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A VERIFIED ENVIRONMENTAL DECLARATION

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Confía

Environmental
Product Declaration

EN ISO 14025:2010
EN 15804:2012+A1:2014
EN 17160:2019

Ceramic Tiles. Porcelain stone-ware (water absorption group BIa EN 14411: 2016)

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VIVES

VIVES AZULEJOS Y GRES, S.A.

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☐ Internal ☑ **External**

Verification body

1. General Information

1.1 The organization

VIVES Azulejos y Gres is a company involved in the manufacture of ceramic products such as floor and wall tiles, porcelain tiles and special pieces, with the aim of offering an innovative and efficient product. Our evolution is based on a constant concern to advance and satisfy the most demanding needs of the market. Vives represents everything in ceramics with great efforts in R&D that allow us to offer quality ceramic products with the latest trends in design, capable of delighting architectural design and creating elegant, avant-garde and select environments..

A constant effort makes VIVES an innovative company in continuous renovation and adaptation to new technologies, with the most advanced production systems and a committed environmental policy through EcoVives, all backed by more than fifty years of experience

1.2 Scope of the declaration

This Environmental Product Declaration includes environmental information about a product aggrupation marked by VIVES AZULEJOS Y GRES S.A. and manufactured by two of the company's production sites, in the geographical and technological environment of Spain in the year 2019.

The results shown present the environmental behaviour of the ceramic coverings belonging the porcelain stoneware tiles, as well as the environmental data of the tiles which present a minimum and maximum impact, thus delimitating the results obtained in the LCA for the average product. The scope of this Environmental Product Declaration (from now on EPD) is from cradle-to-grave.

1.3 Life Cycle and conformity

This EPD was drafted and verified in accordance with the ISO 14025:2006, EN 15804:2012+A1:2013 and EN 17160:2019 (PCR for ceramic tiles).

This EPD may not be comparable with those developed in other programs or under different reference documents; it may not be comparable with EPD that are not developed under EN 15804:2012+A1:2013 standard. In the same way, EPDs cannot be subject to comparison if the origin of the data is different (the databases, for example), if not all relevant information modules are included, or if they are not based on the same scenarios.

Comparison of construction products shall be based on the same function, using the same functional unit at building level (or architectural or civil engineering works), i.e. including the performance of the product during the life cycle and the requirements stated in ISO 14025:2006.

2. The producto

2.1 Identification of the product

The 32 ceramic sizes included in this EPD covers the ceramic tiles pertaining group BIa (porcelain stoneware tiles), classification based on EN 14411:2016 (equivalent to ISO 13006:2018), this is their water absorption is less than 0.5% and its forming is by pressing.

The porcelain stoneware tiles included in the study cover different models with different formats. The thickness formats included in the scope of this EPD are from 7mm to 11mm, with an average weight of 21.3kg/m2.

The results of the formats included in the boundary of the present EDP are shown in the Annexes, they present the minimum and maximum environmental impact, and correspond with the 30x30 cm size of 7mm of thicknesses and 120x120 cm size of 11 mm of thicknesses respectively.

The product CPC code is 37310.

2.2 Intended use of the product

The function of the product is to cover surfaces. In this study the environmental behaviour of the porcelain stoneware tiles as indoor house surface covering has been assessed, however, the versatility of these pieces allows them to be installed in other places, such as offices, stores, hospitals, etc, in indoor and outdoor environments, as well as covering walls and other surfaces.

The product features are included in the technical datasheets which can be requested from the manufacturer, being them, the ones required by the EN 14411:2016 standard.

2.3 Composition of the product

None of the final product components are included in the Candidate List of Very Concerning Substances submitted to Authorisation.

Table 1. Main product components.

	Composition	Content
Ceramic body	Clay, feldspars, sands, kaolin and unfired ceramic scraps cerámicos sin cocer	97%
Decoration	Feldspars, carbonates, quartz, silicates, kaolin, zirconium oxides, clays, alumina, zinc oxide, etc.	3%

Figure 1 Installed product.

3. Information regarding the LCA

3.1. LCA Study

The LCA has been carried out using GaBi 10.0.0.71 *[5]* software and the data base version 2020.1. *(SP40.0) [6] (SpheraSolutions)*. The characterization factors used are those included in EN 15804:2012+A1:2013 standard.

3.2. Functional unit

The Functional Unit considered is **"To cover 1 m2 of a surface *(flooring)* of a residential area for 50 years with porcelain stoneware".**

3.3. Reference Service Life *(RSL)*

The Reference Service Life *(RSL)* of the product is the same as that of the building where it is installed provided that it is installed correctly, as it is a durable product which does not require substitution. A Reference Service Life of 50 years has been considered *(see Table 2)*.

Table 2 Reference Service Life.

Parameter	Result *(expressed per functional unit)*
Reference Service Life	Minimum 50 years
Declared product properties *(on gate)*, coatings, etc.	Minimum values of the relevant characteristics according to Annex G of the EN 14411 standard. For more information request technical data sheets according to model.
Design parameters of the application *(manufacturer's instructions)*, including references to good practices.	For more information request technical data sheets according to model.
Estimated quality of work, when installed according to the manufacturer's specifications	For more information request technical data sheets according to model.
Estimation of the quality of work, when installed from outside environment *(for outdoor applications)*, e.g. weathering, pollutants, UV radiation and wind exposure, building orientation, shading, temperature, etc.	Minimum values of the relevant characteristics according to Annex G of the EN 14411 standard. For more information request technical data sheets according to model.
Indoor environment *(for indoor applications)*, e.g. temperature, humidity, chemical exposure	Minimum values of the relevant characteristics according to Annex G of the EN 14411 standard. For more information request technical data sheets according to model.
Conditions of use, e.g.: frequency of use, mechanical exposure, etc.	For more information request technical data sheets according to model.
Maintenance, e.g.: required frequency, type and quality and replacement of replaceable components	For more information request technical data sheets according to model.

3.4 Allocation and cut off criteria

In this cradle-to-grave LCA study, a cut-off rule of 1% for the energy use *(renewable and non -renewable)* and 1% of total mass in those unitary processes, whose data is insufficient, have been applied. In total, more than 95% of all mass and energy inputs and outputs of the system have been included, excluding the not available nor quantified data.

The excluded data are the following:

- Diffuse particle emissions to the atmosphere during the transportation and storage of powdery nature raw materials.
- Non-regulated channel emissions generated during combustion stages *(spray drying, piece drying and firing)*.
- The recycling and reutilization of the residues generated during the life cycle of the ceramic coverings according to PCR. However, the recycling process of the residues and the benefits obtained from this recycled will be quantified in module D.
- Some consumable auxiliary materials production used in tiles manufacturing: polishing wheels, etc., which represent less than 0.01% of the total mass. Waste management has not been included either.
- Waste management and transport to landfill have not been included in glaze manufacturing.
- Machinery and industrial equipment production.

3.5 Representativeness, quality and selection of data

The raw data has been directly provided by VIVES, this data corresponds to two production centres of the enterprise property. For the secondary data, the most updated GaBi ts databases *[6]* have been used and modelled with GaBi version 10.0.0.71*[5]*. All data belong to a geographical scenario of Spain 2019.

The results presented are representative of ceramic coverings, expressed as average values weighted by the production of the ceramic coverings pertaining BIa group, delimiting it by the products which present the minimum and maximum environmental impact.

3.6. Other calculation rules and hypotheses

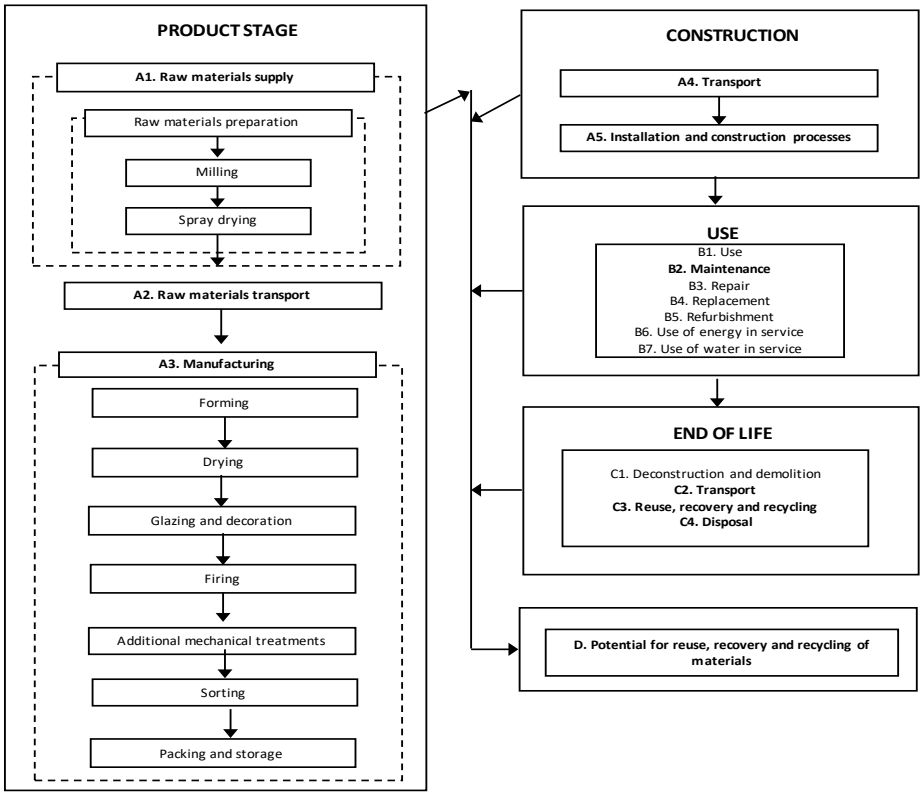
The load assignments applied have been the necessary ones to make it possible to quantify the specific data of covering tiles, as well as to carry out the necessary calculations to assign the associated data to the products which present a maximum and a minimum environmental impact.

The spray dryer includes a simultaneous heat and electricity cogeneration system by means of gas turbines, using natural gas as fuel. The combustion of natural gas provides hot gases directly to the drying stage. The electrical energy generated is partly used in the industrial plant, thus reducing the electrical requirements of the grid, and the rest is fed into the grid for sale and subsequent distribution. In this study, the generation of electricity sold to the grid has been considered as a moved load, specifically, to thermoelectric production from fuel oil/gas, according to the rate reported in Eurostat 2018.

4 System boundaries, scenarios and additional technical information

All the product stage modules relevant for the ceramic coverings according to the PCR have been included.

Figure 3 System boundaries.



The modules included are presented in the following table.

PRODUCT STAGE			CONSTRUCTION PROCESS STAGE		USE STAGE							END OF LIFE STAGE				D
Raw materials extraction	Transport	Manufacturing	Transport from the factory gate to the construction site	Instalation	Use	Maintenance	Repair	Replacement	Refurbishment	Use of energy in service	Use of water in service	Deconstruction Demolition	Transporte	Waste treatment	Disposal	Benefits and burdens beyond the system
A1	A2	A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
X	X	X	X	X	NR	X	NR	NR	NR	NR	NR	NR	X	X	X	X

*NR: Not Relevant module

4.1 Processes that precede manufacturing *(upstream)*

Raw materials supply and transport *(A1 y A2)*

The raw materials required for the ceramic tiles manufacturing are classified as: plastic raw materials and non-plastic or degreasing raw materials. Specifically, the raw materials included in the composition of the support are clays, feldspars and sands, as well as waste from the factory itself, which can be sludge or ceramic pieces generated before and after the firing stage, introduced in the grinding stage of the raw materials.

Regarding glaze raw materials, the most used in the formulation are the following ones: quartz, kaolin, alkaline feldspars, nepheline, calcium carbonate, dolomite, zircon, wollastonite, calcined alumina and ceramic frits.

The ceramic frits are insoluble glasses, prepared in an external company by complete fusion of their original raw materials, called "frits". It is estimated that around 35% of the raw materials used in the glaze applied on porcelain stoneware tiles are submitted to fritting process.

The raw materials used have different origins according to their nature and properties. The raw materials coming from outside Spain are transported by freighter to the port of Castelló, and from there by truck to the production plants. For sea transport the freighter selected is a transoceanic one, whose distance traversed depends on the origin of each case, whereas for road transport a 27t truck which meets the Euro6 standard has been chosen. All raw materials are transported in bulk, that is, they do not require packaging material, except the decoration materials which are transported in a 17,3t payload truck, from the frits and glaze factory to VIVES plants.

The preparation of raw materials for the ceramic body of VIVES ceramic tiles is carried out in the factories of the spray-dried granule suppliers. In this process, the proportion of raw materials is defined and their origin is adjusted to the characteristics of the production process and the final performance required.

The spray-dried granules are obtained by wet milling of the raw materials and subsequent spray drying. VIVES' supplier companies have installed heat and power cogeneration systems in their spray dryers. All hot gases are used in the spray dryer and the electricity generated is partly used in the production process, thus reducing the electrical requirements of the grid, and partly sold to the grid.

Once the spray – dried granule has been obtained, it is transported to the manufacturing plants.

4.2 Product manufacturing

Manufacturing (A3)

This process and the following treatments applied to the tiles are carried out in VIVES's facilities. The procedure is the following: the spry-dried powder is discharged in storage hoppers and with a feed system based in conveyor belts with weight control, this granule is sent to the forming stage by uniaxial dry pressing, carried out by hydraulic or oleodinamic presses. This is the most indicated method to control the pressing cycle.

The pieces formed are placed in a continuous dryer to reduce their humidity, duplicating or triplicating their mechanical resistance, which allows for their subsequent processing.

The tiles coming from the dryer are covered with one or more thin layers of engobe and glaze, which are applied over the ceramic body through spraying and digital glaze techniques. This treatment is used to confer the product surface a series of technique and aesthetic features, as impermeability, ease of cleaning, brightness, colour, superficial texture, chemical and mechanical resistance.

Firing is the most important stage of the ceramic tiles production process, as it is when the pieces, previously shaped, experience a fundamental modification of their features, resulting in a tough, water and chemical resistant product. The ceramic pieces are subject to a single firing single-deck roller kilns.

Once the quality controls are met, the classified pieces are packaged in primary cardboard packs and wood pallets. Finally, they are covered with film LDPE.

4.3 Construction process

Transport (A4)

Product distribution is as follows: 14% in Spain, 43% in Europe and 43% to the rest of the world.

For road transport, a 27t truck classified Euro 6 has been considered (national transport and European, average distance of 300km and 1390km, respectively). For transcontinental transport, an average transoceanic freighter has been estimated (transport to the rest of the world, 6520km), as indicated in EN 17160.

Table 3 Transport to the site

Stage of the construction process.	**Transport to the construction site**
Parameter	**Result (expressed per functional or declared unit)**
Fuel type and consumption	According to the destinations in the distribution as described above: 0.2837 l diesel (truck Euro 6 de 27 t) 0.0557 l fueloil (freighter)
Distance	300 km national distribution: 14% 1390 km European distribution: 43% 6520 km rest o f the world distribution: 43%
Capacity utilisation (including no-load return)	85% in truck 100% freighter
Bulk density of transported products	415,4 kg/m3
Usable capacity factor (factor: =1 or < 1 or ≥ 1 for products that are packed compressed or nested)	Not applicable

Product installation and construction process (A5)

Once the product is unpacked, it is installed. According to the PCRs for ceramic tiles, it has been established that the application of mortar is required for installation.

Glue mortars are cementitious adhesives consisting of a mixture of hydraulic binders, mineral fillers and organic additives, which only need to be mixed with water or liquid addition just before use. They consist of a mixture of white or grey cement, mineral fillers of siliceous and/or limestone nature and organic additives: water retaining agents, water re-dispersible polymers, rheology modifiers, fibres, etc.

The waste derived from the packaging of the pieces is managed separately according to the geographical location of the installation site. Otherwise, 3% of product losses have been considered at the installation stage.

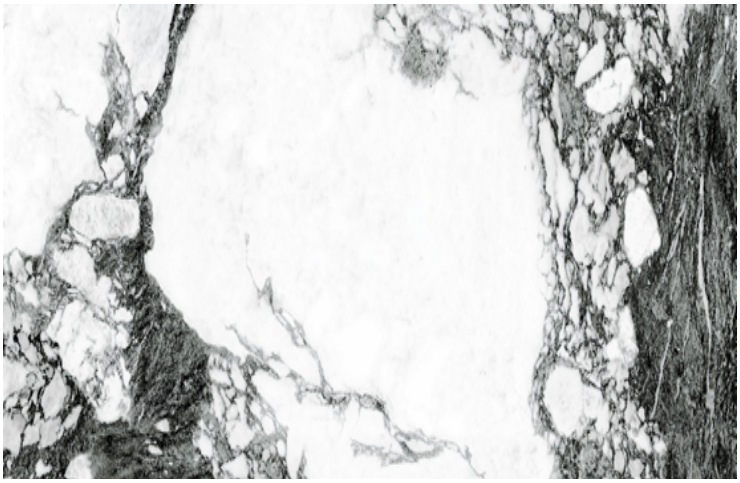


Figure 3 Picture of a porcelain stoneware tile.

Table 4 Instalation of the product in the building.

TECHNICAL INFORMATION. Stage of the construction process. Installation in the building	
Parameter	**Result (expressed per functional or declared unit)**
Supplementary materials for installation	3,3kg
Water use	0,8 l
Use of other resources	Not applicable
Quantitative description of the type of energy (regional mix) and consumption during the installation process	Not applicable
Waste of materials at the construction site before processing of waste generated at the product installation (specified by type)	Product losses: 639g Packaging wastes: - Cardboard: 159,1 g - Plastic: 12,1g - Wood: 350,7 g
Output of materials (specified by type) as a result of waste treatment waste at the construction site, e.g. from waste collected for recycling, energy recovery, disposal (specified by route)	Product losses for recycling: 447g Product losses for final deposition:192g Carboard for incinerating:14 g Carboard for recycling: 105g Cardboard for final deposition: 40 g Plastic for incinerating:2 g Plastic for recycling: 17g Plastic for final deposition: 7 g Wood for incinerating: 33 g Wood for recycling: 228 g Wood for final deposition: 90 g
Direct emissions to ambient air, soil and water	Not applicable

4.4. Use linked to the structure and performance of the building

Use (B1)

Once installed, the tiles do not require any energy input for their use, nor do they require maintenance after installation, except for normal cleaning operations. For this reason, of all the aforementioned modules, only the environmental loads attributable to product maintenance (module B2) are considered.

Maintenance (B2)

Cleaning is done with a damp cloth and, if the surface is dirty or greasy, cleaning agents such as detergents or bleaches can be used. In this study, water and disinfectant consumption has been considered for a floor covering installed in a residential scenario, i.e. cleaning once a week with water and once every two weeks with detergent during the 50-year life span.

Table 5 Use linked to the structure of the building.

TECHNICAL INFORMATION. Stage of use relating to the building	
Parameter	**Result (expressed per functional or declared unit)**
B2 MAINTENANCE	
Maintenance process	according to RCP for ceramic tiles (EN17160) residential floor cleaning scenario
Maintenance cycle	Washing once a week with water and once every two weeks with detergent.
Auxiliary materials for maintenance (e.g. cleaning products) (specify each material)	Detergent: 1,34E-04 kg/m2
Material wastage during maintenance (specify type)	Not applicabble
Net tap water consumption	0,1 l/m2
Energy input during maintenance (e.g. vacuum cleaning), type of energy carrier (e.g. electricity) and amount, if applicable and relevant	Not applicabble

4.5. End of life

Deconstruction and demolition (C1)

At the end of its service life, the product will be removed, either as part of a building renovation or during demolition. In the context of the demolition of a building, the impacts attributable to the removal of the product are negligible.

Transport (C2)

The product waste is transported in a heavy-duty truck (27 t) that complies with Euro 6 standards to be managed either by deposition in inert landfills or recycling. An average distance of 20km from the building site to the container and treatment plant (by truck) and 30km from the container or treatment plant to the destination is considered. Also included is the return of the trucks (100% empty return).

Waste management for reuse, recovery and recycling (C3)

It has been estimated that 70% of tiles are recycled and/or reused, as indicated in the PCR.

Final disposal (C4)

It is estimated that 30% of the product is sent to controlled landfill after the end of its service life.

Table 6 End of life

TECHNICAL INFORMATION. End of life	
Parameter	**Result (expressed per functional or declared unit)**
Collection process, specified by type	24,6 kg/m2
Recovery system, specified by type	17.2 kg recycled as filler material
Disposal, specified by type	7,4 kg to controlled landfill
Assumptions for scenario development (e.g.: transport)	The product waste is transported in a heavy-duty truck (24 t) that complies with Euro 6 standards to be managed either by deposition in inert landfills or recycling. An average distance of 20km from the building site to the container and treatment plant (by truck) and 30km from the container or treatment plant to the destination is considered. Also included is the return of the trucks (100% empty return).

4.6. Benefits and loads outside the boundaries of the building system

Module D Potential environmental benefits and burdens of reuse, recovery and recycling activities

The environmental burdens and benefits of obtaining secondary material from waste generated at the manufacturing stage (waste such as cardboard, plastic and wood), at the installation stage (product losses, tile packaging waste: cardboard, plastic and wood) and at the end of life of the product have been considered.

Figure 4 Picture of a porcelain stoneware tile

5 Declaratión of LCA and LCI enviromental parameters y del ICV

The following tables include the LCA and LCI parameter data.

The results associated with the tiles having the minimum and maximum environmental impact are presented in Annexes I and II.

Environmental impacts

Parameters	Unit	A1-A3	A4	A5	B1	B2	B3-B7	C1	C2	C3	C4	D
GWP	kg CO2 eq	11,3	9,3E-01	1,3	N.R.	2,5E-01	N.R.	N.R.	1,1E-01	0	1,1E-01	-2,5E-01
ODP	kg CFC11 eq	1,4E-09	1,5E-16	4,3E-11		1,5E-07			1,8E-17	0	1,1E-13	-3,6E-09
AP	kg SO2 eq	7,0E-02	5,9E-03	3,7E-03		1,7E-03			7,3E-05	0	6,5E-04	-7,5E-04
EP	kg (PO4)3- eq	1,5E-02	6,9E-04	7,8E-04		3,9E-04			1,3E-05	0	8,7E-05	-1,1E-04
POCP	kg etileno eq	4,7E-03	3,7E-04	2,7E-04		5,5E-04			1,1E-05	0	5,1E-05	-6,6E-05
ADPE	kg Sb eq	3,3E-05	5,9E-08	1,5E-06		1,5E-08			7,8E-09	0	1,2E-08	-6,3E-08
ADPF	MJ	205,9	12,3	11,2		1,4			1,5	0	1,4	-4,2

GWP = Global warming potential**; ODP =** Depletion potential of the stratospheric ozone layer; **AP =** Acidification potential of soil and water resource**s; EP =** Eutrophication potential; **POCP** = Formation potential of tropospheric ozone photochemical oxidants; **ADPE** = Abiotic depletion potential for non fossil resources; **ADPF** = Abiotic depletion potential for fossil resources; **N.R**.: Not Relevant module

Resources use

Parameters	Unit	A1-A3	A4	A5	B1	B2	B3-B7	C1	C2	C3	C4	D
PERE	MJ	38,9	5,8E-01	2,4	N.R.	6,1	N.R.	N.R.	8,2E-02	0	1,7E-01	3,5E-01
PERM	MJ	0	0	0		0			0	0	0	0
PERT	MJ	38,9	5,8E-01	2,4		6,1			8,2E-02	0	1,7E-01	3,5E-01
PENRE	MJ	222,4	12,4	12,3		1,6			1,5	0	1,5	1,4
PENRM	MJ	0	0	0		0			0	0	0	0
PENRT	MJ	222,4	12,4	12,3		1,6			1,5	0	1,5	1,4
SM	kg	0	0	0		0			0	0	0	0
RSF	MJ	0	0	0		0			0	0	0	0
NRSF	MJ	0	0	0		0			0	0	0	0
FW	m3	4,7E-02	6,7E-04	3,5E-03		2,3E-01			9,5E-05	0	2,8E-04	-2,3E-03

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

Output flows and residues categories.

Parameters	Unit	A1-A3	A4	A5	B1	B2	B3 - B7	C1	C2	C3	C4	D
HWD	kg	1,3E-06	4,7E-07	8,9E-08		1,1E-09			6,8E-08	0	0	0
NHWD	kg	48,1	1,8E-03	1,8		6,6E-02			2,2E-04	0	6,8	0
RWD	kg	5,9E-03	1,5E-05	3,8E-04		2,1E-05			1,8E-06	0	2,0E-05	7,3E-06
CRU	kg	0	0	0	N.R.	0	N.R.	N.R.	0	0	0	0
MFR	kg	1,6E-02	0	5,8E-01		0			0	15,9	0	0
MER	kg	0	0	0		0			0	0	0	0
EE	MJ	0	0	0		0			0	0	0	0

HWD = Hazardous waste disposed; **NHWD** = Non-hazardous waste disposed; **RWD** = Radioactive waste disposed **CRU** = Components for re-use; **MFR** = Materials for recycling; **MER** = Materials for energy recovery; **EE** = Exported energy;. **N.R.**: Not Relevant module

6 Additional environmental information

6.1 Indoor air emissions

In the ceramic covering manufacturing process, tiles are subjected to a thermal process above 1000ºC. At these temperatures, any organic compound in the compositions decomposes, yielding an inert end-product free of any volatile organic compounds that might be released in the stage use.

6.2 Release to soil and water

Ceramic coverings release no compounds into the soil or water during their use stage, because a completely inert product is involved that undergoes no physical, chemical, or biological transformations, is neither soluble nor combustible, and does not react physically or chemically or in any other way, is not biodegradable, and does no adversely affect to other materials with which it enters into contact such that it might produce environmental pollution or harm human health. It is a non-leaching product, so that it does not endanger the quality of surface water or groundwater.

ANNEX I. Declaration of the environmental parameters of the LCA and LCI for the format with minimum impacts

Environmental impacts

Parameters	Unit	A1-A3	A4	A5	B1	B2	B3-B7	C1	C2	C3	C4	D
GWP	kg CO2 eq	8,6	6,9E-01	9,8E-01	N.R.	1,8E-01	N.R.	N.R.	7,9E-02	0	8,2E-02	-1,9E-01
ODP	kg CFC11 eq	8,9E-10	1,1E-16	2,7E-11		1,1E-07			1,3E-17	0	8,3E-14	-2,7E-09
AP	kg SO2 eq	7,8E-02	4,4E-03	3,5E-03		1,2E-03			5,4E-05	0	4,8E-04	-5,6E-04
EP	kg (PO4)3- eq	1,8E-02	5,1E-04	7,8E-04		2,9E-04			9,4E-06	0	6,5E-05	-8,1E-05
POCP	kg etileno eq	5,0E-03	2,8E-04	2,5E-04		4,1E-04			8,4E-06	0	3,8E-05	-4,9E-05
ADPE	kg Sb eq	2,1E-05	4,4E-08	9,1E-07		1,1E-08			5,8E-09	0	8,7E-09	-4,7E-08
ADPF	MJ	164,1	9,2	8,7		1,0			1,1	0	1,1	-3,1

GWP = Global warming potential**; ODP =** Depletion potential of the stratospheric ozone layer; **AP =** Acidification potential of soil and water resource**s; EP =** Eutrophication potential; **POCP** = Formation potential of tropospheric ozone photochemical oxidants; **ADPE** = Abiotic depletion potential for non fossil resources; **ADPF** = Abiotic depletion potential for fossil resources; **N.R.**: Not Relevant module

Resources use

Parameters	Unit	A1-A3	A4	A5	B1	B2	B3-B7	C1	C2	C3	C4	D
PERE	MJ	28,2	4,3E-01	1,8	N.R.	4,5	N.R.	N.R.	6,1E-02	0	1,3E-01	2,6E-01
PERM	MJ	0	0	0		0			0	0	0	0
PERT	MJ	28,2	4,3E-01	1,8		4,5			6,1E-02	0	1,3E-01	2,6E-01
PENRE	MJ	176,1	9,2	9,4		1,2			1,1	0	1,1	1,1
PENRM	MJ	0	0	0		0			0	0	0	0
PENRT	MJ	176,1	9,2	9,4		1,2			1,1	0	1,1	1,1
SM	kg	0	0	0		0			0	0	0	0
RSF	MJ	0	0	0		0			0	0	0	0
NRSF	MJ	0	0	0		0			0	0	0	0
FW	m3	3,7E-02	5,0E-04	2,6E-03		1,7E-01			7,0E-05	0	2,1E-04	-1,7E-03

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

Output flows and residues categories.

Parameters	Unit	A1-A3	A4	A5	B1	B2	B3 - B7	C1	C2	C3	C4	D
HWD	kg	8,8E-07	3,5E-07	6,4E-08		7,8E-10			5,0E-08	0	0	0
NHWD	kg	35,5	1,3E-03	1,3		4,9E-02			1,7E-04	0	5,1	0
RWD	kg	4,4E-03	1,1E-05	2,8E-04		1,5E-05			1,3E-06	0	1,5E-05	5,6E-06
CRU	kg	0	0	0	N.R.	0	N.R.	N.R.	0	0	0	0
MFR	kg	1,2E-02	0	4,3E-01		0			0	11,8	0	0
MER	kg	0	0	0		0			0	0	0	0
EE	MJ	0	0	0		0			0	0	0	0

HWD = Hazardous waste disposed; **NHWD** = Non-hazardous waste disposed; **RWD** = Radioactive waste disposed **CRU** = Components for re-use; **MFR** = Materials for recycling; **MER** = Materials for energy recovery; **EE** = Exported energy;. **N.R.**: Not Relevant module

ANNEX II. Declaration of the environmental parameters of the LCA and LCI for the format with maximum impacts

Environmental impacts

Parameters	Unit	A1-A3	A4	A5	B1	B2	B3-B7	C1	C2	C3	C4	D
GWP	kg CO2 eq	13,8	1,1	1,6		2,9E-01			1,3E-01	0	1,3E-01	-3,0E-01
ODP	kg CFC11 eq	3,3E-09	1,7E-16	9,8E-11		1,8E-07			2,1E-17	0	1,3E-13	-4,3E-09
AP	kg SO2 eq	7,8E-02	7,0E-03	4,2E-03		2,0E-03			8,6E-05	0	7,6E-04	-8,9E-04
EP	kg (PO4)3- eq	1,6E-02	8,2E-04	8,7E-04	N.R.	4,6E-04	N.R.	N.R.	1,5E-05	0	1,0E-04	-1,3E-04
POCP	kg etileno eq	5,2E-03	4,4E-04	3,1E-04		6,4E-04			1,3E-05	0	6,0E-05	-7,8E-05
ADPE	kg Sb eq	8,3E-05	7,0E-08	3,9E-06		1,7E-08			9,2E-09	0	1,4E-08	-7,4E-08
ADPF	MJ	238,6	14,5	13,1		1,7			1,7	0	1,7	-4,9

GWP = Global warming potential**; ODP =** Depletion potential of the stratospheric ozone layer; **AP =** Acidification potential of soil and water resource**s; EP =** Eutrophication potential; **POCP** = Formation potential of tropospheric ozone photochemical oxidants; **ADPE** = Abiotic depletion potential for non fossil resources; **ADPF** = Abiotic depletion potential for fossil resources; **N.R**.: Not Relevant module

Resources use

Parameters	Unit	A1-A3	A4	A5	B1	B2	B3-B7	C1	C2	C3	C4	D
PERE	MJ	51,1	6,8E-01	3,0		7,2			9,6E-02	0	2,0E-01	4,1E-01
PERM	MJ	0	0	0		0			0	0	0	0
PERT	MJ	51,1	6,8E-01	3,0		7,2			9,6E-02	0	2,0E-01	4,1E-01
PENRE	MJ	260,5	14,6	14,4		1,9			1,7	0	1,7	1,7
PENRM	MJ	0	0	0	N.R.	0	N.R.	N.R.	0	0	0	0
PENRT	MJ	260,5	14,6	14,4		1,9			1,7	0	1,7	1,7
SM	kg	0	0	0		0			0	0	0	0
RSF	MJ	0	0	0		0			0	0	0	0
NRSF	MJ	0	0	0		0			0	0	0	0
FW	m3	5,5E-02	7,9E-04	4,1E-03		2,7E-01			1,1E-04	0	3,3E-04	-2,7E-03

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

Output flows and residues categories.

Parameters	Unit	A1-A3	A4	A5	B1	B2	B3 - B7	C1	C2	C3	C4	D
HWD	kg	2,2E-06	5,6E-07	1,3E-07		1,2E-09			8,0E-08	0	0	0
NHWD	kg	57,2	2,1E-03	2,1		7,7E-02			2,6E-04	0	8,1	0
RWD	kg	7,1E-03	1,8E-05	4,5E-04		2,4E-05			2,1E-06	0	2,4E-05	7,8E-06
CRU	kg	0	0	0	N.R.	0	N.R.	N.R.	0	0	0	0
MFR	kg	1,9E-02	0	6,8E-01		0			0	18,8	0	0
MER	kg	0	0	0		0			0	0	0	0
EE	MJ	0	0	0		0			0	0	0	0

HWD = Hazardous waste disposed; **NHWD** = Non-hazardous waste disposed; **RWD** = Radioactive waste disposed **CRU** = Components for re-use; **MFR** = Materials for recycling; **MER** = Materials for energy recovery; **EE** = Exported energy;. **N.R.**: Not Relevant module

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