GlobalEPD

A VERIFIED ENVIRONMENTAL DECLARATION

AENOR

ECO PLATFORM EPD VERIFIED

Natural Stone Slabs
BK and Génesis Varieties

Environmental
Product
Declaration

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Piedra Paloma

The holder of this Declaration is responsible for its content, as well as for keeping the supporting documentation that justifies the data and statements included, throughout the validity period.

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The European Standard UNE-EN 15804:2012+A2:2020 serves as the basis for this EPD
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1. General information

1.1. The organization

Piedra Paloma S.L.U. is a company dedicated to the commercialization of natural stone extracted from our own quarries.

We have been creating unique natural spaces for over 30 years and meeting the needs of architects, designers, and clients seeking valuable solutions.

We are one of the most recognized and prestigious companies in the natural stone industry, thanks to the beauty and quality of our materials.

The Calatorao quarry is located in the province of Zaragoza. The limestone we extract from our Calatorao quarry is predominantly black, with black sections and various shades of red, green, gold, and white, resulting in the BK and Genesis varieties.

Piedra Paloma's facilities hold various certifications and recognitions that support our commitment to sustainability in managing all of our processes:

- UNE-EN-ISO 9001:2015, Registration No. ER-0419/2016
- UNE-EN-ISO 14001:2015, Registration No. GA-2016/0165
- CE Marking

1.2. Scope of the declaration

This Environmental Product Declaration provides environmental information regarding the life cycle of natural stone slabs produced at the Piedra Paloma plant in Pedrera (Sevilla), within the Spanish geographic and technological context during the year 2023.

The natural stone slabs are used as cladding, both interior and exterior, in the construction of buildings and unique architectural works. The ornamental characteristics of natural stone make it highly valued by architects and interior designers.

The scope of the EPD is from cradle to gate, including modules C1-C4 and module D.

1.3. Life cycle and compliance

This EPD has been developed and verified in accordance with the UNE-EN ISO 14025:2010 and UNE-EN 15804:2012+A2:2020 standards and their amendments, and includes the following life cycle stages:

System boundaries. Information modules considered.

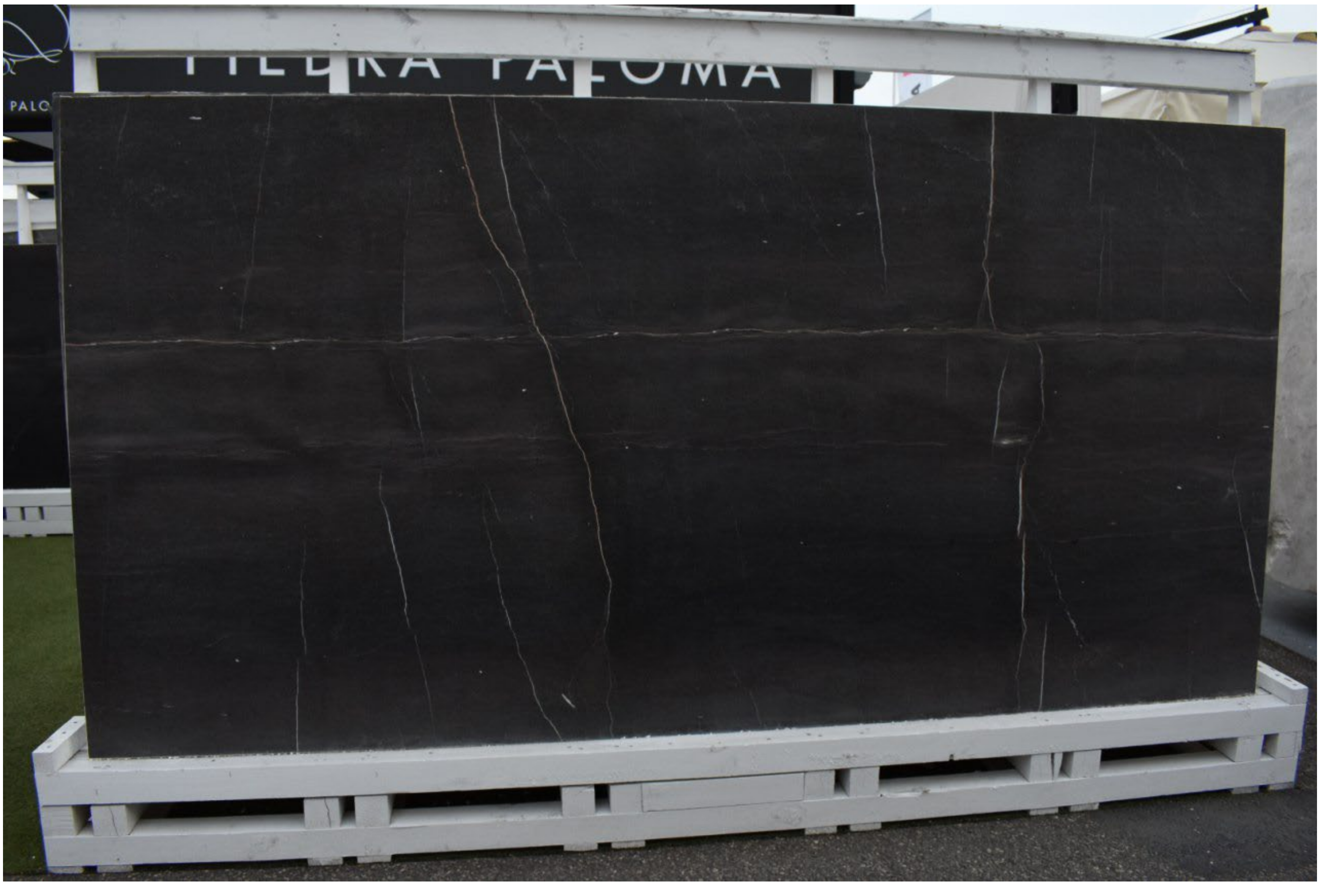
Product stage	A1	Supply of raw materials	X
	A2	Transport to factory	X
	A3	Manufacturing	X
Construction Stage	A4	Transport to site	MNE
	A5	Installation / construction	MNE
Use Stage	B1	Use	MNE
	B2	Maintenance	MNE
	B3	Repair	MNE
	B4	Replacement	MNE
	B5	Rehabilitation	MNE
	B6	Energy use in service	MNE
	B7	Water use in service	MNE
End of life	C1	Deconstruction / demolition	X
	C2	Transport	X
	C3	Waste treatment	X
	C4	Disposal	X
	D	Potential for reuse, recovery, and/or recycling	X

X = Module included in the LCA; NR = Module not relevant; MNE = Module not evaluated

This EPD may not be comparable with those developed in other Programs or according to different reference documents, specifically it may not be comparable with EPDs not developed in accordance with the UNE-EN 15804+A2 standard.

Similarly, EPDs may not be comparable if the data source is different (e.g., databases), if all relevant information modules are not included, or if they are not based on the same scenarios.

The comparison of construction products should be done on the same function, applying the same functional unit and at the building (or architectural or engineering project) level, meaning including the product's performance throughout its entire life cycle, as well as the specifications outlined in section 6.7.2 of the UNE-EN ISO 14025 standard.



2. The product

2.1. Product identification

BK and Genesis are two varieties of natural limestone extracted from the Calatorao quarry, composed of 99% calcite, along with accessory components from other minerals.

The BK variety is characterized by its different shades of black, reddish, and golden tones:

- BK Kafé, where black is the predominant color, with frequent white and pink veining.
- BK Devil, where reddish tones take center stage.
- BK Gold, where the intensity of black and the straightness of gold come together in a unique material.

The **Genesis** variety contrasts with this heterogeneity, prioritizing homogeneity at each of its stages. The new extraction method results in a homogeneous phase characterized by horizontal bands in red, green, and gold.

The product classification according to the United Nations Central Product Classification (CPC) is as follows:

UN CPC code: 15120.

2.2. Product performance

The manufacturer declares the following information about the product's technical specifications:

Characteristc	Value	Unit
Density:	2.650	kg/m^3
Open porosity:	1.0	%
Flexural strength:	19,8	MPa
Breaking Load at dowel hole:	2.450	N

Table 2. Product characteristics

2.3. Product composition

The composition of the natural stone slabs declared by the manufacturer is as follows:

Sustance	Content	Unit
Calcium carbonate	99	%
Other materials	1	%

Table 3. Product composition

The following table shows the packaging material used on average for the distribution of the product per m² of natural stone slab:

Packaging Material	Content	Unit
Wood	0,768	kg
Polyethylene	0,004	kg
PET	0,003	kg
FOAM	0,003	kg
Polystyrene	0,001	kg

Table 4. Packaging material per ton of product

No substances considered hazardous, as listed in the "Candidate List of Substances of Very High Concern (SVHC) for authorization," or subject to other regulations, have been used in manufacturing.

3. Life cycle assessment (LCA) information

3.1. Life cycle analysis

Life Cycle Analysis (LCA) report supporting this EPD has been developed by Sinergy, based on specific data provided by Piedra Paloma for the production process of natural stone slabs at their Pedrera plant, corresponding to the year 2023. [12] LCA Report Natural Stone Slabs. Piedra Paloma. February 2025. V01.

For the calculation of environmental impacts and indicators, SimaPro 9.6 software was used, along with the Ecoinvent 3.10 database.

The life cycle analysis (LCA) has a "cradle to gate" scope, with modules C1-C4 and module D.

3.2. Declared unit

The declared unit is defined as **1 m²** of natural stone slab, as the purpose of the slab is surface cladding, and the m² is the characteristic parameter of this function, as well as the one commonly used in production processes, as well as in marketing and product application.

3.3. Allocation criteria

Where possible, allocation has been avoided. For processes shared between different varieties of natural stone, allocation rules based on m² produced have been applied.

In quantifying material and energy flows, cut-off criteria in accordance with EN 15804 +A2 have been applied. In this way, material flows that are less than 1% of the total mass of inputs and outputs can be excluded, unless their environmental relevance is significant. Similarly, energy flows less than 1% of the total energy of inputs and outputs can be excluded, unless their environmental relevance is significant.

In any case, the sum of the excluded flows does not exceed 5% of the mass, energy, or total environmental impact. The cut-off criteria have not been applied to omit data with significant impacts.

3.4. Representativeness, quality and selection of data

The data used for the LCA are representative of the natural stone extraction technologies at the source quarries and the production of natural stone slabs at the Piedra Paloma plant in Pedrera, as well as the technologies and processes involved in the different life cycle stages analyzed.

Specific data for the extraction and production processes of natural stone slabs cover the entire year of 2023 and have been provided by PiedraPaloma.For generic data sources, SimaPro 9.6 software along with the Ecoinvent 3.10 database has been used. Generic data are representative of a period within the last 10 years.

The geographical scope of the data reflects the operational reality of the different phases of the life cycle analyzed.

Following the quality data criteria of the product category rules for environmental footprint and considering that the processes are representative of the declared geographical area, that the technological aspects are very similar without the need for significant technical adjustments, and that the data is less than 3 years old, the data quality level is considered good.

3.5. Other calculation rules and assumptions

The GWP of the electricity mix applied specifically for A1-A3 is 0.39 kg CO2e/kWh. For the determination of the impacts associated with electricity consumption in the manufacturing stage, the energy mix of each supplier has been modeled, without using grid electricity (GdO).

The GWP of the gas mix applied specifically for A1-A3 is 0.1 kg CO2e/MJ.

4. System boundaries, scenarios, and additional technical information

4.1. Pre-manufacturing processes

Module A1 includes the extraction and processing of raw materials, as well as the generation of imported electrical energy consumed during the product manufacturing processes.

Quarry production is carried out by forming bench levels at different heights, progressing as extraction continues. The natural stone is extracted in block form using cutting and tipping processes at the quarry benches.

In addition to the blocks, limestone waste generated from cutting and tipping is commercialized as a by-product for riprap applications.

Raw blocks are subjected to monowire cutting machines to obtain prismatic shapes with regular faces. Module A2 includes the transportation of materials to the production plant.

Cutting and finishing facilities are located at the Matagallar quarry, requiring the transportation of blocks from Calatorao to these facilities by road.

4.2. Product manufacturing

Module A3 covers the production processes of natural stone slabs at the Piedra Paloma facilities.

Blocks are cut using frame saws and multi-wire machines to produce stone slabs.

These slabs undergo further transformation, including polishing, surface finishing, and cutting to produce slabs in various sizes.

Slabs from Calatorao undergo an intermediate structural reinforcement process using fiberglass mesh and resin application before polishing.

The slabs are then polished, followed by robotic cutting machines that cut the slabs to the required dimensions.

Water is used in the cutting and polishing processes to prevent dust emissions and act as a coolant. The primary water source is rainwater collected at the quarry, supplemented by well water if necessary.

Water is treated in a closed circuit, where dust is removed and recovered for use as aggregate.

Quarry material handling machinery uses diesel fuel, while cutting, polishing, and resin application machinery, as well as overhead cranes for slab movement, use electric power.

Matagallar has photovoltaic power generation facilities used for self-consumption in cutting and finishing processes.

The slabs are packed in wooden crates, placed on pallets, and protected with plastic sheeting. For container transport, wooden structures (bundles) are used as protective and securing elements.

4.3. End of life stage

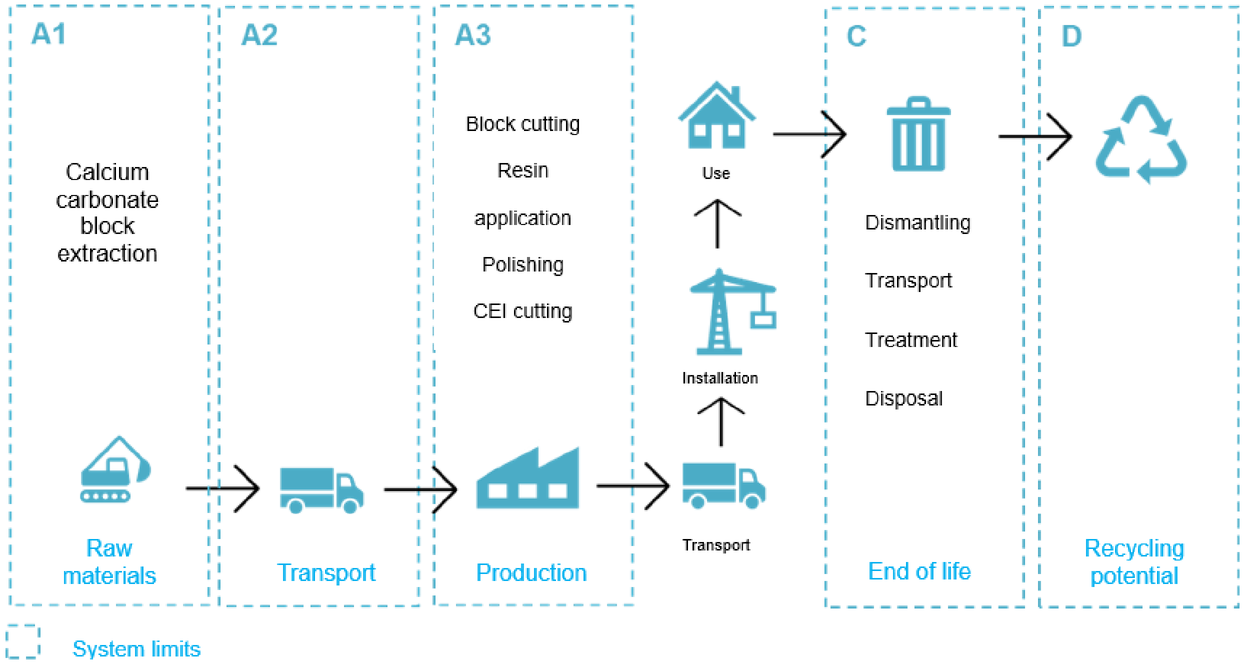
For Modules C1-C4, the following assumptions and scenarios have been considered:

- C1: The dismantling or demolition of the product from the building is assumed to be done alongside other structural materials, with on-site material classification.
- C2: A transport distance of 150 km from the dismantling site to the treatment or final disposal plant is considered.
- C3: 70% of the material is assumed to be processed for recycling into filling material or other uses, in accordance with Law 7/2022.
- C4: The remaining 30% of the material is considered to be disposed of in an inert landfill.

4.4. Benefits and burdens beyond the system boundaries

Module D: it is assumed that recovered material can be reused in filling applications or other uses, replacing an equivalent quantity of calcium carbonate aggregate extracted from a quarry. This avoids the potential environmental impacts associated with quarry extraction.

The benefit calculation is based on the impacts associated with the replaced material, assuming a 5% material loss. The impacts of the crushing process (necessary to make the recovered material functionally similar to the replaced material) are deducted from the benefits.


A1
Calcium carbonate block extraction
Raw materials
A2
Transport
A3
Block cutting
Resin
application
Polishing
CEI cutting
Production
Transport
Installation
Use
C
Dismantling
Transport
Treatment
Disposal
End of life
D
Recycling potential
System limits

5. Declaration of the environmental parameters of the LCA and LCI.

1m^2 Piedra BK / Génesis

Environmental impacts

The estimated impact results are relative and do not indicate the final value of the impact categories, nor do they refer to threshold values, safety margins, or risks.

Parameter	Units	A1	A2	A3	A1-A3	C1	C2	C3	C4	D
GWP-total	kg CO_2 eq	5,62E+00	1,08E-06	1,08E-01	5,73E+00	1,79E-01	1,05E+00	3,77E-01	4,16E-02	-7,42E-02
GWP-fossil	kg CO_2 eq	5,36E+00	1,08E-06	1,20E+00	6,56E+00	1,79E-01	1,05E+00	3,75E-01	4,15E-02	-7,41E-02
GWP-biogenic	kg CO_2 eq	2,56E-01	7,38E-10	-1,09E+00	-8,37E-01	2,76E-05	3,40E-04	2,09E-03	1,19E-04	-4,45E-05
GWP-luluc	kg CO_2 eq	3,89E-04	3,52E-10	1,81E-03	2,20E-03	6,15E-06	2,55E-05	1,47E-04	2,17E-06	-1,03E-08
ODP	kg CFC11 eq	5,64E-08	2,14E-14	4,26E-08	9,90E-08	2,81E-09	2,12E-08	7,62E-09	6,57E-10	-1,04E-09
AP	mol H^+ eq	1,83E-02	3,37E-09	6,55E-03	2,49E-02	1,67E-03	2,51E-03	2,75E-03	3,80E-04	-1,78E-03
EP-freshwater	kg P eq	5,40E-05	8,28E-12	5,52E-05	1,09E-04	1,69E-07	8,71E-07	6,18E-06	5,21E-08	5,02E-08
EP-marine	kg N eq	4,79E-03	1,12E-09	1,65E-03	6,44E-03	7,85E-04	9,50E-04	1,05E-03	1,78E-04	-6,43E-04
EP-terrestrial	mol N eq	5,25E-02	1,23E-08	1,84E-02	7,09E-02	8,61E-03	1,04E-02	1,15E-02	1,95E-03	-9,11E-03
POCP	Kg NMVOC eq	1,80E-02	5,27E-09	6,96E-03	2,50E-02	2,56E-03	4,40E-03	3,67E-03	5,83E-04	-1,99E-03
ADP-minerals& metals [2]	kg Sb eq	2,69E-06	3,44E-12	2,28E-05	2,55E-05	7,47E-09	3,43E-08	2,95E-08	1,72E-09	-2,36E-07
ADP-fossil [2]	MJ	6,36E+01	1,24E-06	5,00E+00	6,86E+01	2,52E-02	1,37E-01	8,31E-01	6,77E-03	2,90E-02
WDP [2]	m^3 worl eq depriv	2,37E+00	6,20E-08	4,06E+00	6,43E+00	1,86E-03	5,83E-03	-8,33E-01	4,34E-04	-8,70E-03

The **Global Warming Potential (GWP - total)** represents the overall impact on climate change, while the **GWP - fossil**specifically accounts for emissions from fossil fuels, and the **GWP - biogenic** reflects the contribution from biogenic sources. The **GWP - luluc** considers emissions resulting from land use and land-use change. The **Ozone Depletion Potential (ODP)** measures the impact on the stratospheric ozone layer. The **Acidification Potential (AP)** indicates the accumulation of acidifying substances. The **Eutrophication Potential** is divided into **EP-freshwater**, which quantifies the fraction of nutrients reaching freshwater, **EP-marine**, which accounts for nutrients in marine environments, and **EP-terrestrial**, which represents the accumulated surplus affecting land ecosystems. The **Photochemical Ozone Creation Potential (POCP)** assesses the formation of tropospheric ozone. The **Abiotic Depletion Potential** is categorized into **ADP-minerals & metals**, addressing the depletion of non-fossil abiotic resources, and **ADP-fossil**, which evaluates the depletion of fossil resources. The **Water Deprivation Potential (WDP)** measures the weighted consumption of deprived water resources. Finally, **NR (Not Relevant)** is used when a specific category does not apply.

Additional environmental impacts

Parameter	Units	A1	A2	A3	A1-A3	C1	C2	C3	C4	D
PM	Disease incidence	1,75E-07	8,42E-14	9,62E-08	2,71E-07	4,42E-07	5,83E-08	3,35E-07	1,11E-08	-2,86E-08
IRP [1]	kBq U235 eq	1,24E+00	6,90E-09	2,61E-02	1,26E+00	2,10E-04	1,87E-03	1,01E-02	7,19E-05	9,24E-04
ETP-fw [2]	CTUe	5,59E+00	4,06E-06	2,58E+01	3,14E+01	8,14E-02	4,32E-01	1,18E+00	1,90E-02	-1,07E+00
HTP-c [2]	CTUh	6,94E-09	7,52E-15	1,06E-08	1,75E-08	1,25E-11	7,42E-11	1,14E-10	2,99E-12	-4,59E-10
HTP-nc [2]	CTUh	1,36E-08	9,42E-15	1,87E-08	3,23E-08	1,77E-10	5,88E-09	3,18E-09	4,59E-11	-2,27E-10
SQP [2]	-	1,86E+01	8,99E-06	1,18E+02	1,37E+02	4,99E-03	3,07E-02	3,67E+00	6,72E-01	-5,35E-01

PM: Potential disease incidence due to particulate matter emissions (PM). **IRP:** Human exposure efficiency potential relative to U235. **ETP-fw:** Comparative toxic unit potential for ecosystems - freshwater. **HTP-c**: Comparative toxic unit potential for ecosystems - cancer effects**. HTP-nc:** Comparative toxic unit potential for ecosystems - non-cancer effects. **SQP**: Soil quality potential index. **NR:** Not relevant.

Notice 1: This impact category primarily addresses the potential effects of low-dose ionizing radiation exposure on human health from the nuclear fuel cycle. It does not consider effects due to possible nuclear accidents or occupational exposure from the disposal of radioactive waste in underground facilities. Ionizing radiation potential from radon or certain construction materials is also not measured under this parameter.

Notice 2: The results of this environmental impact indicator should be used with caution, as uncertainties are high and experience with this parameter is limited.

Resource use

Parameter	Units	A1	A2	A3	A1-A3	C1	C2	C3	C4	D
PERE	MJ	2,37E+00	5,76E-08	2,13E+01	2,37E+01	6,00E-04	5,97E-03	3,89E-02	1,26E-02	-4,23E-02
PERM	MJ	0,00E+00	0,00E+00	4,34E-02	4,34E-02	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
PERT	MJ	2,37E+00	5,76E-08	2,13E+01	2,37E+01	6,00E-04	5,97E-03	3,89E-02	1,26E-02	-4,23E-02
PENRE	MJ	6,36E+01	1,24E-06	2,47E-01	6,38E+01	2,52E-02	1,37E-01	8,30E-01	6,77E-03	2,89E-02
PENRM	MJ	0,00E+00	0,00E+00	4,76E+00	4,76E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
PENRT	MJ	6,36E+01	1,24E-06	5,00E+00	6,86E+01	2,52E-02	1,37E-01	8,30E-01	6,77E-03	2,89E-02
SM	kg	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
RSF	MJ	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
NRSF	MJ	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
FW	m^3	3,25E-02	2,07E-09	6,28E-02	9,53E-02	7,37E-05	3,52E-04	-1,73E-02	2,12E-05	-2,83E-03

PERE: Use of renewable primary energy excluding renewable primary energy used as raw material. **PERM**: Use of renewable primary energy used as raw material. **PERT**: Total renewable primary energy use. **PENRE**: Use of non-renewable primary energy excluding non-renewable primary energy used as raw material. **PENRM**: Use of non-renewable primary energy used as raw material. **PENRT**: Total non-renewable primary energy use. **SM**: Use of secondary materials. **RSF**: Use of renewable secondary fuels. **NRSF**: Use of non-renewable secondary fuels. **FW**: Net use of fresh water resources. **NR**: Not relevant.

Waste categories

Parameter	Units	A1	A2	A3	A1-A3	C1	C2	C3	C4	D
HWD	kg	5,84E-04	3,74E-10	3,44E-03	4,02E-03	1,76E-05	1,01E-04	8,01E-04	6,44E-06	-2,60E-05
NHWD	kg	5,51E-02	7,17E-07	1,04E-01	1,59E-01	6,73E-05	4,08E-04	6,46E+00	1,59E+01	-2,05E-03
RWD	kg	7,78E-04	4,82E-12	1,91E-05	7,98E-04	1,20E-07	1,29E-06	8,04E-06	4,18E-08	9,27E-07

HWD: Hazardous waste disposed of. **NHWD**: Non-hazardous waste disposed of. **RWD**: Radioactive waste disposed of. **NR**: Not relevant.

Output flows

Parameter	Units	A1	A2	A3	A1-A3	C1	C2	C3	C4	D
CRU	kg	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
MFR	kg	0,00E+00	0,00E+00	4,50E+00	4,50E+00	0,00E+00	0,00E+00	3,71E+01	0,00E+00	0,00E+00
MER	kg	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
EE	MJ	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00

CRU: Components for reuse. **MFR**: Materials for recycling. **MER**: Materials for energy recovery. **EE**: Exported energy. **NR**: Not relevant.

Biogenic carbon content

Biogenic Carbon Content	Units	Declared functional unit result
Biogenic carbon content in product	Kg C	0,00E+00
Biogenic carbon content in packaging	Kg C	3,84E-01

References

[1] General Instructions of GlobalEPD Programme 3rd revision (09-10-2023)

[2] UNE-EN ISO 14025:2010 Environmental labels and declarations Tpye III engironmental delcarations. Principles and procedures (ISO 14025:2006).

[3] UNE-EN 15804:2012+A2:2020 Sustainability of construction Works. Environmental product declarations. Core rules for the product category of contruction.

[4] UNE-EN ISO 14040. Environmental managment. Life cycle assesment. Principles and frame work. (ISO 14040:2006).

[5] UNE-EN ISO 14044. Environmental managment. Life cycle assesment. Requirements and guidelines (ISO 14044:2006).

[6] Informe de ensayo. Piedra natural (Calatorao) – Estudio petrográfico. Centro tecnológico del mármol. 2021.

[7] Informe de ensayo. Piedra natural (Calatorao) – Densidad aparente y porosidad abierta. Centro tecnológico del mármol. 2021.

[8] Informe de ensayo. Piedra natural (Calatorao) – Resistencia a la flexión. Centro tecnológico del mármol. 2021

[9] Informe de ensayo. Piedra natural (Calatorao) – Resistencia a la flexión. Centro tecnológico del mármol. 2021

[10] Informe de ensayo. Piedra natural (Calatorao) – Carga de rotura para anclajes. Centro tecnológico del mármol. 2021.

[11] Norma EN 16449. Madera y productos derivados de la madera.

[12] Informe ACV Placas de piedra natural. Piedra Paloma. Febrero 2025. V01

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