ENVIRONMENTAL PRODUCT DECLARATION

DAPc®.002.010

IN ACCORDANCE WITH ISO STANDARDS 14.025 & 21.930

PRODUCT

Medium porcelain stoneware tiles

COMPANY

GRESPANIA CERAMICA

DESCRIPTION OF THE PRODUCT

The product includes different formats of porcelain stoneware tiles (BIa).

PCR REFERENCE

PCR 002 – Ceramic tile products – V.1 (2010)

PRODUCTION PLANT

GRESPANIA, S.A.
CV-16 (Ctra. Castellón-Alcora)
Km. 2,200 P.O.Box 157
12080 Castellón - España

VALIDITY

From : 16.09.2013
To: 16.09.2018

The validity of the DAPc®002.010 is subject to the conditions of the DAPc® regulations. The relevant version of this DAPc is included in the register kept by the CAATEEB; for more information, consult the system's website: http://es.csostenible.net/dapc

Environmental Product Declaration: Medium Porcelain Stoneware Tiles

Executive summary

DAPc®

Environmental product declarations in the construction sector
http://es.csostenible.net

SYSTEM ADMINISTRATOR

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DECLARATION ISSUED BY
ReMa-MEDIOAMBIENTE, S.L.
Calle Crevillente 1, entlo, 12005, Castellón, Spain

DECLARATION NUMBER	DAPc® 002.010
PRODUCT DECLARED	MEDIUM PORCELAIN STONEWARE TILES

PRODUCT DESCRIPTION

The product in question includes different medium porcelain stoneware tile formats with a variability of +/-10% between input and output.

REGISTRATION DATE	16.09.2013

VALIDITY

This verified declaration authorises the holder to use the DAPc® eco-label logo. The declaration is exclusively applicable to the product in question and for five years as of the date of registration. GRESPANIA is responsible for the information contained in this declaration.

SIGNATURE FOR CAATEEB	SIGNATURE OF AUTHORISED INSPECTOR
Rosa Remolà, President of CAATEEB	Xavier Folch, accredited auditor of the ITeC
COL·LEGI D'APARELLADORS, ARQUITECTES TÈCNICS I ENGINYERS D'EDIFICACIÓ DE BARCELONA	ITeC Institut de Tecnologia de la Construcció de Catalunya XAVIER FOLCH

This environmental product declaration complies with ISO standards 14025 and 21930 and contains information of an environmental nature on the life cycle of the medium porcelain stoneware tiles manufactured by GRESPANIA at its plant in Castellón. This declaration is based on the document *PCR 002 Ceramic Tile Products - Version 1 – 2010.06.11.*

Environmental Product Declaration for MEDIUM PORCELAIN STONEWARE TILES

1. Description of the product and its use

The porcelain stoneware tiles are classified in group BIa (dry pressed ceramic tiles with a low water absorption of 0.5% or less) as per ISO 13006 and UNE-EN 14411:2007.

Table 1. **Product included and dimensions**

Product	**Group**	**Finishes**	**Dimensions (cm x cm)**
PORCELAIN STONEWARE TILES AND FULL BODY PORCELAIN STONEWARE TILES	BIa	- Unrectified - Rectified - Polished - Unpolished	14.5/19.5x120, 15x60, 15x80, 22x90, 30x30, 30x60, 40x80, 45x45, 45x90, 60x60, 60x120 and 80x80

The main recommended use for this product is for tiling walls and floors.

2. Description of the life cycle phases

2.1. Manufacture (A1, A2 and A3)

Raw materials (A1 and A2)

The porcelain stoneware tile product (BIa) basically consists of clay, sand and feldspar with a glaze layer mainly consisting of feldspar, carbonate, silicate and kaolin, among other materials.

The raw materials used come from different origins (local, national, Turkey, Ukraine, Italy or the United Kingdom). This variation is due to the impossibility of obtaining these raw materials from a single source. The raw materials from outside of Spain are transported by freighter to the port of Castellón and from there by truck to the plant for manufacturing the spray-dried powder. For marine transport, a transoceanic freighter is used, whose transportation distance varies in each case depending on the point of origin. The raw clay materials are transported in bulk, meaning packaging materials are not required. The frits are transported in bigbags on pallets.

Manufacturing (A3)

The industrial process at the GRESPANIA plant in Castellón starts with the reception of the spray-dried clay in metal hoppers ready to receive the clay from the transportation trucks. The clay is then transported to the corresponding storage silos on unloading and conveyor belts.

The clay is then transported to the presses using conveyor belts, where if necessary it can be treated in a technological tower or a colouring system to create specific types of effects.

The presses are hydraulic, fully automated and electronically controlled. The clay is poured into moulds using a feeder carriage, which first removes the tiles from the previous run. These tiles are transferred to a collecting belt on which they are carried to the vertical driers, where their residual moisture is removed.

The different components of the glazes, such as frits, colours and additives, are loaded together with water into mills with grinding fillers. Once they have been ground, the glaze is poured into vats with stirrers to prevent the different components from precipitating, from where they are pumped or transported to the glazing line.

The glazing line is equipped with systems for transporting the tiles. The different glazes used for each model are applied as a water-based suspension in each of the devices (disks, bell glazing units, spray guns) positioned along the line.

Once the tiles have been glazed and decorated, they are collected by a loading machine that stacks them on racks in an intermediate storage area ready for firing in the kilns.

The kilns are single layer type. The tiles pass through them on rollers that are resistant to high temperatures. Once the tiles have been fired, they are stacked on AGVs and taken to the sorting area.

Before entering the sorting lines, the tiles can be rectified and/or polished. This section for polishing, cutting and rectifying the tiles makes it possible to process a part of the production in order to obtain tiles with an exceptional surface gloss (when polished), smaller tiles made from larger sections (when cut), and/or tiles with an extraordinary dimensional precision, also making it possible to eliminate the typical rounded edges found on tiles (when rectifying).

There is also a cutting section, whose work focuses on obtaining extremely small formats from larger tiles.

Once on the sorting lines, whether the tiles have passed through the rectifying and polishing section or not, the AGVs are unloaded again and the tiles placed on a belt where they undergo a visual inspection and are marked according to their qualities, then separated onto the corresponding output lines. On the line, there is a device for measuring the flatness of the tiles and a calliper to measure the squareness of the tiles. Finally, there is an automatic packaging system and robotic palletising system.

The sorted tiles are packed in cardboard packaging. The number of tiles in each box will vary depending on their format and weight. The different cardboard boxes are stacked on wooden pallets, which are then covered with LDPE shrink or heat shrink film, which adapts to the size of the pallets. Once the pallet is complete, it is stored in the corresponding area.

2.2. Construction

Transporting the product (A4)

Not included in the scope of the study system.

Process of installing the product and construction (A5)

Not included in the scope of the study system.

2.3. Use of the product

The use phase is divided into the following modules:

- Use (B1)
- Maintenance (B2)
- Repair (B3)
- Replacement (B4)
- Refurbishment (B5)
- Operational energy use (B6)
- Operational water use (B7)

Not included in the scope of the study system.

2.4. End of life

The end-of-life phase includes the following modules:

- Deconstruction and demolition (C1)
- Transport (C2)
- Waste management for reuse, recovery and recycling (C3)
- Final disposal (C4)

Not included in the scope of the study system.

2.5. Module D: potential environmental benefits and impacts derived from activities of reuse, recovery and recycling

Module D declares the existence of environmental credits (i.e. environmental impacts that have been avoided) due to the reuse, recovery or recycling of some of the output flows from the system. The net impacts declared will be the result of calculating the impacts of the production of the raw, displaced or replaced materials or fuels, minus the environmental impacts of the reuse, recovery and recycling operations.

Impacts are considered to have been avoided in:

- The management of waste from containers and packaging produced during the manufacturing stage,
- The electrical power generated during the spray-drying process which is sold to the electricity grid. Module A1 includes the environmental impacts caused by burning natural gas during the spray-drying process, thermal energy used for spray-drying, and the electricity generated from cogeneration. Part of this electricity is used in the spray-drying facilities and tile manufacture, and part is sold to the electricity grid. The environmental benefits produced by the displaced energy are quantified in Module D.

3. Life cycle analysis

The life cycle analysis on which this declaration is based has been carried out as per ISO standards 14040 and 14044, and the document PCR 002 Ceramic Tile Products, Version 1 – 2010.06.11.

This LCA is "cradle-to-factory gate", i.e. it covers the phases of the manufacture of the product, but does not include its phases of construction, use and end of life.

Specific data has been used from the plant in Castellón for the year 2012 to inventory the manufacturing phase.

3.1 Functional unit

The declared functional unit is *"1 m^2 of **MEDIUM PORCELAIN STONEWARE TILES**"*

3.2. Limits of the system

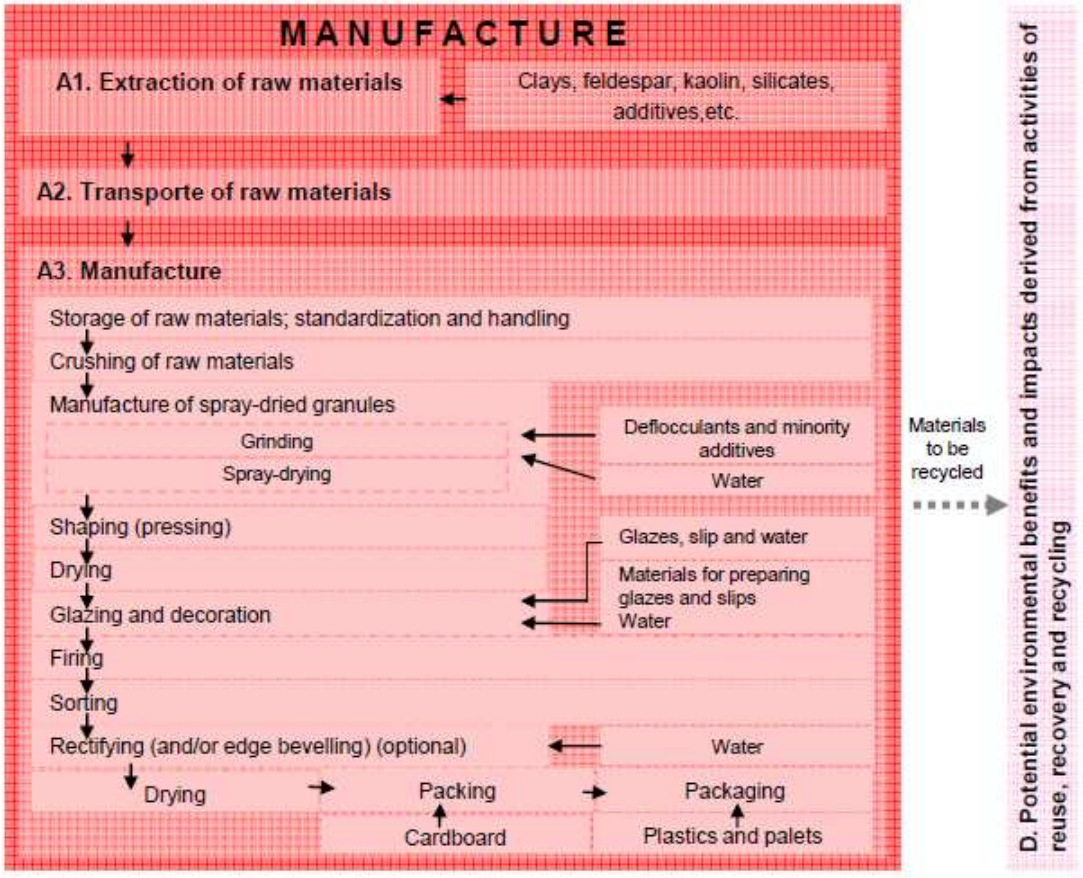

Figure 1: **Limits of the System**

3.3. Impact evaluation indicators

Table 4. **Impact evaluation indicators**

Parameter evaluated	Unit per m² of panel	Life cycle stage													
		Manufacture	Construction		Use							End of life			
		A1. – A3.	A4.	A5.	B1.	B2.	B3.	B4.	B5.	B6.	B7.	C1.	C2.	C3.	C4.
Potential for global warming	Kg of CO_2 eq.	*1.26E+01*	-	-	-	-	-	-	-	-	-	-	-	-	-
Potential for depletion of stratospheric ozone	Kg of CFC11 eq.	*1.44E-07*	-	-	-	-	-	-	-	-	-	-	-	-	-
Potential for acidification	Kg of SO_2 eq.	*3.33E-02*	-	-	-	-	-	-	-	-	-	-	-	-	-
Potential for eutrophication	Kg of PO_4- eq.	*5.86E-03*	-	-	-	-	-	-	-	-	-	-	-	-	-
Potential for depletion of abiotic resources	Kg of Sb eq.	*1.02E-01*	-	-	-	-	-	-	-	-	-	-	-	-	-
Potential for formation of photochemical	Kg of ethane eq.	*1.18E-03*	-	-	-	-	-	-	-	-	-	-	-	-	-
Potential for depletion of abiotic resources (fossil resources)	MJ	*2.12E+02*	-	-	-	-	-	-	-	-	-	-	-	-	-

A1. Supply of raw materials
A2. Transport
A3 Manufacture (as per figure 1)
A4. Transport
A5. Installation and construction processes

B1. Use
B2. Maintenance and transport
B3. Repair
B4. Replacement B5. Refurbishment
B6. Operational energy use
B7. Operational water use

C1. Deconstruction and demolition
C2. Transport
C3. Waste management for reuse, recovery and recycling.
C4. Final disposal

The PCR do not provide for the calculation of this impact, as it is not relevant for this type of product.

3.4. Life cycle inventory data

Table 5. **Life cycle inventory data**

Parameter evaluated	Unit per m² of panel	Life cycle phase													
		Manufacture	Construction		Use							End of life			
		A1. – A3.	A4.	A5.	B1.	B2.	B3.	B4.	B5.	B6.	B7.	C1.	C2.	C3.	C4.
Consumption of primary renewable energy	MJ(net calorific value)	1.65E+01	-	-	-	-	-	-	-	-	-	-	-	-	-
Consumption of primary non-renewable energy	MJ(net calorific value)	2.20E+02	-	-	-	-	-	-	-	-	-	-	-	-	-
Use of non-renewable secondary fuels	MJ(net calorific value)	0.00E+00	-	-	-	-	-	-	-	-	-	-	-	-	-
Use of renewable secondary fuels	MJ(net calorific value)	0.00E+00	-	-	-	-	-	-	-	-	-	-	-	-	-
Consumption of fresh water	m3	6.60E-02	-	-	-	-	-	-	-	-	-	-	-	-	-
Production of waste	kg	1.61E+00	-	-	-	-	-	-	-	-	-	-	-	-	-
Hazardous	kg	3.99E-4	-	-	-	-	-	-	-	-	-	-	-	-	-
Non-hazardous	kg	1.61E+00	-	-	-	-	-	-	-	-	-	-	-	-	-
Radioactive	kg	1.85E-4	-	-	-	-	-	-	-	-	-	-	-	-	-
Material released for	kg	1.24E-2	-	-	-	-	-	-	-	-	-	-	-	-	-
Reuse	kg	0.00E+00	-	-	-	-	-	-	-	-	-	-	-	-	-
Recycling	kg	1.24E-2	-	-	-	-	-	-	-	-	-	-	-	-	-
Energy recovery	kg	0.00E+00	-	-	-	-	-	-	-	-	-	-	-	-	-

A1. Supply of raw materials
A2. Transport
A3 Manufacture (as per figure 1)
A4. Transport
A5. Installation and construction processes

B1. Use
B2. Maintenance and transport
B3. Repair
B4. Replacement
B5. Refurbishment
B6. Operational energy use
B7. Operational water use

C1. Deconstruction and demolition
C2. Transport
C3. Waste management for reuse, recovery and recycling
C4. Final disposal

The PCR do not provide for the calculation of this impact, as it is not relevant for this type of product.

3.5. Potential environmental benefits and impacts derived from activities of reuse, recovery and recycling

Appendix 1- Table 4. **Impact evaluation indicators**

Reuse, recovery and recycling		
Parameter evaluated	**Unit per m² of panel**	**D.**
Potential for global warming	Kg of CO_2 eq.	-6.82E-01
Potential for depletion of stratospheric ozone	Kg of CFC11 eq	-5.40E-09
Potential for acidification	Kg of SO_2 eq.	-3.41E-04
Potential for eutrophication	Kg of PO_4^{3-}-eq.	-2.23E-04
Potential for depletion of abiotic resources	Kg of Sb eq.	-5.38E-03
Potential for formation of photochemical ozone	Kg of ethane eq.	-1.42E-05
Potential for depletion of abiotic resources (fossil resources)		-1.11E+01

D. Potential environmental benefits and impacts derived from activities of reuse, recovery and recycling

Appendix 1- Table 5. **Life cycle inventory data**

Reuse, recovery and recycling		
Parameter evaluated	**Unit per m² of panel**	**D.**
Consumption of primary renewable energy	MJ (net calorific value)	-8.99E-01
Consumption of primary non-renewable energy	MJ (net calorific value)	-1.49E+01
Use of non-renewable secondary fuels	MJ (net calorific value)	0.00E+00
Use of renewable secondary fuels	MJ (net calorific value)	0.00E+00
Consumption of fresh water	m^3	-6.5E-03
Production of waste	Kg	-7.17E-02
Hazardous	Kg	-2.61E-05
Non-hazardous	Kg	-7.10E-02
Radioactive	Kg	-7.14E-04
Material released for	Kg	0.00E+00
Reuse	Kg	0.00E+00
Recycling	Kg	0.00E+00
Energy recovery	kg	0.00E+00

D. Potential environmental benefits and impacts derived from activities of reuse, recovery and recycling

3.6 Recommendations of this DAPc®

Construction products should be compared by applying the same functional unit and level of building, i.e. including the product's behaviour throughout its life cycle.

Environmental product declarations of different systems of type III eco-labelling are not directly comparable, as the rules for calculation may be different.

This declaration represents the average behaviour for the porcelain stoneware tile product manufactured by GRESPANIA

3.7. Cut-off rules

More than 95% of the inputs and outputs of mass and energy of the system has been included, excluding the following:

- Diffuse emissions of particles into the atmosphere produced during the transportation and storage of powdered raw materials.
- Channelled atmospheric contaminants produced during the combustion phases (spray-drying, drying and firing of tiles) not provided for by applicable legislation.
- The process of recycling and reusing the waste produced during the life cycle of the tiles due to the method used for allocating impacts.
- The production of industrial machinery and equipment due to the difficulty of including all of the elements involved in an inventory, and also because the LCA community considers that the environmental impact per product unit is low in relation to the rest of the processes that are included. Also, the databases used do not include these processes, and so their inclusion would require an additional effort beyond the scope of the study.

3.8. Other data

Waste from the ceramics industry is included as "non-hazardous waste" in the European Waste Catalogue under EWC code 101200: "Waste produced by the manufacture of ceramic products" and EWC 101229 "Waste unspecified in other categories" (Decision 2000/532/EC).

4. Technical information and scenarios

Not included in the scope of the system.

5. Additional information

Technical characteristics of the product	- Declaration of performance - Euroclass of reaction to fire: $A1_{FL}$ / A1 - Breaking strength > 1300 N - BIa group water absorption ≤ 0.5% - Modulus of rupture (N/mm^2) > 50 - Resistance to thermal shock: resistant - Crazing resistance: resistant - Frost resistance: resistant

- Certified by the implementation of a Quality System that meets the requirements of ISO 14001:2004.
- Certified by the implementation of a Quality System that meets the requirements of ISO 9001:2008.
- CE Marking (Declaration of Performance)

6. PCR and inspection

This declaration is based on the document *PCR 002 Ceramic Tile products V.1.*

PCR002- Ceramic Tile Products V.1. was revised by the Advisory Board of the DAPc® system.
Independent verification of the declaration and data as per ISO 14025:2006 standard ☐ internal ☒ external
Third-party inspector: - Xavier Folch Berenguer, ITeC Oficina d'Acreditació d'Entitats Col·laboradores Verificació VEDAP-001-10 ITeC
Date of verification: 13 September 2013

References

- Life cycle analysis of PORCELAIN STONEWARE TILES. ReMa-MEDIOAMBIENTE, S.L. for GRESPANIA 2013 (unpublished)

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