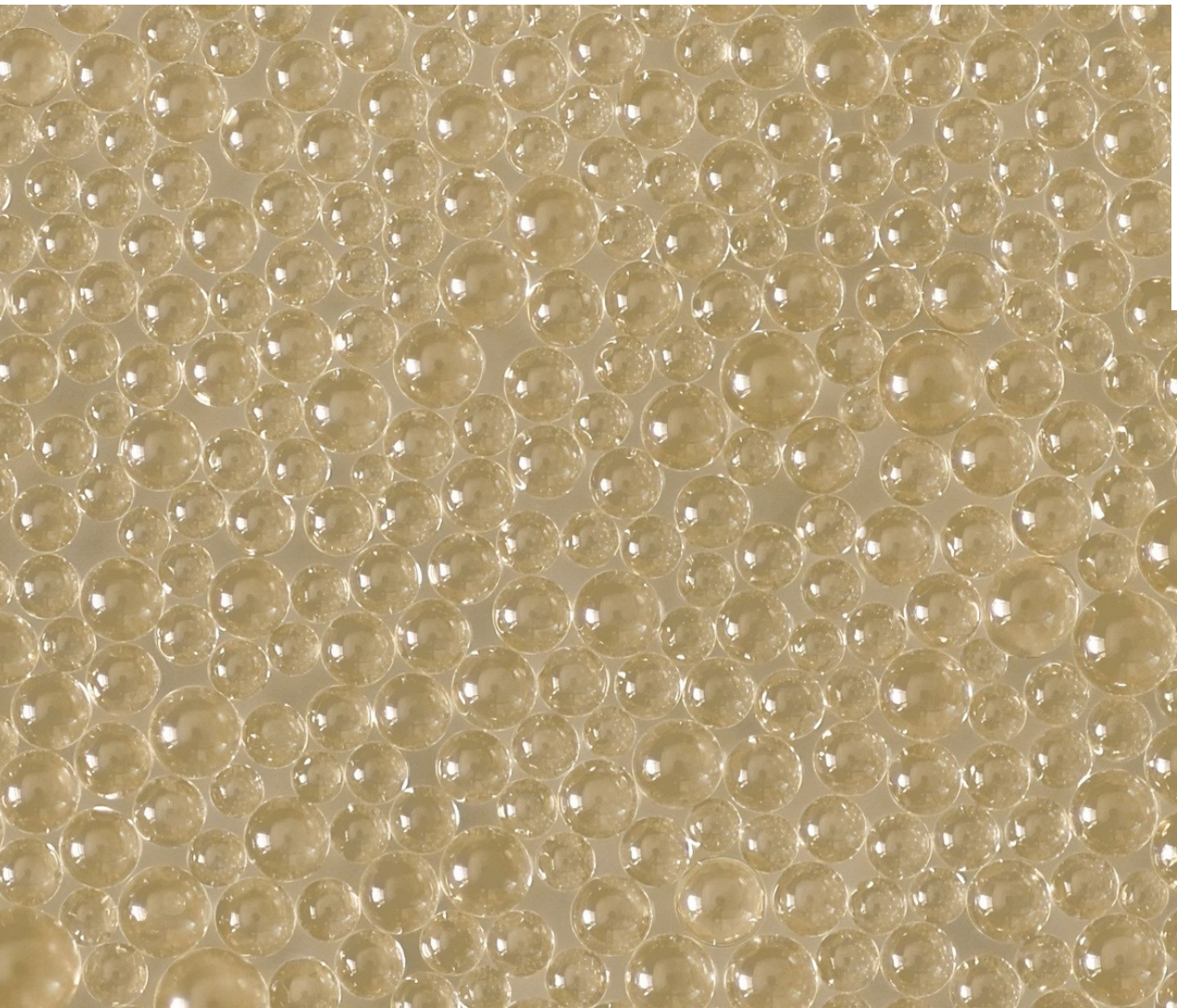


General Information

SWARCO

Programme holder

IBU – Institut Bauen und Umwelt e.V.
Hegelplatz 1
10117 Berlin
Germany

Declaration number

EPD-SWA-20250518-CBA1-EN

This declaration is based on the product category rules:

Glass beads for road marking systems, 01.08.2025
(PCR checked and approved by the SVR)

Issue date

09.12.2025

Valid to

08.12.2030

Dipl.-Ing. Hans Peters
(Chairman of Institut Bauen und Umwelt e.V.)

Florian Pronold
(Managing Director Institut Bauen und Umwelt e.V.)

SWARCO SOLIDPLUS retroreflective glass beads

Owner of the declaration

SWARCO AG
Blattenwaldweg 8
6112 Wattens
Austria

Declared product / declared unit

SWARCO SOLIDPLUS retroreflective glass beads

Scope:

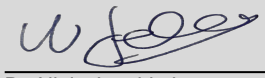
This Environmental Product Declaration (EPD) covers SWARCO SOLIDPLUS retroreflective glass beads, a premium product designed to improve the visibility and durability of road markings, especially at night and wet conditions. Due to their high refractive index and superior roundness, SWARCO SOLIDPLUS beads contribute significantly to road safety by enhancing the retroreflection performance of marking systems.

The product is manufactured exclusively at the production site of M. Swarovski GmbH in Neufurth, Austria. The environmental data used in this EPD refer to the year 2023 and represent 100 % of the annual production volume of SWARCO SOLIDPLUS at this location.
The owner of the declaration shall be liable for the underlying information and evidence; the IBU shall not be liable with respect to manufacturer information, life cycle assessment data and evidences.

The EPD was created according to the specifications of EN 15804+A2. In the following, the standard will be simplified as *EN 15804*.

Verification

The standard EN 15804 serves as the core PCR
Independent verification of the declaration and data according to ISO 14025:2011
☐ internally ☒ externally



Dr. Niels Jungbluth,
(Independent verifier)

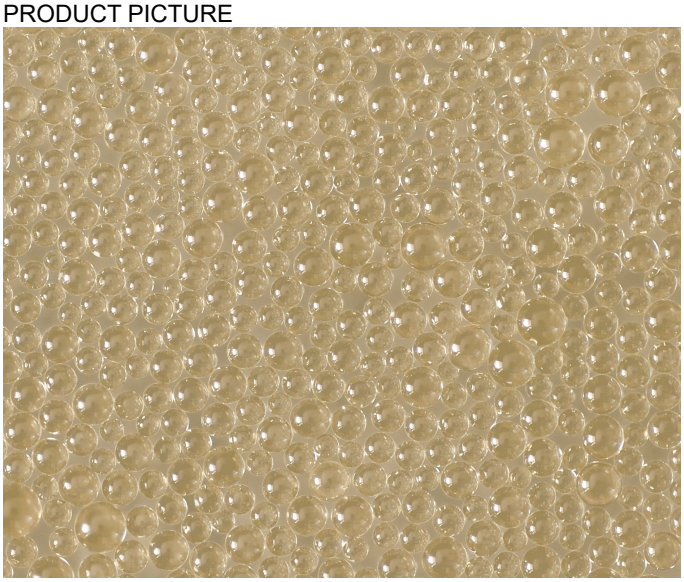
Product

Product description/Product definition

SWARCO SOLIDPLUS retroreflective glass beads are designed for use in premium road marking systems to improve nighttime visibility through retroreflection.

They are available in particle size ranges from approximately 212 µm to 1400 µm and comply with the European standards *EN 1423* (harmonized) and *EN 1424*. The beads are suitable for application of thermoplastic markings, cold plastics, and solvent- or waterborne paints.

PRODUCT PICTURE



To increase durability and performance, SWARCO SOLIDPLUS glass beads can be surface-treated with organosilanes to improve adhesion to the marking material. These treatments are included in the scope of this EPD and were part of the 2023 production data.
Intermixing with other glass bead types or anti-skid aggregates may be possible upon request; however, such customized blends are not covered by this EPD and were not part of the declared product group or the underlying LCA.

For the placing on the market of the product in the European Union/European Free Trade Association (EU/EFTA), with the exception of Switzerland, *Regulation (EU) No. 305/2011* (Construction Products Regulation – CPR) applies.
The product is placed on the market with a Declaration of Performance (DoP) in accordance with *EN 1423:2012* and carries the CE marking. For the application and use of the product, the respective national provisions at the place of use apply.

Application

SWARCO SOLIDPLUS retroreflective glass beads are primarily used to improve nighttime visibility of road markings by reflecting vehicle headlights. In addition to their optical function, the beads provide mechanical protection, shielding the marking from traffic-induced abrasion and extending its service life. The main application method is the drop-on process, in which the beads are applied to freshly laid, still-liquid marking material. This process can be carried out mechanically using road marking machines or manually for smaller applications. The product is suitable for a wide range of uses, including highways, rural and urban roads, parking areas, and runways.

MECHANICAL DROP-ON

MANUAL DROP-ON

In addition to drop-on applications, SWARCO SOLIDPLUS retroreflective glass beads can also be integrated directly into the marking material during the production of thermoplastics, cold plastics, or comparable road marking systems.

Technical Data

The technical specifications of the product within the scope of this Environmental Product Declaration (EPD) are listed in the table below. All values refer to the declared product in its delivery condition and are based on internal testing and/or standardised methods, as required by the harmonised standard *EN 1423:2012*. These characteristics represent the essential performance properties in accordance with the product's Declaration of Performance (DoP) according to the Construction Products *Regulation No. 305/2011* and delegated *Regulation (EU) No. 574/2014.*

Constructional data

Name	Value	Unit
True Density	~ 2.9	g/cm³
Refractive index acc. to EN 1423	1.65 - 1.69	
Roundness acc. to EN 1423	≥ 90	%
Particle size acc. to EN 1423	212 - 1400	µm
Harmful elements (Pb, As, Sb) acc. to EN 1423	< 10	mg/kg

Delivery Status
After quality control, the finished glass beads are filled into suitable packaging units. The packaging options include:

- Paper bags with 25 kg net weight
- FIBC big bags ranging from 250 kg to 1,250 kg net weight

These units are stacked on EURO pallets for transport and storage.

Base materials/Ancillary materials
The SWARCO SOLIDPLUS retroreflective glass beads consist primarily of soda-lime glass produced from high-purity raw materials such as sand, sodium carbonate, and calcium carbonate.

They do not contain substances of very high concern (SVHC) as defined by Article 59(10) of *Regulation (EC) No. 1907/2006 REACH* candidate list, dated 2024-01-23), at concentrations at or above 0.1 % by weight.

The Bill of Materials (BOM) has been normalized to represent the composition of SWARCO SOLIDPLUS retroreflective glass beads, and the packaging BOM has been adjusted accordingly to ensure consistency with the declared unit and throughout the life cycle assessment.

Composition of SWARCO SOLIDPLUS retroreflective glass beads

Name	Value	Unit
Metal oxides	45-50	%
Metal carbonates	50-55	%
Coating / Organosilane	0.01-0.02	%
TOTAL	100	%

Composition of packaging of SWARCO SOLIDPLUS retroreflective glass beads

Name	Value	Unit
Pallets	20-22	%
Bags	70-72	%
PE packaging	6-8	%
TOTAL	100	%

Reference service life
The wear and durability of glass beads and road markings vary significantly depending on the geographical area and climatic conditions in which they are used. Under these circumstances, it is not possible to define a standardized service life for SWARCO SOLIDPLUS retroreflective glass beads due to the wide range of operating conditions.

In warmer climates like Southern Europe and colder regions like Scandinavia, conditions vary widely, resulting in a service life of road markings incorporating SWARCO SOLIDPLUS retroreflective glass beads of approximately 0.5 to 10 years, depending on local conditions. Factors such as the selected marking system (e.g. thermoplastics, cold plastics, or paints), road type and traffic load, winter maintenance (e.g. snow ploughing), and installation quality significantly influence the durability of both the marking and the beads, making a standardized service life impossible to determine.
The service life of road markings must therefore be assessed under local conditions to obtain a realistic estimate.

LCA: Calculation rules

Declared Unit
The conversion from kilograms (kg) to cubic meters (m^3) is based on the bulk density of ~ 1,800 kg/m^3.

Note: Density depends on the composition of glass beads, which may affect their refractive index and/or roundness.

Name	Value	Unit
Gross density	2900	kg/m^3
Declared unit	1	kg

System boundary
The representative EPD is classified as "cradle to grave" with options; the declared modules are A1–A3, A4, A5, B1, C1–C4 and D.
The system boundaries define the processes and life cycle modules considered within this Life Cycle Assessment (LCA) of SWARCO SOLIDPLUS retroreflective glass beads. This EPD is based on a modular approach in accordance with *EN 15804*.
The following life cycle modules are included in this study:

- A1–A3: Raw material supply, transport, and manufacturing
- A4–A5: Transport to site and installation
- B1: Use phase – removal of glass beads from road markings during service life
- C1–C4: Removal of markings, transport, waste processing, and disposal
- D: Reuse, recovery, or recycling potential of packaging materials

Wooden pallets are included in the life cycle assessment as reusable packaging materials. At the M. Swarovski GmbH site, pallets circulate in a closed-loop return system and are reused multiple times before their end-of-life, at which point they are either recycled or incinerated with energy recovery. To reflect reuse, the pallet mass is allocated pro-rata per use (i.e., only the share corresponding to the current product cycle is counted). The associated pallet transport in Module A4 is allocated on the same pro-rata basis. This approach provides a consistent, unambiguous representation of packaging inputs in accordance with *EN 15804* and the applicable *PCR Part A* and *B* requirements.

A1 – A3: Product stage
A1 – Raw material supply: The first step in the production of SWARCO SOLIDPLUS retroreflective glass beads is the procurement of high-purity raw materials from selected European suppliers. These include various metal oxides and metal carbonates, which are essential for achieving the required optical clarity, density, and mechanical durability of the final product. The quality and consistency of these materials directly influence the retroreflective performance of the beads.

All relevant resources, materials, and services used in this production phase are included in the study. The Bill of Materials is based on mass-weighted input data from the 2023 production year at the M. Swarovski GmbH site in Neufurth, Austria.

A2 – Transport: The raw materials are delivered to the production site by truck or, where applicable, by ship. All inbound transport routes to the Neufurth plant have been included in the life cycle inventory. In accordance with *EN 15804*, an average load factor of 50 % was applied (fully loaded transport to the site, empty return).

A3 – Manufacturing: The manufacturing process includes the mixing and melting of the raw materials into a homogeneous glass mass, followed by the formation of spherical beads using a proprietary high-temperature process. The beads are then cooled, sieved into specific size fractions, optionally coated with organosilanes, and packaged in either 25 kg paper bags or large FIBC big bags. All manufacturing data was collected on-site at M. Swarovski GmbH for the reference year 2023 and includes energy consumption, emissions, and waste generation.
For the environmental impact assessment, the electricity supply is based on 100 % renewable sources, primarily hydro power.

A4 – A5: Construction process stage
A4 – Transport from the gate to the site: Truck transport within Central Europe is considered.
Average distances from the M. Swarovski GmbH production site to customer warehouses are based on internal logistics data.
Distances from warehouses to construction sites come from questionnaires completed by the two largest road-marking companies in Austria and Germany.
Energy use and emissions were calculated from distance and load weight for both legs.

A5 – Assembly: Glass beads are applied manually or with road marking machines. Fuel/energy use and packaging waste (pallets, paper, plastics) are included; impacts are allocated by mass between glass beads and the marking material.

B1 – B7: Use stage
The use stage (B1–B7) is partly included in this study. Module B1 covers the gradual removal of glass beads from the road marking surface during use due to traffic.
The remaining use-stage modules (B2–B7) are not applicable, as SWARCO SOLIDPLUS retroreflective glass beads are passive components that do not require maintenance, repair, replacement, or energy input during their service life.

C1 – C4: End-of-life stage
To gain a comprehensive overview of the end-of-life scenarios for road markings, questions were posed to the two largest marking companies in Austria and Germany. The aim was to gain an insight into the ecological footprint of SWARCO SOLIDPLUS retroreflective glass beads.

C1 – Deconstruction/Demolition: During removal of the road markings, covering all C-stages, different scenarios were evaluated with the aforementioned road marking companies. We considered the share where markings are removed without asphalt and removal together with asphalt. The joint recycling is not considered, as glass beads account for less than 1 % of asphalt mass, making their impact negligible.

C2 – Transport: In this stage, the transport of materials from the deconstruction location to the waste treatment facility or landfill site is considered.

C3 – Waste processing: No specific waste processing activities are modelled for SWARCO SOLIDPLUS retroreflective glass beads in Module C3.
Only the amount of glass beads removed together with asphalt are considered as MFR (material for recycling).

C4 – Disposal: In this stage, the final disposal of waste materials (glass waste) is addressed. The amount of waste and corresponding emissions are calculated based on the remaining materials after the product's functional service life.

D: Benefits and loads beyond the system boundaries
No credits or benefits are modelled for the recycling or reuse of the product itself. Module D addresses the potential environmental benefits and loads associated with the end-of-life management of packaging materials used for SWARCO SOLIDPLUS retroreflective glass beads. These benefits include:

- Recycling: Packaging materials, such as pallets, paper and plastics, are recycled where possible, contributing to reduced demand for virgin materials.
- Energy Recovery: Incineration of packaging materials generates energy, which is accounted for as a credit in Module D.

Geographic Representativeness
Land or region, in which the declared product system is manufactured, used or handled at the end of the product´s lifespan: Europe

Comparability
Basically, a comparison or an evaluation of EPD data is only possible if all the data sets to be compared were created according to *EN 15804* and the building context, respectively the product-specific characteristics of performance, are taken into account. The life cycle assessment was carried out using the software *Ecochain Helix* 4.3.1 (© 2023 Ecochain Technologies B.V.). Background data for upstream and downstream processes was sourced from the *Ecoinvent v3.9.1 Cut-off* database, ensuring a consistent and up-to-date basis for modelling environmental impacts in accordance with *EN 15804.*

LCA: Scenarios and additional technical information

Characteristic product properties of biogenic carbon
SWARCO SOLIDPLUS retroreflective glass beads do not contain biogenic carbon. However, the packaging, specifically the pallets and paper bags, includes biogenic carbon, which is considered in the environmental assessment.

Biogenic carbon content
In the table below, the biogenic carbon content of paper bags and pallets are shown (both calculated and considered in A1 – raw material purchasing). The table shows the values at the end of A3 (cradle-to-gate).

Name	Value	Unit
Product Carbon content	0.00000	kg C
Packaging Carbon content	0.00164	kg C

Note: 1 kg of biogenic carbon is equivalent to 44/12 kg of CO_2.

The GWP of the suppliers' electricity mix (100 % renewable electricity, primarily hydro power) used in modules A1–A3 is 0.0429 kg CO_2e/kWh.

LCA Scenarios and Additional Technical Information
The following scenarios describe the life cycle stages modelled after the production phase (A1–A3):

A4 – Transport from the gate to the site

Name	Value	Unit
Litres of fuel	-	l/100km
Transport distance	808	km
Capacity utilisation (including empty runs)	50	%
Gross density of products transported	2900	kg/m^3
Capacity utilisation volume factor	-	-

A5 – Assembly

Name	Value	Unit
Other resources Diesel consumption	1.8	MJ/kg

B1 – Use
During the use stage, material losses of glass beads occur due to traffic. It is assumed that 50 % of the applied glass beads are gradually removed from the road marking surface over the service life. These losses are modelled in Module B1 as worst-case approach by emissions to air. No additional energy consumption or maintenance activities are required during use. However, B1 (use) is modelled to include the traffic-related mass release, thereby closing the material mass balance.

Name	Value	Unit
Material loss of glass bead due to traffic	0.50	kg

End of life (C1 - C4)

Name	Value	Unit
Collected separately waste type	0.024	kg
Collected as mixed construction waste	0.476	kg
Reuse	-	kg
Recycling	0.476	kg
Energy recovery	-	kg
Landfilling	0.024	kg

According to B1 it is assumed that at end-of-service life, half of the beads are lost through traffic. Of the remainder, only 5 % is removed from the asphalt and landfilled. In all other cases, a new marking is applied over the existing one, or the marking is removed along with the asphalt and downcycled. Since the share of glass beads in recycled asphalt is under 1 %, their impact is negligible and not modelled. Its mass is explicitly reported as MFR in C3, thus the mass balance of the declared unit is fully closed.

D - Benefits and Loads Beyond System Boundaries

Name	Value	Unit
Paper bags recycling	70.5	%
Paper bag incineration	29.5	%
PE packaging landfill	17.3	%
PE packaging recycling	37.8	%
PE packaging incineration	44.9	%
Pallet recycling	46.0	%
Pallet incineration	53.7	%
Pallet landfill	0.3	%

LCA: Results

The declared unit is "1 kilogram of SWARCO SOLIDPLUS retroreflective glass beads", including the associated packaging. This unit is used to quantify the environmental impacts across the product's life cycle, including production, construction, end-of-life, disposal, and recycling.

DESCRIPTION OF THE SYSTEM BOUNDARY (X = INCLUDED IN LCA; MND = MODULE OR INDICATOR NOT DECLARED; MNR = MODULE NOT RELEVANT)

Product stage			Construction process stage		Use stage							End of life stage				Benefits and loads beyond the system boundaries
Raw material supply	Transport	Manufacturing	Transport from the gate to the site	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	X	X	MND	MNR	MNR	MNR	MND	MND	X	X	X	X	X

RESULTS OF THE LCA - ENVIRONMENTAL IMPACT according to EN 15804+A2:

Parameter	Unit	A1-A3	A4	A5	B1	C1	C2	C3	C4	D
GWP-total	kg CO_2 eq	1.46E+00	1.18E-01	2.13E-01	0	2.01E-01	3.08E-04	ND	1.34E-04	-5.15E-03
GWP-fossil	kg CO_2 eq	1.45E+00	1.18E-01	2.07E-01	0	2.01E-01	3.08E-04	ND	1.34E-04	-5.09E-03
GWP-biogenic	kg CO_2 eq	-1.11E-03	3.55E-05	6.05E-03	0	3.01E-05	9.24E-08	ND	6.78E-08	-3.54E-05
GWP-luluc	kg CO_2 eq	1.78E-03	5.78E-05	3.34E-05	0	3.29E-05	1.5E-07	ND	2.64E-08	-2.19E-05
ODP	kg CFC11 eq	3.84E-08	2.59E-09	3.44E-09	0	3.37E-09	6.75E-12	ND	4.64E-12	-1.71E-10
AP	mol H^+ eq	2.05E-02	5.52E-04	1.78E-03	0	1.74E-03	1.44E-06	ND	8.64E-07	-2.93E-05
EP-freshwater	kg P eq	5.22E-05	9.71E-07	8.71E-07	0	8.53E-07	2.53E-09	ND	7.66E-10	-4.29E-07
EP-marine	kg N eq	1.16E-03	2.17E-04	8.16E-04	0	7.97E-04	5.66E-07	ND	3.76E-07	-8.91E-06
EP-terrestrial	mol N eq	1.13E-02	2.35E-03	8.88E-03	0	8.67E-03	6.11E-06	ND	4.04E-06	-1.06E-04
POCP	kg NMVOC eq	4.77E-03	8.2E-04	2.66E-03	0	2.6E-03	2.13E-06	ND	1.6E-06	-3.74E-05
ADPE	kg Sb eq	7.13E-06	3.68E-07	1.47E-07	0	1.46E-07	9.59E-10	ND	1.41E-10	-2.09E-08
ADPF	MJ	1.4E+01	1.71E+00	2.73E+00	0	2.67E+00	4.44E-03	ND	3.4E-03	-9.15E-02
WDP	m^3 world eq deprived	1.43E+00	7.47E-03	6.8E-03	0	6.66E-03	1.94E-05	ND	1.23E-05	-2.27E-03

GWP = Global warming potential; ODP = Depletion potential of the stratospheric ozone layer; AP = Acidification potential of land and water; EP = Eutrophication potential; POCP = Formation potential of tropospheric ozone photochemical oxidants; ADPE = Abiotic depletion potential for non-fossil resources; ADPF = Abiotic depletion potential for fossil resources; WDP = Water (user) deprivation potential)

RESULTS OF THE LCA - INDICATORS TO DESCRIBE RESOURCE USE according to EN 15804+A2:

Parameter	Unit	A1-A3	A4	A5	B1	C1	C2	C3	C4	D
PERE	MJ	1.26E+01	2.7E-02	1.96E-02	0	1.92E-02	7.03E-05	ND	6.76E-05	-3.26E-01
PERM	MJ	0	0	0	0	0	0	ND	0	0
PERT	MJ	1.26E+01	2.7E-02	1.96E-02	0	1.92E-02	7.03E-05	ND	6.76E-05	-3.26E-01
PENRE	MJ	1.51E+01	1.81E+00	2.9E+00	0	2.84E+00	4.72E-03	ND	3.62E-03	-9.85E-02
PENRM	MJ	0	0	0	0	0	0	ND	0	0
PENRT	MJ	1.51E+01	1.81E+00	2.9E+00	0	2.84E+00	4.72E-03	ND	3.62E-03	-9.85E-02
SM	kg	0	0	0	0	0	0	ND	0	0
RSF	MJ	0	0	0	0	0	0	ND	0	0
NRSF	MJ	0	0	0	0	0	0	ND	0	0
FW	m^3	4.64E-02	2.39E-04	2.21E-04	0	2.16E-04	6.23E-07	ND	3.96E-06	-6.25E-05

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 material; RSF = Use of renewable secondary fuels; NRSF = Use of non-renewable secondary fuels; FW = Use of net fresh water

RESULTS OF THE LCA – WASTE CATEGORIES AND OUTPUT FLOWS according to EN 15804+A2:

Parameter	Unit	A1-A3	A4	A5	B1	C1	C2	C3	C4	D
HWD	kg	5.74E-05	1.07E-05	1.82E-05	0	1.78E-05	2.8E-08	0	1.66E-08	-4.51E-07
NHWD	kg	9.25E-01	1.08E-01	2.81E-02	0	2.82E-02	2.81E-04	0	2.36E-02	-1.46E-03
RWD	kg	2.66E-05	5.74E-07	3.9E-07	0	3.82E-07	1.49E-09	0	7.36E-10	-1.29E-07
CRU	kg	0	0	0	0	0	0	0	0	0
MFR	kg	0	0	0	0	0	0	4.76E-01	0	0
MER	kg	0	0	0	0	0	0	0	0	0
EEE	MJ	0	0	0	0	0	0	0	0	0
EET	MJ	0	0	0	0	0	0	0	0	0

HWD = Hazardous waste disposed; NHWD = Non-hazardous waste disposed; RWD = Radioactive waste disposed; CRU = Components for re-use; MFR = Materials for recycling; MER = Materials for energy recovery; EEE = Exported electrical energy; EET = Exported thermal energy

RESULTS OF THE LCA – additional impact categories according to EN 15804+A2-optional:

Parameter	Unit	A1-A3	A4	A5	B1	C1	C2	C3	C4	D
PM	Disease incidence	9.2E-08	1.16E-08	4.88E-08	2.74E-05	4.77E-08	3.02E-11	ND	2.18E-11	-4.26E-10
IR	kBq U235 eq	3.31E-02	8.83E-04	6.84E-04	0	6.7E-04	2.3E-06	ND	1.33E-06	-1.62E-04
ETP-fw	CTUe	1.17E+01	8.4E-01	1.31E+00	0	1.28E+00	2.19E-03	ND	1.44E-03	-2.93E-02
HTP-c	CTUh	1.45E-09	6.36E-11	7E-11	0	6.8E-11	1.66E-13	ND	4.54E-14	-2.25E-11
HTP-nc	CTUh	2.61E-08	1.32E-09	6.86E-10	0	6.76E-10	3.45E-12	ND	5.98E-13	-6.56E-11
SQP	SQP	7.38E+00	1.28E+00	4.5E-01	0	4.49E-01	3.34E-03	ND	7.02E-03	-1.73E+00

PM = Potential incidence of disease due to PM emissions; IR = Potential Human exposure efficiency relative to U235; ETP-fw = Potential comparative Toxic Unit for ecosystems; HTP-c = Potential comparative Toxic Unit for humans (cancerogenic); HTP-nc = Potential comparative Toxic Unit for humans (not cancerogenic); SQP = Potential soil quality index

Disclaimer 1 – for the indicator “Potential Human exposure efficiency relative to U235”. 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 or radioactive waste disposal in underground facilities. Potential ionizing radiation from the soil, radon and from some construction materials is also not measured by this indicator.

Disclaimer 2 – for the indicators “abiotic depletion potential for non-fossil resources”, “abiotic depletion potential for fossil resources”, “water (user) deprivation potential, deprivation-weighted water consumption”, “potential comparative toxic unit for ecosystems”, “potential comparative toxic unit for humans – cancerogenic”, “Potential comparative toxic unit for humans - not cancerogenic”, “potential soil quality index”. The results of this environmental impact indicator shall be used with care as the uncertainties on these results are high as there is limited experience with the indicator.

References

EN 15804
EN 15804:2012+A2:2019, Sustainability of construction works — Environmental Product Declarations — Core rules for the product category of construction products.

ISO 14025
EN ISO 14025:2011, Environmental labels and declarations — Type III environmental declarations — Principles and procedures.

ISO 14040
ISO14040:2006; Environmental management - Life Cycle Assessment – Principles and Framework, International Organization for Standardization

ISO 14044
ISO 14044:2006-10, Environmental management - Life Cycle Assessment - Requirements and guidelines, International Organization for Standardization

PCR Part A
Calculation Rules for the Life Cycle Assessment and Requirements on the Project Report according to EN 15804+A2:2019, version 1.4, valid as of April 15, 2024

PCR Part B
Glass beads for road marking systems, Version 4, 28 August 2025 (IBU).

EN 1423
EN 1423:2012 + AC:2013, Road marking materials – Drop on materials – Glass beads, antiskid aggregates and mixtures of the two

EN 1424
EN 1424:2013, Road marking materials – Premix glass beads

Regulation (EU) No 305/2011 (CPR)
Construction Products, European Commission, 2011.

Regulation (EU) No 574/2014
Commission Implementing Regulation, European Commission, 2014.

REACH Regulation
Candidate List of Substances of Very High Concern for Authorisation

Software/database

Ecochain Helix
Environmental Intelligence Platform for Life Cycle Assessment and Sustainability Management - Ecochain version 4.3.1, 2024

Ecoinvent
Comprehensive Life Cycle Inventory Database for Environmental Impact Assessment – Ecoinvent version 3.9.1 Cut-off (system model)

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