



DECLARATION NUMBER: DAP 017:2022



Acoustic masonry units – FREEBLOCO®

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ARTEBEL - ARTEFACTOS DE BETÃO S.A.



FreeBLOCO®

artebel®
ARTEFACTOS DE BETÃO, S. A.


centroHabitat
Plataforma para a Construção Sustentável

VERSION 1.1. EDITION JULY 2015

Index

1. GENERAL INFORMATION	1
1.1. THE DAPHABITAT SYSTEM.....	1
1.2. EPD OWNER	1
1.3. INFORMATION CONCERNING THE EPD	2
1.4. DEMONSTRATION OF THE VERIFICATION.....	2
1.5. EPD REGISTRATION	2
1.6. PCR OF REFERENCE	3
1.7. INFORMATION CONCERNING THE PRODUCT/PRODUCT CLASS	4
2. ENVIRONMENTAL PERFORMANCE OF THE PRODUCT	5
2.1. CALCULATION RULES OF THE LCA	5
2.1.1. FLOW DIAGRAM OF INPUT AND OUTPUT OF THE PROCESSES.....	6
2.1.2. DESCRIPTION OF THE SYSTEM BOUNDARIES	7
2.2. PARAMETERS DESCRIBING ENVIRONMENTAL IMPACTS	8
2.3. PARAMETERS DESCRIBING RESOURCE USE.....	9
2.4. OTHER ENVIRONMENTAL INFORMATION DESCRIBING DIFFERENT WASTE CATEGORIES	9
2.5. OTHER ENVIRONMENTAL INFORMATION DESCRIBING OUTPUT FLOWS	11
3. SCENARIOS AND ADDITIONAL TECHNICAL INFORMATION.....	11
REFERENCES	12

1. GENERAL INFORMATION

1.1. The DAPHabitat System

Program operator:	Sustainable Construction Platform 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 401576	
Website:	www.daphabitat.pt	
Logo:		



1.2. EPD OWNER

Name of the owner:	ARTEBEL - ARTEFACTOS DE BETÃO S.A.
Production site:	Meirinhas
Address (head office):	Rua das Achadas Largas, nº20 3105-219 Meirinhas, Pombal
Telephone:	+351 236 949 180
E-mail:	geral@artebel.pt
Website:	https://www.artebel.pt/
Logo:	
Information concerning the applicable management Systems:	ISO 9001:2015 - Quality Management Systems
Specific aspects regarding the production:	Main CAE: 23610 - Fabricação de produtos de betão para a construção Secondary CAE: 47523 - Comércio a retalho de material de bricolage, equipamento sanitário, ladrilhos e materiais similares, em estabelecimentos especializados
Organization's environmental policy:	Not applicable

1.3. Information concerning the EPD

Authors:	1. Artebel - artefactos de betão s.a. 2. Envisolutions, Lda.
Contact of the authors:	1. Artebel - artefactos de betão s.a. Address: Rua das Achadas Largas, nº20, 3105-219 Meirinhas, Pombal, PT Telephone: +351 236 949 180 2. Envisolutions, Lda. Address: Rua Gonçalves Zarco, 1843, R/C D 4450-683 Leça da Palmeira - Matosinhos, PT Telephone: + 351 220 996 067 Aline Silva Abrantes aline.abrantes@envisolutions.eu Daniel Afonso daniel.afonso@envisolutions.eu Website: http://envisolutions.eu/
Issue date:	27/10/2022
Registration date:	31/10/2022
Registration number:	DAP 017:2022
Valid until:	26/10/2027
Representativity of the EPD (location, manufacturer, group of manufacturers):	Acoustic masonry blocks produced at the industrial unit of Artebel in Pombal. The products included in these category are: - FREEBLOCO [®]
Where to consult explanatory material:	Artebel website - https://www.artebel.pt/
Type of EPD:	Cradle-to-gate 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
	
(CERTIF – Associação para a Certificação)	(Marisa Almeida)

1.5. EPD Registration


Program Operator

(Plataforma para a Construção Sustentável)

1.6. PCR of reference

Name:	PCR – Masonry units – V.1.1
Issue date:	18 th November 2015
Number of registration on the data base:	RCP006
Version:	1.1
Identification and contact of the coordinator (s):	Baio Dias baiodias@ctcv.pt Luís Arroja arroja@ua.pt
Identification and contact of the authors:	Marisa Almeida marisa@ctcv.pt Baio Dias baiodias@ctcv.pt Luís Arroja arroja@ua.pt
Composition of the Sectorial Panel:	APICER – Associação Portuguesa da Indústria de Cerâmica Artebel, S.A – Soluções construtivas em betão ANIPB – Associação Nacional dos Industriais de Prefabricação em Betão Argex – Argila Expandida, S.A
Consultation period:	From 11/06/2014 to 30/06/2014
Valid until:	December, 2022
Name:	PCR – Base Model – V.2.1 (2016)
Issue date:	19 th January 2016
Number of registration on the data base:	RCP-MB001
Version:	2.1
Identification and contact of the coordinator (s):	Marisa Almeida marisa@ctcv.pt Luís Arroja arroja@ua.pt José Silvestre jds@civil.ist.utl.pt
Identification and contact of the authors:	Marisa Almeida Luis Arroja José Silvestre Fausto Freire Cristina Rocha; Ana Paula Duarte; Ana Cláudia Dias; Helena Gervásio; Victor Ferreira; Ricardo Mateus António Baio Dias
Composition of the Sectorial Panel:	-
Consultation period:	18/11/2015 to 18/01/2016
Valid until:	December, 2022

1.7. Information concerning the product/product class

Identification of the product:	Acoustic masonry units - FREEBLOCO [®]																																					
Illustration of the product:																																						
Brief description of the product:	Lightweight concrete block for sound insulation.																																					
Main technical characteristics of the product:	<p>The product's characteristics are stated in its declaration of performance and are presented in the table below:</p> <table border="1"> <thead> <tr> <th>Main characteristics</th> <th colspan="2">Performance</th> </tr> </thead> <tbody> <tr> <td>Configuration, appearance, nominal external dimensions, dimensional tolerances</td> <td colspan="2">D1 Category</td> </tr> <tr> <td>Compressive strength</td> <td colspan="2">≥2.5 N/mm²</td> </tr> <tr> <td>Dry density (dry volume mass ± 15%)</td> <td>FREEBLOCO</td> <td>1300 kg/m³</td> </tr> <tr> <td>Cut resistance (according to the standard EN 998-2)</td> <td colspan="2">0.15 N/mm²</td> </tr> <tr> <td>Dimensional stability</td> <td colspan="2">DND</td> </tr> <tr> <td>Water vapor permeability</td> <td colspan="2">DND</td> </tr> <tr> <td>Water absorption</td> <td colspan="2">DND</td> </tr> <tr> <td>Sound isolation (aerial sounds of the final conditions of use)</td> <td>FREEBLOCO</td> <td>43 dB(A)</td> </tr> <tr> <td>Durability. Freeze/thaw resistance</td> <td colspan="2">DND</td> </tr> <tr> <td>Thermal conductivity coefficient</td> <td>FREEBLOCO</td> <td>1.69 W/m² °C</td> </tr> <tr> <td>Hazardous substances</td> <td colspan="2">DND</td> </tr> </tbody> </table>		Main characteristics	Performance		Configuration, appearance, nominal external dimensions, dimensional tolerances	D1 Category		Compressive strength	≥2.5 N/mm ²		Dry density (dry volume mass ± 15%)	FREEBLOCO	1300 kg/m ³	Cut resistance (according to the standard EN 998-2)	0.15 N/mm ²		Dimensional stability	DND		Water vapor permeability	DND		Water absorption	DND		Sound isolation (aerial sounds of the final conditions of use)	FREEBLOCO	43 dB(A)	Durability. Freeze/thaw resistance	DND		Thermal conductivity coefficient	FREEBLOCO	1.69 W/m ² °C	Hazardous substances	DND	
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Hazardous substances	DND																																					
Description of the products application:	Intended for the execution of single and double walls, where the demand for thermal insulation is imposed.																																					
Reference service life:	Not specified																																					
Placing on the market / Rules of application in the market / Technical rules of the product:	<p>Regulation (EU) No 305/2011 of the European Parliament and of the Council of 9 March 2011</p> <p>EN 771-3:2011+A1:2015 Specification for masonry units - part 3: aggregate concrete masonry units (dense and lightweight aggregates).</p>																																					
Quality control:	Control Plan according to EN 771-3:2011+A1:2015																																					
Special delivery conditions:	Not applicable.																																					
Components and substances to declare:	The concrete mix comprises 72% aggregates, 8% cement, 3% water. It does not have SVHC in its composition under the REACH Regulation.																																					
History of the LCA studies:	Not applicable. First edition.																																					

2. ENVIRONMENTAL PERFORMANCE OF THE PRODUCT

2.1. Calculation rules of the LCA

Declared unit:	1 m ² lightweight concrete block, for interior or exterior masonry walls
Functional unit:	--
System boundaries:	Cradle-to-gate EPD
Criteria for the exclusion:	<p>According to paragraph 6.3.5 of EN 15804, the exclusion criterion for unit processes is 1% of the total energy consumed and 1% of the total mass of inputs, with particular attention so it does not exceed a total of 5% of the energy and mass flows excluded in the product step.</p> <p>The following cases were not considered in this study, as they may fit the exclusion criteria:</p> <ul style="list-style-type: none"> • Environmental loads associated with the construction of industrial infrastructure and the manufacture of machinery and equipment. • Environmental loads related to infrastructure (production and maintenance of vehicles and roads) for the transport of pre-products. • Water consumption, production, and treatment of wastewater as well as waste management in administrative areas. • Energy used to transport employees. <p>All known inflows and outflows were considered.</p>
Assumption and limitations:	All data collected and results of environmental impacts and other indicators presented in this DAP refer to the year 2020.
Quality and other characteristics about the information used in the LCA:	<p>The specific data used were collected based on the 2020 year, and the specific data of Artebel's industrial unit located in Pombal. The data modeling considered the data collected and validated based on mass balances and production times.</p> <p>For processes in which producers do not have interference or specific information, such as the extraction of raw materials, generics obtained from the Ecoinvent 3.6 database were used.</p> <p>Regarding electricity, the energy mix for 2019 was considered based on Ecoinvent 3.6 data.</p>
Allocation rules:	<p>The concrete composition of each model of thermal block produced, despite having a common matrix in terms of materials, the percentage of each one in the final mixture presents variations. The average composition by product family was calculated taking into account the representativeness of each model in the annual production of the industrial unit. The consumption profile is not expected to suffer relevant changes and the concrete composition is also expected to remain stable.</p> <p>The allocation to the other flows (energy, fuel, waste, packaging materials, etc.) were calculated considering the relative percentage of cement consumption.</p>
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 15948 and according to the comparability conditions determined by ISO 14025.

2.1.1. Flow diagram of input and output of the processes

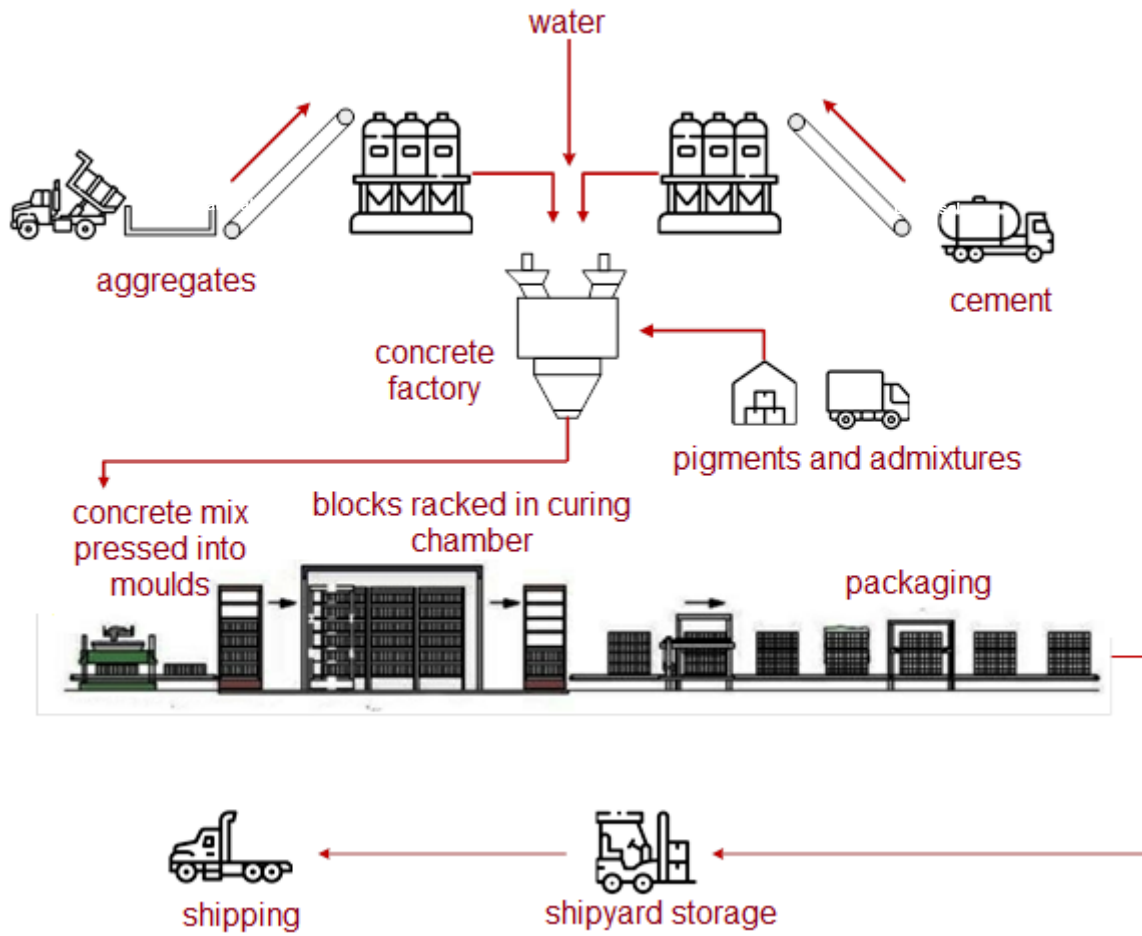


Figure 1: Life cycle stages and unit processes of the product.

2.1.2. Description of the system boundaries

(✓= included; x= 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
✓	✓	✓	X	X	X	X	X	X	X	X	X	X	X	X	X	X

Raw materials are transported by truck from their place of production to the factory. When they are delivered, there is a verification/confirmation of the material, and it is unloaded and sent to storage silos according to its characteristics.


The manufacturing process is based on the manufacture of lightweight concrete, which is then molded and pressed according to the configuration of the product being manufactured. Molded products come out in trays that are then automatically transported to a curing chamber. After curing, the products are collected by an automatic transport system and palletized. It's at this stage that they are also identified and strapped for greater safety in the transport of pallets.

Transport to the constructions or to the distributor, as well as its application in the constructions are outside the boundaries of this study.

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 ₂ H 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	1,54E+01	3,966E-7	7,222E-2	1,513E-2	3,146E-3	1,115E-4	1,03E+02
Transport	A2	2,119E-1	4,005E-8	4,361E-4	8,81E-5	2,763E-5	3,658E-6	3,33E+00
Manufacturing	A3	2,463E-1	2,479E-8	1,627E-3	3,999E-4	7,899E-5	1,68E-6	4,25E+00
Total	Total	1,58E+01	4,614E-7	7,428E-2	1,561E-2	3,253E-3	1,168E-4	1,11E+02

LEGEND:

 Product stage

2.3. Parameters describing resource use

		Primary energy						Secondary materials and fuels, and use of water			
		EPR	RR	TRR	EPNR	RNR	TRNR	MS	CSR	CSNR	Net use of fresh water
		MJ, P.C.I.	MJ, P.C.I.	MJ, P.C.I.	MJ, P.C.I.	MJ, P.C.I.	MJ, P.C.I.	kg	MJ, P.C.I.	MJ, P.C.I.	m ³
Raw material supply	A1	9,27E+00	0,00E+00	9,27E+00	1,03E+02	3,462E-1	1,03E+02	8,678E-2	0,00E+00	0,00E+00	1,17E-1
Transport	A2	4,197E-2	0,00E+00	4,197E-2	3,33E+00	0,00E+00	3,33E+00	0,00E+00	0,00E+00	0,00E+00	6,942E-4
Manufacturing	A3	2,29E+00	4,23E+00	6,52E+00	4,25E+00	4,78E-3	4,25E+00	5,302E-5	0,00E+00	0,00E+00	9,241E-4
Total	Total	1,16E+01	4,23E+00	1,58E+01	1,11E+02	3,51E-1	1,11E+02	8,684E-2	0,00E+00	0,00E+00	1,186E-1

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 (EPNR + RNR);

MS = use of secondary material;

CSR = use of renewable secondary fuels;

CSNR = use of non-renewable secondary fuels.

2.4. Other environmental information describing different waste categories

		Hazardous waste disposed	Non hazardous waste disposed	Radioactive waste disposed
		kg	kg	kg
Raw material supply	A1	6,194E-1	1,68E+01	2,58E-4
Transport	A2	3,24E-3	3,584E-1	2,288E-5
Manufacturing	A3	2,31E-2	4,519E-1	1,377E-5
Total	Total	6,458E-1	1,76E+01	2,947E-4

LEGEND:

Product stage

2.5. Other environmental information describing output flows

Parameters	Units*	Results
Components for re-use	kg	0.0E0
Materials for recycling	kg	2.0E-3
Radioactive waste disposed	kg	0.0E0
Materials for energy recovery	kg	0.0E0
Exported energy	MJ per energy carrier	0.0E0

* expressed by functional unit or declared unit

3. SCENARIOS AND ADDITIONAL TECHNICAL INFORMATION

This EPD represents only the production stage of Artebel's masonry units, including modules A1 to A3. Therefore, the following scenarios referring to the construction stages (A4 and A5 modules), use (B1 to B7) and end-of-life (C1 to C4) are not applicable.

REFERENCES

- ✓ **General Instructions of the DAPHabitat System**, Version 1.1, October 2015 (in www.daphabitat.pt);
- ✓ **PCR – basic module for construction products and services**. DAPHabitat System. Version 2.1, 2020 (in www.daphabitat.pt);
- ✓ **PCR – Masonry units**. DAPHabitat System. Version 1.1, 2020 (in www.daphabitat.pt);
- ✓ **ISO 14025:2009** Environmental declarations and labels – Type III environmental declarations – Principles and procedures;
- ✓ **EN 15804:2012+A1:2013** Sustainability of construction works - Environmental product declarations - Core rules for the product category of construction products;
- ✓ **UNE CEN/TR 15941:2014** Sustainability of construction works - Environmental product declarations - Methodology for selection and use of generic data
- ✓ **EN 15942:2011** Sustainability of construction works – Environmental product declarations – Communication format business-to-business.
- ✓ **EN 771-3:2011+A1:2015** Specification for masonry units - Part 3: Aggregate concrete masonry units (Dense and lightweight aggregates).