DAPHabitat System

www.daphabitat.pt

ENVIRONMENTAL PRODUCT DECLARATION

[according to ISO 14025, EN 15804:2012+A1:2013 and EN 15942]

Registration Number: DAP 001:2022

Slabs for façade claddings and for interior claddings and flooring in natural *semi-rijo* limestone: *Branco Real, Branco do Mar, Branco Snow, Branco Imperial, Branco Ártico* and *Branco Oriental*

ISSUE DATE: 17/01/2022 **VALID UNTIL: 16/01/2027**

SOLANCIS — SOCIEDADE EXPLORADORA DE PEDREIRAS, S.A.

VERSION 1.1. EDITION JULY 2015

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GENERAL INFORMATION

1.1. The DAPHabitat System

Program operator:	Associação Plataforma para a Construção Sustentável www.centrohabitat.net centrohabitat@centrohabitat.net
Address:	Departamento Engenharia Civil Universidade de Aveiro 3810-193 Aveiro
Email address:	deptecnico@centrohabitat.net
Telephone number:	(+351) 234 401 576
Website:	www.daphabitat.pt
Logo:	

1.2. EPD owner

Name of the owner:	SOLANCIS — Sociedade Exploradora de Pedreiras, S.A.
Production site:	Rua da Sindocal, 22, Casal do Carvalho, 2475-016 – Benedita- Portugal
Address (head office):	Rua da Sindocal, 22, Casal do Carvalho, 2475-016 – Benedita- Portugal
Telephone:	Eng.º Marco Aniceto: +351 262 925 080
E-mail:	marco.aniceto@solancis.com
Website:	http://www.solancis.com
Logo:	
Information concerning the applicable management Systems:	SOLANCIS has an integrated quality, environment, health and safety management system implemented, following the ISO 9001:2015, EN ISO 14001:2015 and ISO 45001:2018 standards. This management system meets the requirements of the StonePT (Premium) and StonePT – Green specifications for the Extraction + Primary Transformation + Secondary Transformation activities. All its products thus benefit from the procedures associated with the quality and environment control system.
Specific aspects regarding the production:	SIC Code 23701 – Manufacture of marble, and of similar stones, articles
Organization's environmental policy:	

1.3. Information concerning the EPD

Authors:	CERIS - Civil Engineering Research and Innovation for Sustainability, José Dinis Silvestre
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Emission date:	17/01/2022
Registration date:	08/03/2022
Registration number:	DAP 001:2022
Valid until:	16/01/2027
Representativity of the EPD (location, manufacturer, group of manufacturers):	This is the cradle-to-gate EPD of one (1) product produced in one (1) industrial unit belonging to a single producer (SOLANCIS — Sociedade Exploradora de Pedreiras, S.A.).
Where to consult explanatory material:	www.solancis.com
Type of EPD:	

1.4. Demonstration of the verification

External independent verification, accordingly with the standard ISO 14025:2009 and EN 15804:2012+A1:2013

Certification Body	**Verifier (s)**
(CERTIF – Associação para a Certificação)	(Marisa Almeida)

1.5. EPD Registration

Program Operator
(Plataforma para a Construção Sustentável)

1.6. PCR of reference

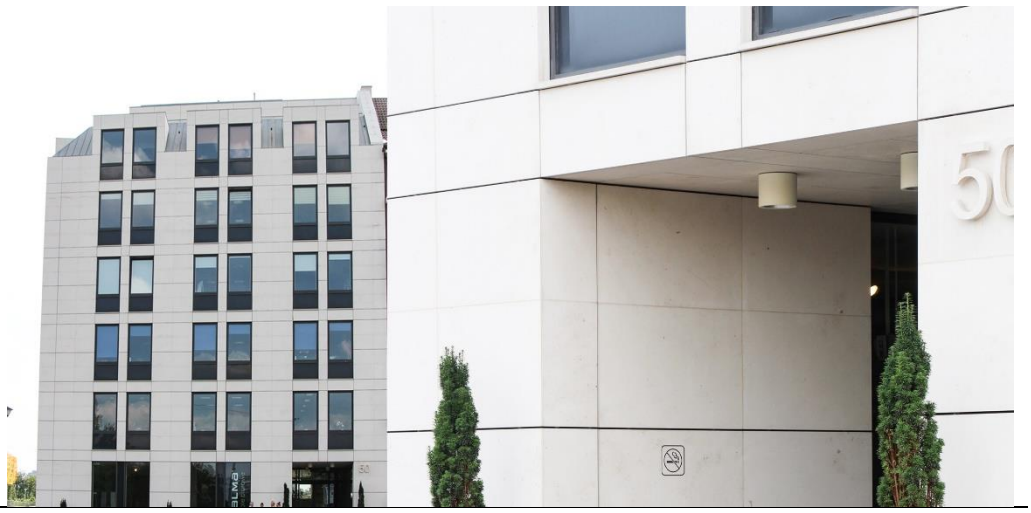
Name:	1. PCR: Basic module for construction products and services 2. PCR: Wall coverings 3. PCR: Floor coverings
Emission date:	1. November 2020 2. November 2020 3. November 2020
Number of registration on the data base:	1. RCP-mb001 2. RCP002:2014 3. RCP001:2014
Version:	1. Version 2.1 2. Version 1.1 3. Version 1.1
Identification and contact of the coordinator (s):	1. PCR: basic module for construction products and services • Marisa Almeida | marisa@ctcv.pt • Luís Arroja | arroja@ua.pt • José Silvestre | jds@civil.ist.utl.pt 2. PCR: Wall coverings • Luís Arroja | arroja@ua.pt • Marisa Almeida | marisa@ctcv.pt 3. PCR: Floor coverings • Luís Arroja | arroja@ua.pt • Marisa Almeida | marisa@ctcv.pt
Identification and contact of the authors:	1. PCR: basic module for construction products and services • Marisa Almeida | marisa@ctcv.pt • Luis Arroja | arroja@ua.pt • José Silvestre | jds@civil.ist.utl.pt • Fausto Freire • Cristina Rocha • Ana Paula Duarte • Ana Cláudia Dias • Helena Gervásio • Victor Ferreira • Ricardo Mateus • António Baio Dias 2. PCR: Wall coverings • Marisa Almeida | marisa@ctcv.pt • Luís Arroja | arroja@ua.pt • Ana Cláudia Dias | acdias@ua.pt 3. PCR: Floor coverings • Marisa Almeida | marisa@ctcv.pt • Luís Arroja | arroja@ua.pt • Ana Cláudia Dias | acdias@ua.pt
Composition of the Sector Panel:	2. RCP: Wall coverings • RMC - Revestimentos de Mármore Compactos, S.A. • APICER – Associação Portuguesa da Indústria de Cerâmica • Sonae Indústria, SGPS, S.A. • Gyptec Ibérica - Gessos Técnicos, S.A. 3. RCP: Floor coverings • RMC - Revestimentos de Mármore Compactos, S.A. • Dominó – Indústrias Cerâmicas, S.A. • MAS – Manuel Amorim da Silva, Lda. • Sonae Indústria, SGPS, S.A. • APICER – Associação Portuguesa da Indústria de Cerâmica
Consultation period:	1. 18/11/2015 - 18/01/2016 2. 12/08/2013 - 30/11/2013 3. 01/08/2013 - 30/11/2013
Valid until:	1. December of 2022 2. January of 2022 3. January of 2022

1.7. Information concerning the product/product class

Identification of the product:

Slabs for façade claddings, and for interior claddings and flooring, in natural *semi-rijo* limestone with the references *Branco Real, Branco do Mar, Branco Snow, Branco Imperial, Branco Ártico and Branco Oriental*

Illustration of the product:



Brief description of the product:

The product corresponds to slabs for façade claddings, and for interior claddings and flooring, in natural *semi-rijo* limestone. This limestone has white to light beige colour and compact appearance, with brownie grains of fine to medium size. The production of these slabs is made at the Solancis industrial plant, in Benedita.

These slabs are available in the maximum dimension of (3,200x2,000) mm and, usually, in the following thicknesses:

- Façade and interior wall claddings: 20 to 40 mm;
- Interior flooring with low circulation: 10 to 30 mm.

Since the production process is the same for all the natural stone slabs produced at the Solancis plant, for every thickness, it is possible to transform the results of this EPD for 1 m^2 of slab with the referred thickness, taking into account the density of this product (2.350 kg/m^3), using a conversion factor, as indicated in Table 1.

Table 1: Conversion factor to apply to the EPD results for 1 m^2 of slab with different thickness (in relation to the values presented in this EPD)

Thickness of the slab with 1 m^2	Factor to be applied
10 mm	0.0235
20 mm	0.047
30 mm	0.0705
40 mm	0.094

Main technical characteristics of the product:

The main physical and technical characteristics of the product are presented in Table 2 (average values – these characteristics should be confirmed on the most recent technical sheet of the manufacturer for each application and geometry of the product).

Table 2: Physical and technical characteristics of the product

Essential characteristic	Performance in accordance with EN 12058	Harmonized technical standard
Petrographic description	Pelsparite Limestone	EN 12407
Apparent density	Mean – 2,350 kg/m^3	EN 1936
Flexural strength	Mean – 11.5 MPa Lower expected value – 8.3 MPa Standard deviation – 1.7 MPa	EN 12372
Water absorption at atmospheric pressure	Maximum expected value – 6.9 %	EN 13755
Reaction to fire	Class A1	EN 13501-1
Water absorption by capillarity	Maximum expected value – 96.9 g/$m^2.s^{0.5}$	EN 1925
Open porosity	Mean – 11.5 %	EN 1936
Thermal shock resistance	Change in flexural strength – 11.6 %	EN 14066

	Breaking load at a dowel hole (d=40 mm)	Mean – 1850 N Lower expected value – 1500 N Standard deviation – 150 N	EN 13364
	Flexural strength before and after 56 freeze-thaw cycles – in normal conditions	Mean value before – 11.6 MPa Mean value after – 8.8 MPa	EN 12371
	Abrasion resistance	Maximum expected value – 31.5 mm	EN 14157
	Slip resistance (Finish: Sawn) Dry conditions Wet conditions	 Mean – 50 SRV Mean – 44 SRV	 CEN/TS 16165

Description of the products' application:	Because of their low hardness, the main application of these slabs is in the execution of façade, interior wall claddings, capping and interior flooring with low circulation.
Reference service life:	Not specified
Placing on the market / Rules of application in the market / Technical rules of the product:	• Decision No. 768/2008 / EC of the European Parliament and of the Council of 9 July 2008 • Regulation (EC) No 764/2008 of the European Parliament and of the Council of 9 July 2008 • Regulation (EC) No 765/2008 of the European Parliament and of the Council of 9 July 2008 • Regulation (EU) No 305/2011 of the European Parliament and of the Council of 9 March 2011 and its amendments. • Technical Product Standards: – EN 1469:2015: Natural stone products – Slabs for cladding - Requirements; – EN 12057:2015: Natural stone products – Modular Tiles - Requirements; – EN 12058:2004: Natural stone products – Slabs for floors and stairs - Requirements.
Quality control:	Quality control assured in accordance with the integrated quality management system and with the technical standards of the product.
Special delivery conditions:	Not applicable
Components and substances to declare:	Not applicable
History of the LCA studies:	-

2. ENVIRONMENTAL PERFORMANCE OF THE PRODUCT

2.1. Calculation rules of the LCA

Declared unit:	One tonne (1 ton) of slabs for façade claddings, and for interior claddings and flooring, in natural *semi-rijo* limestone, with a density of 2,350 kg/m^3, packaging included.
Functional unit:	-
System boundaries:	EPD from cradle-to-gate
Criteria for the exclusion:	The following processes were not considered in this study, since they meet the cut-off criteria of 1% use of renewable and non-renewable primary energy and 1% of the total input mass of the unit process where they occur, with a maximum of 5% energy and mass use in the considered stages (A1-A3): • Construction of industrial infrastructures, manufacture and exchange of equipment and machinery; • Impacts of infrastructure (vehicle manufacturing, road maintenance) associated with the transport of pre-products and raw materials; • Transport of small consumables to the industrial unit; • Other negligible flows, considering their contribution below the cut-off criteria.
Assumption and limitations:	This EPD represents one (1) product that is produced in one (1) manufacturing unit and may have different thicknesses and finishing.
Quality and other characteristics about the information used in the LCA:	Production data was collected for the year of 2018, from internal and official records of the production plant and is according to with the reality. Generic data used belongs to Ecoinvent, ELCD and Simapro industrial database (Industry data 2.0), and meets the quality criteria (age, geographical and technology coverage, plausibility, etc.) for generic data.
Allocation rules:	In the blocks extraction stage from all quarries, the specific consumption of electricity and oil in 2018 was considered, making a mass allocation between the blocks transported to the plant and the material not used for block and used as raw material for the lime industry or sold for other uses. The manufacturing plant where these natural stone slabs are produced also produces other products, namely curbs. Taking it into account, an allocation methodology was used to define which input and output flows associated only to the production of the natural stone slabs being studied.
Comparability of EPD for construction products:	The EPD of construction products and services cannot be comparable in case they are not produced according to EN 15804 and EN 15942 and according to the comparability conditions determined by ISO 14025.

2.1.1. Flow diagram of input and output of the processes

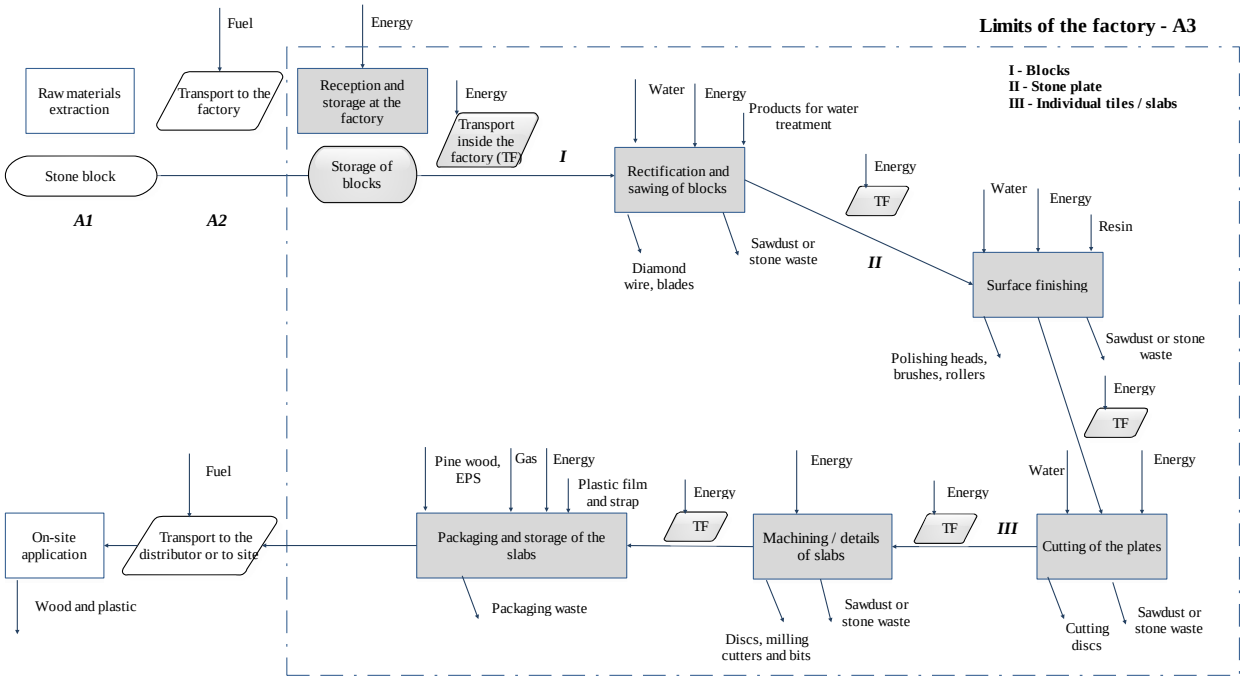


Figure 1. Life cycle stages of natural stone slabs from Solancis

The following paragraphs describe the life cycle stages studied for the development of this EPD.

Upon arrival at the factory, limestone blocks are stored. The slabs' production process starts in the Cutting Machines through the sawing process (which can be preceded by the rectification). Diamond saws laminate the blocks to the required thickness, resulting in several stone plates.

After measuring the thickness of the plates, they are introduced in the polisher. The stone receives here, through friction, the desired finishes (polished, sawn, hammered, sandblasted or aged, as tiles are to be visible by the inside or outside). Next is the cutting process, which turns them into individual tiles / slabs.

The modelling of the pieces into more complex formats is (machining / details) done in CNC (Computer Numerical Control). Following labelling and inspections, the slabs are finally packed in wooden structures (wrapped in plastic film and wrapped in a plastic strap, with expanded polystyrene – EPS as protection elements of the slabs) and stored according to the placement plans, the form of transport and the destination.

Transport to the construction site or the distributor and the application on site are outside of the boundaries of this EPD.

2.1.2. Description of the system boundaries

(✓= included; ✖= module not declared)

PRODUCT STAGE			CONSTRUCTION PROCESS STAGE		USE STAGE							END OF LIFE STAGE				BENEFITS AND LOADS BEYOND THE SYSTEM BOUNDARY
Raw material supply	Transport	Manufacturing	Transport	Construction installation process	Use	Maintenance	Repair	Replacement	Refurbishment	Operational energy use	Operational water use	De-constructions, demolition	Transport	Waste processing	Disposal	Re-use, recovery, recycling potential
A1	A2	A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
✓	✓	✓	✖	✖	✖	✖	✖	✖	✖	✖	✖	✖	✖	✖	✖	✖

2.2. Parameters describing environmental impacts

		Global warming potential; GWP kg CO_2 equiv.	Depletion potential of the stratospheric ozone layer; ODP kg CFC 11 equiv.	Acidification potential of soil and water, AP kg SO_2 equiv.	Eutrophication potential, EP kg $(PO_4)^{3-}$ equiv.	Formation potential of tropospheric ozone, POCP kg C_2H_4 equiv.	Abiotic depletion potential for non-fossil resources kg Sb equiv.	Abiotic depletion potential for fossil resources MJ, P.C.I.
Raw material supply	**A1**	4.16E+00	5.18E-07	3.30E-02	4.96E-03	1.02E-03	1.13E-06	5.39E+01
Transport	**A2**	9.50E-01	1.92E-09	4.26E-03	9.72E-04	3.02E-04	3.77E-08	1.33E+01
Manufacturing	**A3**	5.89E+01	3.22E-06	4.22E-01	9.02E-02	2.27E-02	2.31E-04	7.91E+02
Total	**Total**	6.41E+01	3.74E-06	4.59E-01	9.62E-02	2.41E-02	2.32E-04	8.58E+02

LEGEND:

Product stage

NOTES: P.C.I. – Low Heating Value (LHV).

Units expressed per declared unit (1 ton).

2.3. Parameters describing resource use

		Primary energy						Secondary materials and fuels, and use of water			
		EPR MJ, P.C.I.	RR MJ, P.C.I.	TRR MJ, P.C.I.	EPNR MJ, P.C.I.	RNR MJ, P.C.I.	TRNR MJ, P.C.I.	MS kg	CSR MJ, P.C.I.	CSNR MJ, P.C.I.	Net use of fresh water m^3
Raw material supply	**A1**	8.88E+00	0.00E+00	8.88E+00	5.98E+01	0.00E+00	5.98E+01	0.00E+00	0.00E+00	0.00E+00	4.51E-02
Transport	**A2**	1.51E-02	0.00E+00	1.51E-02	1.42E+01	0.00E+00	1.42E+01	0.00E+00	0.00E+00	0.00E+00	8.48E-05
Manufacturing	**A3**	2.10E+02	8.32E-02	2.10E+02	8.65E+02	5.24E+01	9.17E+02	0.00E+00	0.00E+00	0.00E+00	2.01E+00
Total	**Total**	2.18E+02	8.32E-02	2.18E+02	9.39E+02	5.24E+01	9.91E+02	0.00E+00	0.00E+00	0.00E+00	2.06E+00

LEGEND:

Product stage

EPR = use of renewable primary energy excluding renewable primary energy resources used as raw materials;

RR = use of renewable primary energy resources used as raw materials;

TRR = total use of renewable primary energy resources (EPR + RR);

EPNR = use of non-renewable primary energy excluding non-renewable primary energy resources used as raw materials;

RNR = use of non-renewable primary energy resources used as raw materials;

TRNR = total use of non-renewable primary energy resources (EPRN + RNR);

MS = use of secondary material;

CSR = use of renewable secondary fuels;

CSNR = use of non-renewable secondary fuels.

Net use of fresh water = net use of fresh water.

NOTE: Units expressed per declared unit (1 ton).

2.4. Other environmental information describing different waste categories

		Hazardous waste disposed kg	Non-hazardous waste disposed kg	Radioactive waste disposed kg
Raw material supply	**A1**	9.42E-05	1.16E-02	2.93E-04
Transport	**A2**	0.00E+00	1.18E-06	0.00E+00
Manufacturing	**A3**	4.20E-04	1.25E+02	1.67E-03
Total	**Total**	5.14E-04	1.25E+02	1.97E-03

LEGEND:

Product stage

NOTE: Units expressed per declared unit (1 ton).

2.5. Other environmental information describing output flows

Parameters	Units*	Results
Components for re-use	kg	0.00E+00
Materials for recycling	kg	5.44E+00
Radioactive waste disposed	kg	0.00E+00
Materials for energy recovery	kg	1.33E-02
Exported energy	MJ by energy carrier	0.00E+00

* expressed per declared unit (1 ton)

3. SCENARIOS AND ADDITIONAL TECHNICAL INFORMATION

This EPD evaluates only the production stage of the natural stone slabs from Solancis, integrating stages A1 to A3. Thus, the following scenarios of the construction stage (modules A4 and A5), stage of use (B1 to B7) and end of life stage (C1 to C4), are not applicable.

3.1. Additional environmental information about the release of dangerous substances

No tests related to the release of dangerous substances or equivalent were carried out. There are no known toxic effects of this product. Due to its properties, no danger to the environment is expected. Natural stone slabs are considered an inert product, non-biodegradable.

3.2. Certifications

SOLANCIS — Sociedade Exploradora de Pedreiras, S.A. has a management system that meets the requirements of the StonePT (Premium) specification for the Extraction + Primary Transformation + Secondary Transformation activities, as audited and verified by APCER (Certificate of Conformity n.º 11/2020 valid until 15/03/2023) and that that meets the requirements of the StonePT– Green specification for the Extraction + Primary Transformation + Secondary Transformation activities, as audited and verified by APCER (Certificate of Conformity n.º 11/2026V valid until 15/03/2023).

REFERENCES

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- ✓ EN 15804:2012+A1:2013 - Sustainability of construction works - Environmental product declarations - Core rules for the product category of construction products.
- ✓ EN ISO 14020:2005 - Environmental labels and declarations - General principles (EN ISO 14020:2005).
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