ENVIRONMENTAL PRODUCT DECLARATION

in accordance with ISO 14025:2006 and
EN 15804:2012+A2:2019/AC:2021 for:

Resin Coated Sand

Programme: The International EPD System, www.environdec.com
Programme operator: EPD International AB
Licensee: EPD Brasil® Fundação Vanzolini
EPD Registration number: EPD-IES-0024952:003
Type of EPD: EPD of a single product from a manufacturer provider

Version date: **2025/08/05**

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An EPD may be updated or depublished if conditions change. To find the latest version of the EPD and to confirm its validity, see **www.environdec.com**.

General Information

Programme information		
Programme	The International EPD® System	EPD Brasil® Fundação Vanzolini
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PCR information
CEN standard EN 15804:2012+A2:2019/AC:2021 as the Core Product Category Rules (PCR)
Product category rules (PCR): PCR 2019:14 Construction Products, version 2.0.1
PCR review was conducted by: The Technical Committee of the International EPD® System See www.environdec.com for a list of members. **Chairs of the PCR review:** Rob Rouwette (chair), Noa Meron (co-chair).

Verification
External and independent ('third-party') verification of the declaration and data, according to ISO 14025:2006, via EPD verification through: ☒ Individual EPD verification without a pre-verified LCA/EPD tool ☐ Individual EPD verification with a pre-verified LCA/EPD tool ☐ EPD process certification* without a pre-verified LCA/EPD tool ☐ EPD process certification* with a pre-verified LCA/EPD tool ☐ Fully pre-verified EPD tool
Independent third-party verification of the declaration and data, according to ISO 14025:2006: ☒ EPD verification by individual verifier
Third party verifier: Marcel Gómez Ferrer (info@marcelgomez.com) Approved by: The International EPD© System
Procedure for follow-up of data during EPD validity involves third part verifier: ☐ Yes ☒ No

The EPD owner has the sole ownership, liability, and responsibility for the EPD.

EPDs within the same product category but published in different EPD programmes, may not be comparable. For two EPDs to be comparable, they shall be based on the same PCR (including the same first-digit version number) or be based on fully aligned PCRs or versions of PCRs; cover products with identical functions, technical performances and use (e.g. identical declared/functional units); have identical scope in terms of included life-cycle stages (unless the excluded life-cycle stage is demonstrated to be insignificant); apply identical impact assessment methods (including the same version of characterisation factors); and be valid at the time of comparison.

Information about EPD owner

Address and contact information of the EPD owner: Mineração Jundu LTDA, Estrada Analandia-Corumbatai, Km 5, Analandia – SP - Brasil

Management system-related certification: ISO 14001 & ISO 50001

LCA practitioner: LATAM LCA Team, Saint-Gobain Research Brasil - Sartor, Lucas de Bona (lucas.sartor@saint-gobain.com); Exposito, Caio Cesar Dente (caio.exposito@saint-gobain.com); Frota, Thiago Marques da (thiago.frota@saint-gobain.com)

Communication: The intended use of this EPD is for B2B communication.

Product Information

Product name: Resin Coated Sand

UN CPC CODE: 37990 - Non-metallic mineral products n.e.c.

Manufacturing site: Descalvado - Usina Shell Molding plant: SP-215, KM 114 - Rural, Descalvado - SP

Product description

Product description and description of use

This Environmental Product Declaration (EPD®) describes the environmental impacts of 1 ton of Resin Coated Sand produced. The study was conducted using the annual value provided by the Descalvado/SP manufacturing site.

The production facility of Mineração JUNDU utilizes naturally occurring and abundant raw materials in the form of sand, which is then coated with resin. It applies advanced resin coating techniques to create sand that enhances mold stability, minimizes casting defects, and improves overall productivity. Non-metallic minerals, including resin coated sand, limestone, and dolomite, supplied by Mineração JUNDU, are essential components for numerous industrial applications and the manufacturing of everyday products. As a market leader in the supply of industrial minerals, Mineração JUNDU offers high-purity resin coated sands with controlled heavy mineral content. The production process involves specialized equipment that ensures stable physical and chemical characteristics, surpassing the stringent specifications

required by the foundry market. The Resin Coated Sand family covers the following commercial products: AFR-12/20, AFR-16/30, J-30-J, J-50-E, J-50-G, J-50-I, J-50-J, J-50-O, J-50-S, J-50-SS, J-60-J, J-60-S, J-90-E, J-90-G, J-90-J, J-90-O, J-90-S, J-90-SS, J-90-SSS .

By employing superior quality raw materials and utilizing the latest technological generation equipment, Mineração JUNDU produces resin coated sand that meets the most demanding technical specifications. In the foundry industry, resin coated sand is used for core making in the manufacturing of various cast pieces, including automotive engine blocks, agricultural parts, pipe accessories, mining components, railway parts, and wind turbine components. The high purity, low fines content, high sphericity, rounded grains, and near-neutral pH of the sand provide several advantages in mold and core production:

- Improved gas release during casting.
- Better mechanical recovery of molds and cores.
- Reduced mold expansion at high temperatures.
- Versatility in mold and core fabrication.
- Lower costs for cast pieces.

Technical data/physical characteristics

Parameter	Value
Quantity of raw material for 1 ton of product	1 ton
Density	1.65 ton/m³
Packaging for the transportation and distribution	Paper bag, 0.1 ton/ton
Product used for the installation	None

Content declaration

Product	Mass, t	Post-consumer recycled material, mass-% of product	Biogenic material, mass-% of product	Biogenic material, kg C/product
Resin coated sand	1.00	0	0	0
Sum	1.00	0	0	0

Packaging materials	Mass, kg	Mass-% (versus the product)	Biogenic material, kg C/product
High-density polyethylene bag	2	0.1 - 1	0
Kraft paper bag	0.173	0.1 - 1	1.8
Wood pallet	17	1 - 2	4.7
Sum	19.17	1 - 2	6.5

Hazardous substances

All the date of issue of this declaration, there is no “Substance Very High Concern (SVCH)” in concentration above 0.1% by weight, and neither do their packaging, following the European REACH regulation (Registration, Evaluation, Authorization and Restriction of Chemicals).

LCA information

EDP type	**Cradle to grave and module D (A+B+C+D)**
Declared unit	1 ton finished resin coated sand
System boundaries	Cradle to grave and module D
Reference service life (RSL)	1 year
Cut-off rules	Considering all input and outflows in a unit process i.e., considering the value of all flows in the unit process and the corresponding LCI whenever available The use of cut-off criterion on mass inputs and primary energy at the unity process level (1%) and at the information module level (5%) No simplification on the LCI by additional exclusions of material flows Polluter pays principle and modularity principle All inputs and outputs to the manufacturing plants have been included and made clearly. All assumptions regarding the materials and water balances have also been included All hazardous and toxic materials and substances are included in the inventory and the cut-off rules do not apply Care has been taken to include material and energy flows known to have the potential to cause significant emissions into air and water or soil. The long-term emissions haven’t been considered The flows related to human activities such as employee transport and administration activity and related to production of machines and building haven’t been included
Allocations	Allocations criteria are based on mass
Geographical coverage and time period	Scope: Brazil. Data is collected in 2024 from one production site, Descalvado, located in Brazil.
Background data source	Databases from Sphera CUP2024.1 and ecoinvent v.3.9.1 EF Package 3.1
Software	Sphera LCA for experts 10

Description of system boundaries

	Product stage			Construction stage		Use stage							End of life stage				Benefits and loads beyond the system boundaries
	Raw material supply	Transport	Manufacturing	Transport	Construction-Installation process	Use	Maintenance	Repair	Replacement	Refurbishment	Operational energy use	Operational water use	De-construction Demolition	Transport	Waste processing	Disposal	Reuse-recovery
Modules	**A1**	**A2**	**A3**	**A4**	**A5**	**B1**	**B2**	**B3**	**B4**	**B5**	**B6**	**B7**	**C1**	**C2**	**C3**	**C4**	**D**
Modules declared	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Geography	GLO	GLO	BR	BR	BR	BR	BR	BR	BR	BR	BR	BR	BR	BR	BR	BR	BR

System boundaries (X=included, MND=module not declared)

Data quality declaration

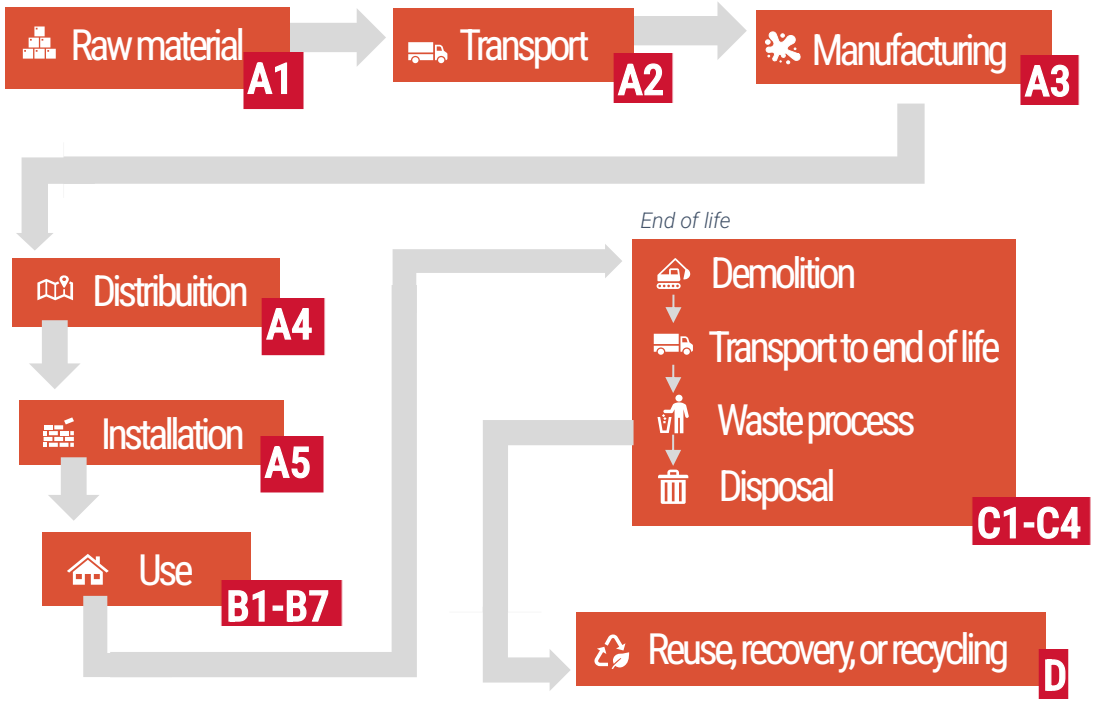
Process	Source type	Source	Reference year	Data category	A1-A3 GWP-GHG [kg CO2 eq.]
Thermal energy	Database	Sphera 2024.2	2023	Primary data	8%
Electricity	Database	Sphera 2024.2 /ecoinvent 3.9.1	2023	Primary data	2%
EPD specific, Dry sand	EPD	S-P-12715	2024	Primary data	8%
Other processes	Database	Sphera 2024.2 /ecoinvent 3.9.1	2023	Secondary data	1%
Total share of primary data					19%

A1-A3 GWP-GHG	19%

The share of primary data is calculated based on GWP-GHG results. It is a simplified indicator for data quality that supports the use of more primary data, to increase the representativeness of and comparability between EPDs. Note that the indicator does not capture all relevant aspects of data quality and is not comparable across product categories.

Life cycle stages

Flow diagram of the life cycle



A1-A3, Product stage

The product stage of the products is subdivided into 3 modules A1, A2 and A3 respectively “Raw material supply”, “transport” and “manufacturing”.

A1, Raw material supply

This module considers the extraction and processing of all raw materials (e.g. resin, sand) and energy which occur upstream to the studied manufacturing process

A2, Transport to the manufacturer

The raw materials are transported to the shell molding facility. The transport is modeled based on average road transport distances using diesel-powered trucks, as this reflects the typical logistics scenario in Brazil

A3, Manufacturing

This module includes the packaging manufacturing, energy consumption and the waste generation during manufacturing, as well as their transport and management. The resin-coating process, including sand preheating, resin application, curing, cooling, and sieving, as

well as the energy and water consumption, waste generation, and their packaging, transport and management.

The aggregation of the modules A1, A2 and A3 is a mandatory considered by the EN 15804 standard. This rule was applied in the present EPD.

Manufacturing process flow diagram

Manufacturing details

The manufacturing process for resin coated sand begins with the precise measurement and mixing of silica sand, resin, catalysts, and additives according to defined specifications. This formulation preparation ensures optimal coating performance and consistency. Next, the silica sand is preheated to a specific temperature to facilitate proper resin adhesion, ensuring uniform coating and the desired mechanical properties.

Following preheating, the sand is combined with thermosetting resin and curing agents in a specialized mixer. This resin coating and mixing process ensures uniform distribution of the resin, coating each grain for enhanced moldability and strength. After the resin is applied, the coated sand is cooled to a temperature that ensures proper curing of the resin. The curing process, typically facilitated by a catalyst, solidifies the resin coating, imparting the desired strength and thermal stability to the sand.

The coated sand then undergoes sieving to remove lumps and oversized particles. It is analyzed and classified based on grain size, resin content, and flowability to ensure compliance with foundry industry standards. The resin-coated sand is stored in silos or bagged to maintain quality and prevent contamination, ensuring product stability before dispatch.

Finally, the resin-coated sand is loaded onto trucks for transportation to customers or further processing facilities, ensuring safe and efficient delivery to its destination.

Electricity information

The electricity used in the model is residual mixes from:

Type of information	Description
Location	Representative of Electricity residual market in Brazil.
Geographical representativeness description	Split of energy sources in Brazil - Coal: 2.0% - Oil: 1.3% - Natural gas: 5.5% - Nuclear: 2.0% - Biofuels: 8.1% - Hydro: 60.2% - Wind: 13.5% - Waste: 0.2% - Solar PV: 7.2%
Reference year	2023
Type data set	Sphera database v2024 Ecoinvent 3.9.1
Source	LCA for Experts database v2024; International Energy Agency – IEA, 2024
GHG-GWP CO2 eq.	0.10 kg CO_2 eq. kWh^{-1}

A4-A5, Construction process

The construction process is divides into two modules: transport to the customer site (A4) and installation (A5).

A4, Transport to the customer site

This module includes the “transportation in bulk” of the product from the production gate to customer sites within Brazil (regional scenario).

The transport scenario is representative of national distribution and is modeled using parameters such as vehicle type, fuel type, fuel consumption, and empty return rate, as detailed in the following table. The transport distance is calculated as a sales-weighted average, based on the volumes sold from each production plant to various customer locations across Brazil during the reference year.

Parameter	Value/description
Fuel type and consumption of vehicle or vehicle type used for transportation e.g., long distance truck, boat, etc.	Average truck trailer (27 t payload) and diesel consumption of 25 liters for 100 km
Distance	430 km
Capacity utilization (including empty returns)	100 % of the capacity in volume

A5, Installation

There is no installation for resin coated sand use. This module includes processing of packaging wastes. There is no use of packaging for resin coated sand.

B1-B5, Use stage

This stage includes any emissions to the environment from the used product (module B1) and technical operations on the product such as maintenance, repair, replacement, and refurbishment (module B2 to B5, respectively).

B1, Use or application of the installed product

This module represents any emissions to the environment from the installed product. In this case, there is no installation for resin coated sand use.

B2, Maintenance; B3, Repair; B4, Replacement; B5, Refurbishment

There is no action or technical operation required during the use stage until the end-of-life stage.

B6-B7, Operation stage

The use stage related to the operation of the building is divided into the operational energy use (module B6) and the operational water use (module B7).

B6, Operational energy use; B7, Operational water use

The resin coated sand is not related to the use of electricity nor water during operation.

C1-C4, End-of-life

This stage includes the different modules of end-of-life C1 to C4 detailed below.

C1, De-construction, demolition

There is no action or technical operation required for de-construction, demolition of the used resin coated sand.

C2, Transport to waste processing

This module includes transport from the resin coated sands used on site to the waste processing.

C3, Waste processing for reuse, recovery and/or recycling

The resin coated sand is considered landfilled.

C4, Disposal

The resin coated sand is assumed to be 100% landfilled.

Parameter	Value/description
Collection process specified by type	1 ton of the product is collected alongside any mixed construction waste and sent to landfill
Disposal specified by type	1 ton of the product are landfilled
Assumptions for scenario development (e.g., transportation)	The waste going to landfill is transported 100 km by truck from deconstruction/demolition sites to landfill.

D, Benefits and loads beyond the system boundary

Module D accounts for potential environmental benefits and burdens from the reuse, recycling, or energy recovery of materials beyond the system boundary. In this study, the net balance between recycled input and output to recycling is zero, resulting in no net benefit or burden being declared in Module D.

Environmental performance

As specified in EN 15804:2012+A2:2019/AC:2021 and the Product-Category Rules, the environmental impacts are declared and reported using the baseline characterization factors based on EF 3.1. Raw materials and energy consumption, as well as transport distances have been taken directly from the manufacturing plant.

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.

The results of the end-of-life stage (modules C1-C4) should be considered when using the results of the product stage (modules A1-A3).

Disclaimer 1: The results of this environmental impact indicator shall be used with care as the uncertainties on these results are high or as there is limited experienced with the following indicators:

- Resource use, mineral and metals [kg Sb eq.]
- Resource use, energy carriers [MJ]
- Water deprivation potential [m^3 world equiv.]
- Land use [Pt]
- Human toxicity (cancer) [CTUh]
- Human toxicity(noncancer) [CTUh]
- Ecotoxicity (freshwater [CTUe]

Disclaimer 2: The impact category Ionizing radiation, human health [kBq U235 eq.] 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 material is also not measured by this indicator.

Disclaimer 3: The product is considered to be 100% landfilled post useful service life.

Disclaimer 4: The assumptions for the modules are in accordance with the project report (LCA study).

The following non-mandatory additional environmental indicators are not declared:

- Ecotoxicity freshwater [CTUe]
- Particulate Matter emissions [Disease incidence]
- Cancer human health effects [CTUh]
- Ionizing radiation - human health [kBq U235 eq.]
- Non-cancer human health effects [CTUh]
- Land Use [Pt].

Results refer to a declared unit to 1 ton finished Resin Coated Sand.

Environmental impacts

	Environmental indicators	Product stage	Construction stage		Use stage							End of life stage				Reuse, Recovery Recycling
		A1 / A2 / A3	A4 Transport	A5 Installation	B1 Use	B2 Maintenance	B3 Repair	B4 Replacement	B5 Refurbishment	B6 Operational energy use	B7 Operational water use	C1 Deconstruction / demolition	C2 Transport	C3 Waste processing	C4 Disposal	D Reuse, recovery, recycling
	Climate Change [kg CO2 eq.]	1.35E+02	2.93E+01	2.45E+01	0	0	0	0	0	0	0	0	8.14E+00	0	2.02E+02	0
	Climate Change (fossil) [kg CO2 eq.]	1.59E+02	2.60E+01	5.11E-01	0	0	0	0	0	0	0	0	7.21E+00	0	2.00E+02	0
	Climate Change (biogenic) [kg CO2 eq.]	-2.40E+01	0	2.40E+01	0	0	0	0	0	0	0	0	0	0	0	0
	Climate Change (land use change) [kg CO2 eq.]	3.33E-01	3.34E+00	1.54E-02	0	0	0	0	0	0	0	0	9.25E-01	0	2.21E+00	0
	Ozone depletion [kg CFC-11 eq.]	6.13E-06	8.83E-13	8.83E-09	0	0	0	0	0	0	0	0	2.44E-13	0	3.95E-06	0
	Acidification terrestrial and freshwater [Mole of H+ eq.]	6.60E-01	2.20E-02	2.21E-03	0	0	0	0	0	0	0	0	6.46E-03	0	8.22E-01	0
	Eutrophication freshwater [kg P eq.]	3.37E-02	2.72E-04	5.40E-05	0	0	0	0	0	0	0	0	7.52E-05	0	8.66E-02	0
	Eutrophication marine [kg N eq.]	1.43E-01	1.27E-02	1.26E-02	0	0	0	0	0	0	0	0	3.71E-03	0	2.04E-01	0
	Eutrophication terrestrial [Mole of N eq.]	1.44E+00	1.04E-01	6.90E-03	0	0	0	0	0	0	0	0	3.09E-02	0	2.06E+00	0
	Photochemical ozone formation - human health [kg NMVOC eq.]	6.32E-01	2.34E-02	4.74E-03	0	0	0	0	0	0	0	0	6.83E-03	0	1.01E+00	0
	Resource use, mineral and metals [kg Sb eq.][1]	9.98E-04	1.21E-06	7.35E-07	0	0	0	0	0	0	0	0	3.35E-07	0	2.89E-04	0
	Resource use, energy carriers [MJ][1]	3.69E+03	3.33E+02	6.44E+00	0	0	0	0	0	0	0	0	9.22E+01	0	2.88E+03	0
	Water deprivation potential [m³ world equiv.][1]	7.88E+01	1.04E-01	1.98E-01	0	0	0	0	0	0	0	0	2.86E-02	0	4.23E+01	0

[1] The results of this environmental impact indicator shall be used with care as the uncertainties on these results are high or as there is limited experienced with the indicator

Resources use

	Resources Use indicators	Product stage	Construction stage		Use stage							End of life stage				D Reuse, recovery, recycling
		A1 / A2 / A3	A4 Transport	A5 Installation	B1 Use	B2 Maintenance	B3 Repair	B4 Replacement	B5 Refurbishment	B6 Operational energy use	B7 Operational water use	C1 Deconstruction / demolition	C2 Transport	C3 Waste processing	C4 Disposal	D Reuse, recovery, recycling
	Use of renewable primary energy (PERE) [MJ]	7.78E+02	3.53E+01	3.06E-01	0	0	0	0	0	0	0	0	9.78E+00	0	7.92E+02	0
	Primary energy resources used as raw materials (PERM) [MJ]	2.69E-01	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Total use of renewable primary energy resources (PERT) [MJ]	7.79E+02	3.53E+01	3.06E-01	0	0	0	0	0	0	0	0	9.78E+00	0	7.92E+02	0
	Use of non-renewable primary energy (PENRE) [MJ]	3.69E+03	3.33E+02	6.44E+00	0	0	0	0	0	0	0	0	9.22E+01	0	2.88E+03	0
	Non-renewable primary energy resources used as raw materials (PENRM) [MJ]	5.35E-02	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Total use of non-renewable primary energy resources (PENRT) [MJ]	3.69E+03	3.33E+02	6.44E+00	0	0	0	0	0	0	0	0	9.22E+01	0	2.88E+03	0
	Input of secondary material (SM) [kg]	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Use of renewable secondary fuels (RSF) [MJ]	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Use of non-renewable secondary fuels (NRSF) [MJ]	3.43E-26	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Use of net fresh water (FW) [m3]	2.79E+00	3.16E-02	4.75E-03	0	0	0	0	0	0	0	0	8.75E-03	0	9.85E-01	0

Waste category & Output flows

		Product stage	Construction stage		Use stage							End of life stage				D Reuse, recovery, recycling
	Waste Category & Output Flows	A1 / A2 / A3	A4 Transport	A5 Installation	B1 Use	B2 Maintenance	B3 Repair	B4 Replacement	B5 Refurbishment	B6 Operational energy use	B7 Operational water use	C1 Deconstruction / demolition	C2 Transport	C3 Waste processing	C4 Disposal	D Reuse, recovery, recycling
	Hazardous waste disposed (HWD) [kg]	4.11E+00	5.36E-09	2.06E-05	0	0	0	0	0	0	0	0	1.48E-09	0	1.00E+03	0
	Non-hazardous waste disposed (NHWD) [kg]	8.59E+01	5.18E-02	1.86E+01	0	0	0	0	0	0	0	0	1.43E-02	0	0	0
	Radioactive waste disposed (RWD) [kg]	1.70E-03	7.19E-05	4.57E-06	0	0	0	0	0	0	0	0	1.99E-05	0	0	0
	Components for re-use (CRU) [kg]	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Materials for Recycling (MFR) [kg]	6.92E-05	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Material for Energy Recovery (MER) [kg]	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Exported electrical energy (EEE) [MJ]	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Exported thermal energy (EET) [MJ]	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Additional voluntary indicators from EN 15804

		Product stage	Construction stage		Use stage							End of life stage				Reuse, Recovery Recycling
	Environmental indicators	A1 / A2 / A3	A4 Transport	A5 Installation	B1 Use	B2 Maintenance	B3 Repair	B4 Replacement	B5 Refurbishment	B6 Operational energy use	B7 Operational water use	C1 Deconstruction / demolition	C2 Transport	C3 Waste processing	C4 Disposal	D Reuse, recovery, recycling
	Climate Change [kg CO2 eq.][2]	1.44E+02	2.59E+01	6.01E+00	0	0	0	0	0	0	0	0	7.17E+00	0	1.97E+02	0

Information on biogenic carbon content

	Biogenic Carbon Content	Product stage A1 / A2 / A3
	Biogenic carbon content in product [kg]	0
	Biogenic carbon content in packaging [kg]	6.5

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

[2] The indicator includes all greenhouse gases included in GWP-GHG but excludes biogenic carbon dioxide uptake and emissions and biogenic carbon stored in the product. This indicator is thus almost equal to the GWP-GHG indicator originally defined in EN 15804:2012+A1:2013.

Version History

This document represents the first and original version of the EPD for 1 ton of Resin Coated Sand with a useful life of 1 year. It was officially issued on 5th August 2025. This version is valid for a period of five years from the version date, unless significant changes to the product or its manufacturing process occur that would warrant an earlier update. Any future revisions or updates to this EPD will be clearly documented and version-controlled to ensure transparency and traceability.

Additional information

Data quality

Inventory data quality is judged by geographical, temporal, and technological representativeness. To cover these requirements and to ensure reliable results, first-hand industry data crossed with LCA background datasets were used. The data was collected from internal records and reporting documents from Mineração JUNDU. After evaluating the inventory, according to the defined ranking in the LCA report, the assessment reflects good inventory data quality for the geographical representation, good for technological and very good for temporal representation.

Abbreviations

DU	Declared unit
EPD	Environmental Product Declaration
eq.	equivalents
FU	Functional unit
EF	Environmental Footprint
kg	kilogram
kWh	kilowatt-hour
L	liter
LCA	Life Cycle Assessment
LCI	Life Cycle Inventory Analysis
LCIA	Life Cycle Impact Assessment
MJ	Mega Joules (as Net Calorific Value)
PCR	Product Category Rules
RSL	Reference Service Life (in years)
ton	metric ton

References

ISO 14040:2006: Environmental Management - Life Cycle Assessment-Principles and framework.

ISO 14044:2006: Environmental Management - Life Cycle Assessment-Requirements and guidelines.

ISO 14025:2006: Environmental labels and Declarations-Type III Environmental Declarations-Principles and procedures.

EN 15804:2012+A2:2019/AC:2021- Sustainability of construction works - Environmental product declarations - Core rules for the product category of construction products.

EPD International. General Programme Instructions (GPI) for the International EPD® System Version 4.0 http://www.environdec.com/.

EPD International (2025) General Programme Instructions for the International EPD System. Version 5.0.1. www.environdec.com.

The International EPD System PCR 2019:14 Construction products and Construction services. Version 2.0.1.

Mineração JUNDU (2024). Environmental Product Declaration – Dry Sand. Version 1, published 2024-02-29. In accordance with ISO 14025 and EN 15804:2012+A2:2019/AC:2021. The International EPD® System. Registration number: S-P-12715.

LCA report for the verification of the Environmental Product Declaration of Shell Molding Products – Resin Coated Sand - Mineração JUNDU (2025, Version 1)