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Ceramic Tiles. Porcelain stoneware (water absorption group Ala EN 14411: 2016)

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Environmental Product Declaration

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

GRUPO GRECO GRES

GRUPO GRECO GRES INTERNACIONAL, S.L.

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GlobalEPD EN 17160-005 The RCPs for ceramic tiles (EN 17160: 2019) serve as the basis for the RCPs for this DAP.
Independent verification of the declaration and data, according to ISO 14025:2010 ☐ Internal ☑ **External**
Verification body AENOR Confía

1 General information

1.1 The organization

Grupo Greco Gres Internacional is a group of companies with a long tradition in ceramics, located in Alameda de La Sagra (Toledo) whose origins date back to 1940. The experience accumulated during decades in our production plants is dedicated to the elaboration of high technology ceramic products. The quality of these, have allowed us to continue growing until today where it is possible to find our products both nationally and internationally, helped by our more than 10 delegations spread all over the world.

In the year 2000, Grupo Greco Gres Internacional continued its commitment to expand its range of products and to improve its processes, so it created Venatto Design, a new factory dedicated to the production of porcelain stoneware by extrusion, which over the years has allowed us to position ourselves nationally and internationally as a benchmark in the manufacture of porcelain floor tiles, ventilated facades and other innovative products.

1.2 Scope of the Declaration

This Environmental Product Declaration includes environmental information about a product aggrupation manufactured in Venatto Design, S.L site from GRUPO GRECO GRES INTERNACIONAL, S.L 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 extruded 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.

THis EPD version has been issued in 2022 exclusively for udated the company logo.

1.3 Life cycle and conformity

This EPD was drafted and verified in accordance with the ISO 14025:2010, 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 14025:2010.

2 The product

2.1 Identificación of product

The ceramic tiles included in this EPD covers the ceramic tiles pertaining group AIa (porcelain stoneware tiles), classification based on EN 14411:2016 (equivalent to ISO13006:2018), this is their water absorption is less than 0.5% and its forming is by extrusion.

The extruded porcelain stoneware tiles included in the study cover 44 commercial sizes, glazed and unglazed, with additional mechanical treatments. The thickness formats included in the scope of this EPD are from 6mm to 20 mm, with an average weight of 30.2kg/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 20x120cm, 20x180cm size of 22.5kg/m2 and 33x160cm size of 40.3 kg/m2 of weight respectively.

The product CPC code is 37310.

2.2 Product performance

The function of the product is to cover surfaces. In this study the environmental behaviour of the extruded 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	99%
Decoration	Feldspars, carbonates, quartz, silicates, kaolin, zirconium oxides, clays, alumina, zinc oxide, etc..	1%

Figure 1 Installed product

3 Information regarding the LCA

3.1 LCA Study

The LCA has been carried out using GaBi 10.5.1.124 [5] software and the data base version 2021.1. (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	Mínimum 50 years
Declared product properties (on gate), coatings, etc.	Minimum values of the relevant characteristics according to Annex M 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 M 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 M 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.
- In glaze manufacture, sectoral data for frits and glazes have been used and do not take into account the production of auxiliary materials and the management of glaziers’ waste.
- Machinery and industrial equipment production.

3.5 Representativeness, quality and selection of data

The raw data has been directly provided by GRECO GRES; this data corresponds to their production plant (Venatto Design), in Alameda de la Sagra (Toledo). For the secondary data, the most update Gabi ts databases [6] have been used and modelled with GaBi version 10.5.1.124 [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 AIa 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.

3.7. Deviations of the impact results

The results of the sizes associated with the highest and lowest environmental impact show deviations of more than 10% from the weighted average. Annexes I and II show the environmental impact results of the reference with minimum and maximum impact values respectively.

Figure 2 Installed product

The following table shows the deviations of the average ceramic tiles manufactured by Greco Gres for some of the impact categories studied, at the product manufacturing stage (A1-A3), according to EN15804+A1

Table 3 Deviations from the average

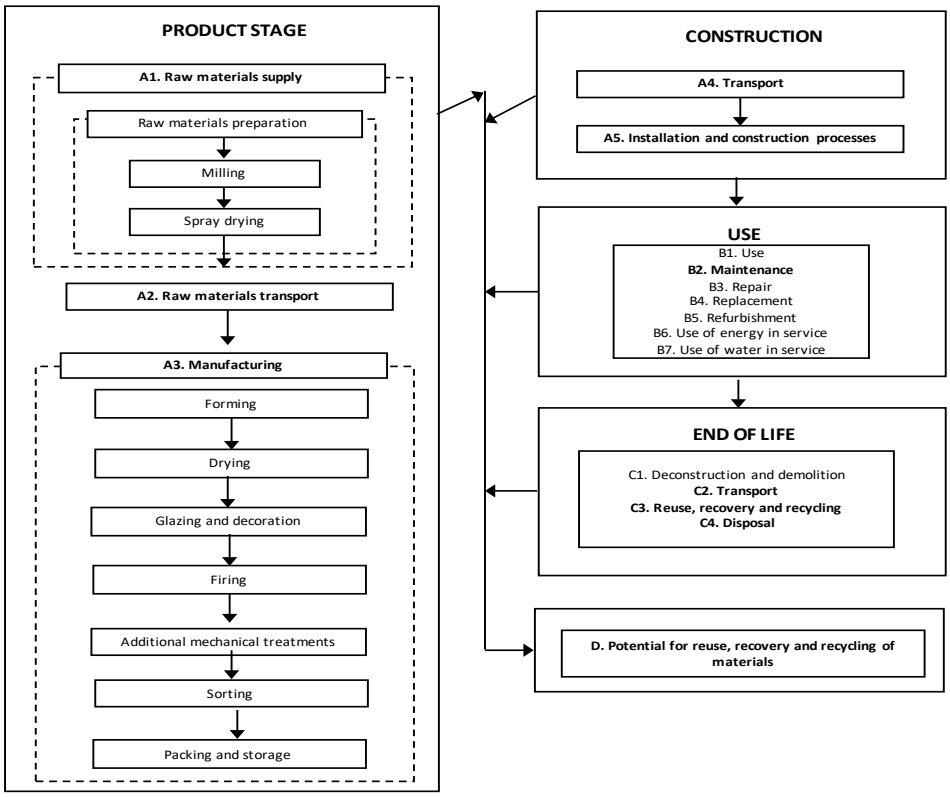
Parameter	GWP	ODP	AP	POCP	ADPF
Deviations from the average (±%)	-26% +32%	-25% +30%	-23% +28%	-24% +33%	-26% +33%

GWP = Global Warming Potential; **ODP** = Depletion potential of the stratospheric ozone layer; **AP** = Acidification potential of soil and water resources; **POCP** = Formation potential of tropospheric ozone photochemical oxidants; **ADPF** = Abiotic depletion potential for fossil resources

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	Installation	Use	Maintenance	Repair	Replacement	Refurbishment	Use of energy in service	Use of water in service	Deconstruction Demolition	Transport	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	X	X	X	X	X	X	X	X	X	X	X	X

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 30% of the raw materials used in the glaze applied on extruded 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 GRECO GRES plants.

The preparation of raw materials for the ceramic body of GRECO GRES ceramic tiles is carried out in their own sites. 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.

4.2 Product Manufacturing

Manufacturing (A3)

Once the spray-dried granules have been obtained, they are stored in storage hoppers. Before forming, water is added to the atomised granules to form a kind of paste with a humidity of approximately 17% to facilitate extrusion forming. This process is called kneading.

Once the humidity of the paste has increased, the extrusion process is carried out, which consists of passing a column of paste, in a plastic state, through a die, by means of the thrust of a propulsion system. Once the extrusion has been carried out, the material obtained is cut or die-cut to obtain the size of the required part.

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 and porexpan.

4.3 Construction process

Transport (A4)

Product distribution is as follows: 47% in Spain, 11% in Europe and 42% 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 4 Transport to the site

Stage of the construction process. Transport to the construction site	**Transporte a la obra**
Parameter	**Result (expressed per functional unit)**
Fuel type and consumption	According to the destinations in the distribution as described above: 0.1719 l diesel (truck Euro 6 27 t) 0.01719 l fuel oil (freighter)
Distance	300 km national distribution: 47% 1390 km European distribution: 11% 6520 km rest of the world distribution: 42%
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 4 Installed product

Table 5 Installation of the product in the building.

TECHNICAL INFORMATION. Stage of the construction process. Installation in the building	
Parameter	**Result (expressed per functional 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: 905g Packing wastes: - Cardboard: 229 g - Plastic: 558g - Wood: 1 408 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: 633g Product losses for final deposition: 271g Carboard for incinerating:20 g Carboard for recycling: 154g Cardboard for final deposition: 56 g Plastic for incinerating:54 g Plastic for recycling: 342g Plastic for final deposition: 162g Wood for incinerating: 122 g Wood for recycling: 928g Wood for final deposition: 359g
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 6 Use linked to the structure of the building.

TECHNICAL INFORMATION. Stage of use relating to the building	
Parameter	**Result (expressed per functional unit)**
B2 MAINTENANCE	
Maintenance process	According to RCP for ceramic tiles (EN 17160) 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 applicable
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 applicable

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 7 end of life

TECHNICAL INFORMATION. End of life	
Parameter	**Result (expressed per functional unit)**
Collection process, specified by type	33,5 kg/m2
Recovery system, specified by type	23,5 kg recycled as filler material
Disposal, specified by type	10 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 (tile waste, tile packaging waste: cardboard, plastic and wood) and at the end of life of the product have been considered.

Figure 5 Installed product

5 Declaration of LCA and LCI Environmental parameters

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.

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.

Parámetro	Unidad	A1-A3	A4	A5	B1	B2	B3-B7	C1	C2	C3	C4	D
GWP	kg CO2 eq	26,6	7,6E-01	2,9	N.R.	3,3E-01	N.R.	N.R.	1,4E-01	0	1,5E-01	-1,2
ODP	kg CFC11 eq	1,0E-08	1,2E-16	3,0E-10		2,1E-07			2,5E-17	0	1,5E-13	-1,1E-08
AP	kg SO2 eq	4,3E-02	8,0E-03	3,6E-03		2,2E-03			8,9E-05	0	8,7E-04	-5,7E-03
EP	kg (PO4)3- eq	5,4E-03	9,1E-04	1,1E-03		5,3E-04			1,7E-05	0	1,2E-04	-4,4E-04
POCP	kg etileno eq	4,6E-03	4,7E-04	4,7E-04		7,4E-04			1,5E-05	0	6,9E-05	-6,5E-04
ADPE	kg Sb eq	2,9E-05	4,7E-08	9,2E-07		2,0E-08			1,1E-08	0	1,6E-08	-1,5E-07
ADPF	MJ	447,4	10,0	20,6		1,9			2,0	0	1,9	-33,0

GWP = Global warming potential; **ODP** = Depletion potential of the stratospheric ozone layer; **AP** = Acidification potential of soil and water resources; **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

Use of resources

Parameter	Unit	A1-A3	A4	A5	B1	B2	B3-B7	C1	C2	C3	C4	D
PERE	MJ	91.8	3,9E-01	4.5	N.R	8,2	N.R	N.R	1,1E-01	0	2,3E-01	-17.4
PERM	MJ	0	0	0		0			0	0	0	0
PERT	MJ	91.8	3,9E-01	4.5		8,2			1,1E-01	0	2,3E-01	-17.4
PENRE	MJ	481.5	10,0	22.4		2,2			2,0	0	2,0	-35.7
PENRM	MJ	0	0	0		0			0	0	0	0
PENRT	MJ	481.5	10,0	22.4		2,2			2,0	0	2,0	-35.7
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	2.3E-01	4,5E-04	1.0E-02		3,1E-01			1,3E-04	0	3,8E-04	-1.9E-02

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

Other outflows and waste categories

Parameter	Unit	A1-A3	A4	A5	B1	B2	B3 - B7	C1	C2	C3	C4	D
HWD	kg	2.0E-3	3.7E-10	2.2E-05		6.2E-11			9.9E-11	0	0	-4.6E-08
NHWD	kg	2.6E-01	1.3E-03	9.1E-01		8.8E-02			2.9E-04	0	9,2	3.7E-05
RWD	kg	1.2E-02	1.2E-05	6.3E-04		2.7E-05			2.4E-06	0	2,7E-05	1.5E-04
CRU	kg	0	0	0	N.R	0	N.R	N.R	0	0	0	0
MFR	kg	0	0	2.2		0			0	21,5	0	-1.2E-01
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 1000°C. 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

The results obtained are relative expressions and do not predict impacts on endpoint categories, exceeding certain levels, safety margins or risks.

Environmental impacts

Parameters	Unit	A1-A3	A4	A5	B1	B2	B3-B7	C1	C2	C3	C4	D
GWP	kg CO2 eq	19.8	5.7E-01	2.1		2,5E-01			1.1E-01	0	1,1E-01	-8,9E-01
ODP	kg CFC11 eq	7.5E-09	9.2E-17	2.2E-10		1,6E-07			1.9E-17	0	1,1E-13	-8,2E-09
AP	kg SO2 eq	3.3E-02	5.9E-03	2.7E-03		1,7E-03			6.6E-05	0	6,5E-04	-4,3E-03
EP	kg (PO4)3- eq	4.3E-03	6.8E-04	8.4E-04	N.R.	3,9E-04	N.R	N.R	1.2E-05	0	8,8E-05	-3,3E-04
POCP	kg ethylene eq	3.5E-03	3.5E-04	3.5E-04		5,5E-04			1.1E-05	0	5,1E-05	-4,8E-04
ADPE	kg Sb eq	2.1E-05	3.5E-08	6.8E-07		1,5E-08			8.4E-09	0	1,2E-08	-1,1E-07
ADPF	MJ	333.0	7.4	15.4		1,4			1.5	0	1,4	-2.5E+01

GWP = Global warming potential; **ODP** = Depletion potential of the stratospheric ozone layer; **AP** = Acidification potential of soil and water resources; **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

Use of resources

Parameters	Unit	A1-A3	A4	A5	B1	B2	B3-B7	C1	C2	C3	C4	D
PERE	MJ	68.4	2.9E-01	3.4		6,1			8,2E-02	0	1,7E-01	-13.0
PERM	MJ	0	0	0		0			0	0	0	0
PERT	MJ	68.4	2.9E-01	3.4		6,1			8,2E-02	0	1,7E-01	-13.0
PENRE	MJ	359.1	7.5	16.7		1,6			1,5	0	1,5	-26.6
PENRM	MJ	0	0	0	N.R	0	N.R	N.R	0	0	0	0
PENRT	MJ	359.1	7.5	16.7		1,6			1,5	0	1,5	-26.6
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	1.7E-01	3.4E-04	7.8E-03		2,3E-01			9,3E-05	0	2,8E-04	-1.4E-02

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

Other outflows and waste categories

Parameters	Unit	A1-A3	A4	A5	B1	B2	B3 - B7	C1	C2	C3	C4	D
HWD	kg	2.0E-3	2.8E-10	2.2E-05		4.6E-11			7.4E-11	0	0	-3.4E-08
NHWD	kg	2.0E-01	9.9E-04	6.8E-01		6.6E-02			2.2E-04	0	6.9	2.8E-05
RWD	kg	8.9E-03	8.8E-06	4.7E-04		2.0E-05			1.8E-06	0	2.0E-05	1.1E-04
CRU	kg	0	0	0	N.R	0	N.R	N.R	0	0	0	0
MFR	kg	0	0	1.6		0			0	16.0	0	-9.2E-02
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 maximun impacts

The results obtained are relative expressions and do not predict impacts on endpoint categories, exceeding certain levels, safety margins or risks.

Environmental impacts

Parameters	Unit	A1-A3	A4	A5	B1	B2	B3-B7	C1	C2	C3	C4	D
GWP	kg CO2 eq	35.2	1.0	3.8	N.R.	4.4E-01	N.R	N.R	1.9E-01	0	2.0E-01	-1.6
ODP	kg CFC11 eq	1.3E-08	1.6E-16	3.9E-10		2.8E-07			3.3E-17	0	2.0E-13	-1.5E-08
AP	kg SO2 eq	5.5E-02	1.1E-02	4.7E-03		3.0E-03			1.2E-04	0	1.2E-03	-7.6E-03
EP	kg (PO4)3- eq	6.8E-03	1.2E-03	1.5E-03		7.0E-04			2.2E-05	0	1.6E-04	-5.8E-04
POCP	kg ethylene eq	6.1E-03	6.2E-04	6.2E-04		9.8E-04			2.0E-05	0	9.2E-05	-8.6E-04
ADPE	kg Sb eq	2.3E-05	6.2E-08	7.7E-07		2.6E-08			1.5E-08	0	2.1E-08	-2.0E-07
ADPF	MJ	594.2	13.2	27.4		2.5			2.6	0	2.5	-44.0

GWP = Global warming potential; **ODP** = Depletion potential of the stratospheric ozone layer; **AP** = Acidification potential of soil and water resources; **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

Use of resources

Parameters	Unit	A1-A3	A4	A5	B1	B2	B3-B7	C1	C2	C3	C4	D
PERE	MJ	121.4	5.2E-01	6.0	N.R	10.9	N.R	N.R	1.5E-01	0	3.1E-01	-23.1
PERM	MJ	0	0	0		0			0	0	0	0
PERT	MJ	121.4	5.2E-01	6.0		10.9			1.5E-01	0	3.1E-01	-23.1
PENRE	MJ	640.3	13.3	29.8		2.9			2.6	0	2.6	-47.3
PENRM	MJ	0	0	0		0			0	0	0	0
PENRT	MJ	640.3	13.3	29.8		2.9			2.6	0	2.6	-47.3
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	3.1E-01	6.0E-04	1.4E-02		4.1E-01			1.7E-04	0	5.0E-04	-2.5E-02

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

Other outflows and waste categories

Parameters	Unit	A1-A3	A4	A5	B1	B2	B3 - B7	C1	C2	C3	C4	D
HWD	kg	2.0E-03	4.9E-10	2.2E-05		8.2E-11			1.3E-10	0	0	-6.1E-08
NHWD	kg	3.3E-01	1.8E-03	1.2		1.2E-01			3.9E-04	0	12.2	5.0E-05
RWD	kg	1.6E-02	1.6E-05	8.3E-04		3.6E-05			3.2E-06	0	3.6E-05	2.0E-04
CRU	kg	0	0	0	N.R	0	N.R	N.R	0	0	0	0
MFR	kg	0	0	2.9		0			0	28.5	0	-1.6E-01
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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A verified environmental statement

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A VERIFIED **ENVIRONMENTAL** DECLARATION