

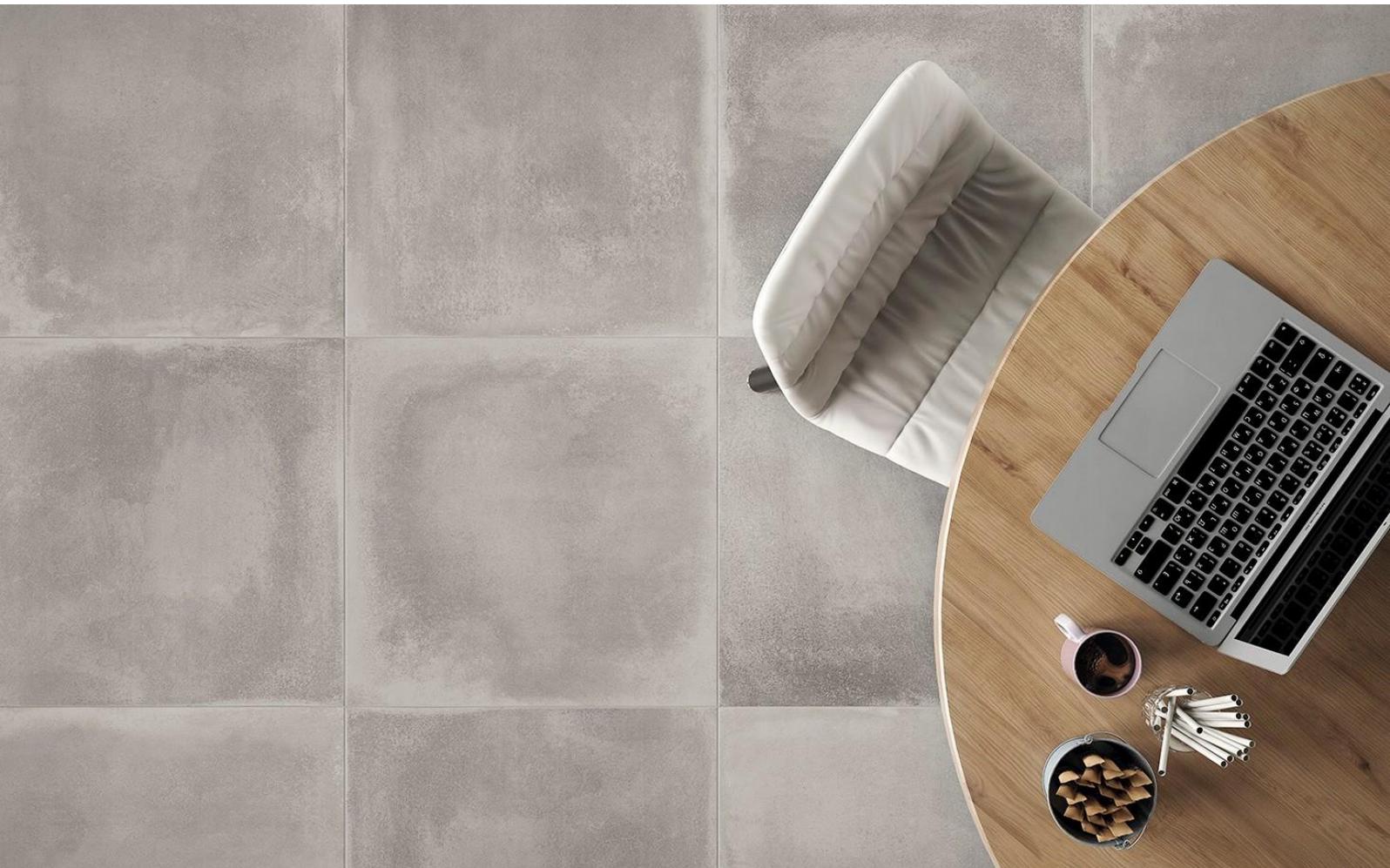
Environmental Product Declaration

ISO 14025:2006
EN 15804:2012+A1:2013

Spanish Ceramic Coverings

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The EPD holder is responsible for the content of the Declaration. The holder is responsible for keeping the records and documents supporting the content of the Declaration.

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GlobalEPD-RCP-002 rev. 2 CEN standard EN 15804:2012+A1:2013 serves as the core PCR	
Independent verification of the declaration and data, according to ISO 14025:2006	
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Verification body AENOR	

1 General information

1.1. The organization

The main objective of ASCER (Spanish Ceramic Tile Manufacturers' Association) is to support, defend and promote the general and common interests of the ceramic tile industry, as well as to offer its associates valuable services and help them to improve the management of their companies and to create sustainable competitive advantages. ASCER activities are based on the need or call for joint action in those areas in which companies are unable to successfully tackle individually, or which require a considerable financial outlay. The high representativeness of the Association as well as the geographical concentration of the companies (94% of the production in the province of Castellon) guarantee that any activity will have an immediate and a global diffusion of the sector.

1.2. Scope of the Declaration

This Environmental Product Declaration describes environmental information relative to the life cycle of Spanish Ceramic Coverings manufactured by companies associated with ASCER. The results shown are considered representative of the **companies associated with ASCER, in a geographical and technological environment of Spain in the year 2017.**

The results of the Life Cycle Analysis (LCA) of this EPD are based on data provided by manufacturers of 40% of the Spanish ceramic coverings production. The participants have provided all the data and, therefore, it is considered that the results obtained in this study are representative of the Spanish tile manufacturing sector. The scope of this EPD is from cradle to grave.

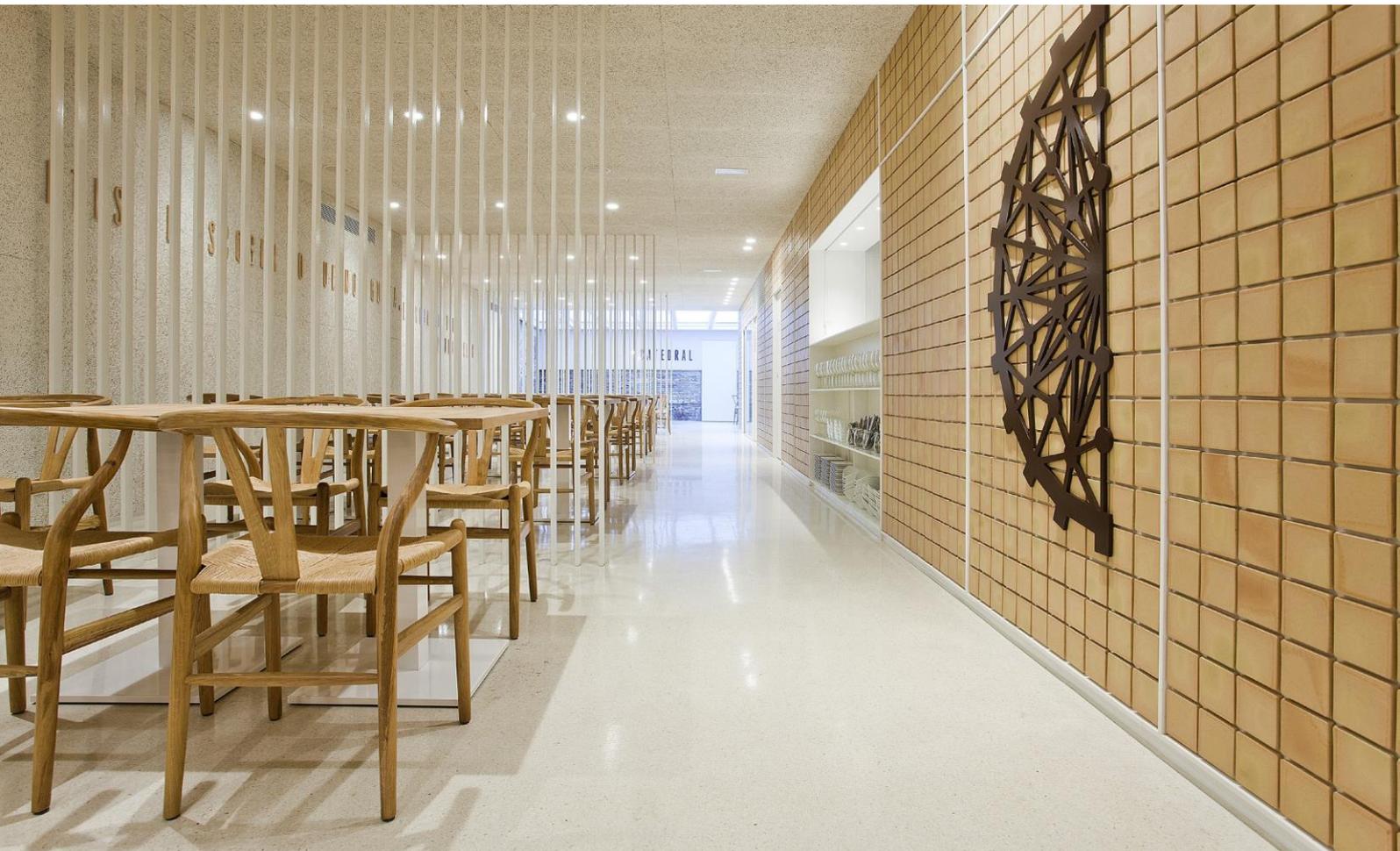


Figure 1. Installed product

1.3. Life cycle and conformity

This EPD was drafted and verified in accordance with the ISO 14025:2006 and EN 15804:2012+A1:2013 Standards and the Product Category Rules (PCR) listed in table 1.

This EPD includes the lifecycle stages listed in table 2. The EPD type is cradle-to-grave

Title	Ceramic coverings
Registration code	GlobalEPD-RCP-002 rev. 2
Issue date	2018/07/11
Conformity	EN 15804+A1
Programme	GlobalEPD
Programme Operator	AENOR

Table 1. Information of PCR.

This EPD may not be comparable with those developed in other programs or under different reference documents; in particular, it may not be comparable with EPD that are not developed under EN 15804+A1 standard. In the same way, Environmental Declarations 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, 6.7.2.

Product stage	A1	Raw materials supply	X
	A2	Transport to the manufacturer	X
	A3	Manufacturing	X
Const.	A4	Transport to the building site	X
	A5	Installation / construction	X
Use stage	B1	Use	NR
	B2	Maintenance	X
	B3	Repair	NR
	B4	Replacement	NR
	B5	Refurbishment	NR
	B6	Operational energy use	NR
	B7	Operational water use	NR
End of life	C1	Deconstruction / demolition	NR
	C2	Transport	X
	C3	Waste processing	X
	C4	Disposal	X
	D	Reuse, recovery and/or recycling potentials	X
X = Module included in the LCA			
NR = Not relevant module			
MNA = Module not assessed			

Table 2. System boundary. Information modules included.

2 The product

2.1. Identification of the product

This EPD collects environmental information on uniaxial pressing or extruded ceramic coverings for floor and/or wall covering, both indoor and outdoor. This Product Category also includes mosaics, complementary and special pieces which can be of many different sizes and shapes, even non-flat ones. In short, ceramic coverings defined by the EN 14411:2016 Standard (equivalent to ISO 13006:2018 Standard) are included. This Standard groups the ceramic coverings according to the forming mode and water absorption group: BIII, BIb/BIa, BIa, AIIb – AIII, AI – AIIa, AIIb – AIII.

The ceramic coverings presented in this EPD have an average weight of 20.3kg/m².

2.2. Intended use of the product

The product's function is to cover surfaces. The versatility of the ceramic tile allows this type of coverings to be installed in different environments (houses, offices, shops, hospitals, etc.) in interior and exterior environments, as well as covering floors, walls or other surfaces.

Technical specifications of ceramic coverings are listed in EN 14411:2016 Standard. This information will be provided by the manufacturer.

2.3. Composition of the product

The following table (table 3) describes the main components of the product.

Raw materials	Materials	Content	Units
Body	Clay, feldspar, sand, kaolin, deflocculant, unfired and fired tile scrap	96	%
Glaze	Feldspar, carbonates, quartz, borates, silicates, kaolin, zirconium oxide, clays, zinc oxide, etc.	4	%

Table 3. Composition of the product.



Figure 2. Installed product

3 Information regarding the LCA

3.1. Life cycle analysis

The Life Cycle Assessment (LCA) study on which this EPD is based has been drawn up from data provided by the Spanish manufacturers, representing 40% of the Spanish ceramic coverings manufactured in 2017.

The results in this EPD are shown as an average of the production of the ceramic coverings. This average has been obtained by weighing the data of each collaborating company, by their production.

The LCA on which this declaration is based has been conducted according to the ISO 14040 and ISO 14044 standard, and the GlobalEPD-RCP-002 version 2 for ceramic coverings of the GlobalEPD Programme of AENOR.

This LCA has a “cradle-to-grave” scope.

For further information: <https://ascer.es/>

3.2. Functional Unit

The Functional Unit is “covering 1 m² of a surface (floor, walls, façade, others) during 50 years with ceramic coverings”.

3.3. Reference service life

The Reference Service Life (RSL) is the same as that of the building where it is installed, if it is properly installed. It is a long-lasting product that does not require replacement. It has been considered a reference service life of 50 years.

PARAMETER	RESULT
Reference service life	Minimum 50 years
Declared product properties (at the gate) and finishes, etc.	Minimum values of the relevant characteristics according to EN14411. For further information, apply for the manufacturer's technical data sheet, for each model.
Design application parameters (manufacturer's instructions), including the references to appropriate practices	For further information, apply for the manufacturer's technical data sheet, for each model.
Assumed quality of work, when installed in accordance with the manufacturer's instructions	For further information, apply for the manufacturer's technical data sheet, for each model.
Outdoor environment (for outdoor applications), e.g. weathering, pollutants, UV radiation and wind exposure, building orientation, shading, temperature	Values of the relevant characteristics according to EN 14411 For further information, apply for the manufacturer's technical data sheet, for each model.
Indoor environment (indoor applications), e.g. temperature, moisture, chemical exposure	Values of the relevant characteristics according to EN 14411 For further information, apply for the manufacturer's technical data sheet, for each model.
Usage conditions, e.g. frequency of use, mechanical exposure	For further information, apply for the manufacturer's technical data sheet, for each model.
Maintenance, e.g. required frequency, type and quality and replacement of replaceable components	For further information, apply for the manufacturer's technical data sheet, for each model.

Table 4. Reference service life

3.4. Allocation and cut-off criteria

In this “cradle-to-grave” LCA study, a cut-off rule of 1% has been applied for the energy use (renewable and non-renewable) and for the mass in all single processes whose data are insufficient. More than 95% of inputs and outputs from energy and matter have been included, excluding not available and not quantifiable dataset.

The excluded dataset are:

- Diffuse particulate emissions generated by transport and storage of powdery raw materials.
- Non-regulated channelled emissions from combustion stage (spray drying, ceramic tiles drying and firing stage).
- The waste recycling and reuse processes generated throughout the life cycle of ceramic covering based on Product Category Rules (PCR). However, the waste recycling process and their benefits are considered in module D.
- Industrial machinery and equipment manufacture, owing to the lack of currently available data, the cost/complexity of analysis and the relatively low environmental impact per FU compared to other processes in the case of building products. In addition, these processes are not included in the used databases. Waste generated during the maintenance of this machinery and equipment are also excluded due to the low impact caused.

3.5. Representativeness, quality and selection of data

The primary data have been obtained through questionnaires filled in by the Spanish manufacturers, representing 40% of the Spanish ceramic coverings manufactured in 2017. These questionnaires have been individually reviewed and analysed by the authors of the LCA study to ensure data integrity, suitability and traceability.

For secondary data, GaBi databases have been used, compilation 8007 and modelled with GaBi version 8.0.7.18.

All datasets provided by the companies belong to a geographical scenario of Spain 2017.

3.6. Other calculation rules and hypotheses

The information collected from the manufacturers has been statistically treated individually and then a collective treatment has been made: analysing the scattering of the datasets, removing non-logical extremes and finally, making weighted averages by the production of each of the participating companies.

4 System boundaries, scenarios and additional technical information

All Life Cycle modules applicable to ceramic covering according to PCR have been included.

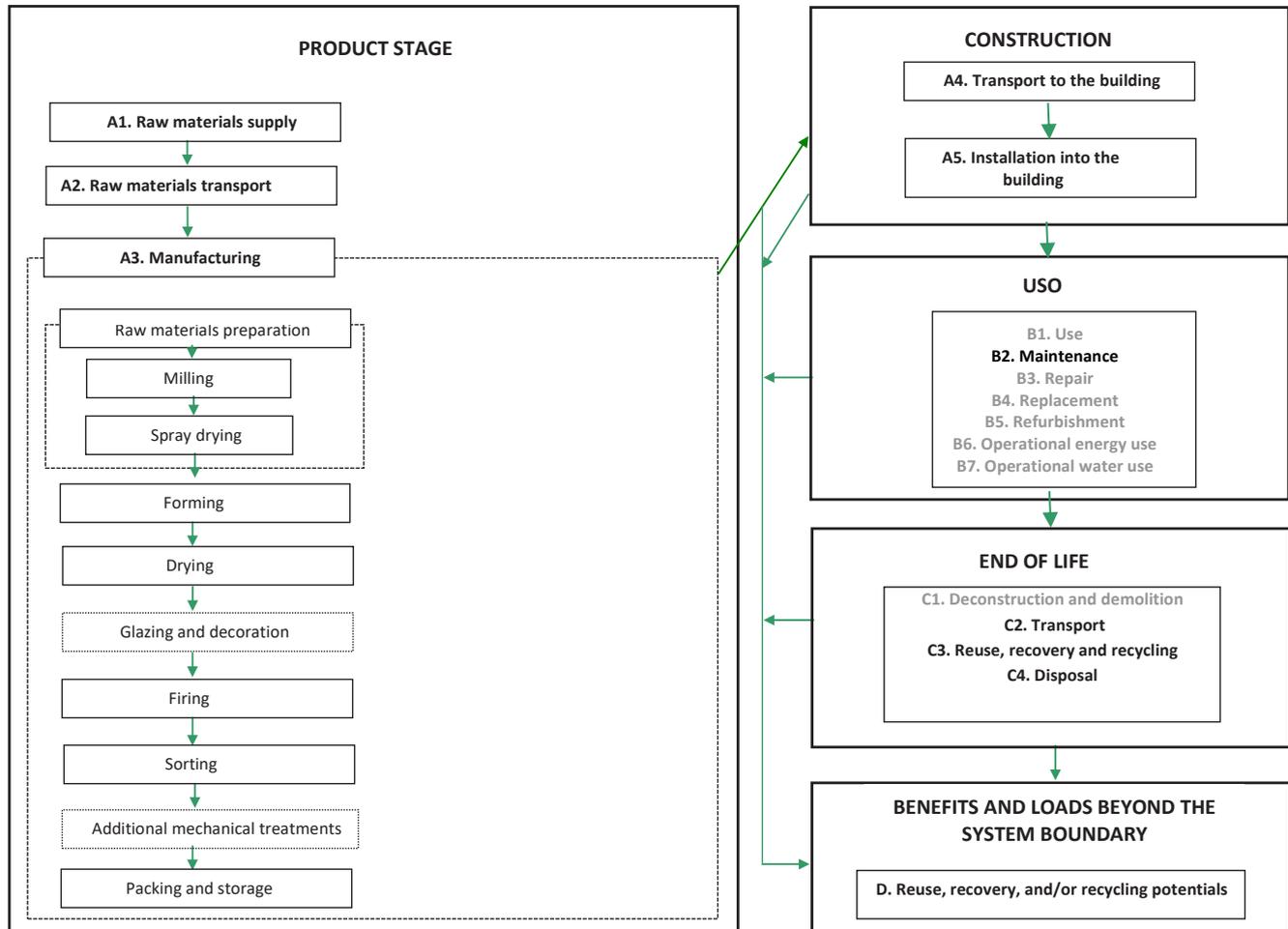


Figure 3. Stages and information modules for the building assessment.

4.1. Processes that precedes manufacturing (upstream) and manufacturing of the product (A1-A3)

Raw materials supply and transport (A1 and A2)

The basic materials for the manufacture of ceramic coverings are classified in plastic raw materials and non-plastic or degreasing raw material. Their proportion should be appropriate to form the covering and to provide enough raw strength to allow it to be processed. Other raw materials are the waste from the factory itself i.e. sludge, unfired tile scrap and fired tile scrap. These wastes are introduced in the milling stage of the raw materials.

Relative to glazes raw materials, the most common used in the formulation are: quartz, kaolin, borates, alkaline, feldspars, nepheline, calcium carbonate, dolomite, zircon, wollastonite, calcined alumina, additives (deflocculants, binders, suspending agents...) with an average frit content of 50%.

Raw materials have different sources according to their nature and properties. Raw materials that have its origin outside Spain are transported to the harbour by ship and then by truck to the manufacturing plants. For transport by sea, a type of transoceanic freighter has been chosen, whose distance travelled differs in each case depending on the origin. All raw materials are transported in bulk, i.e. with no packing.

Manufacturing (A3)

Raw materials are mixed and can be milled through a wet or dry process, being the most popular the wet milling one. The mixture of water and raw materials obtained from the wet process is then spray-dried to obtain the granule.

Most of the spray-driers have cogeneration systems for combined heat and electric power. All the heated gases generated are used in the atomization process; part of the electric energy generated is used in the manufacturing process itself, thus reducing the energy demand from the grid and other part is sold to the grid, considering therefore, a coproduct.

The granules are transported to the ceramic covering's factories. The ceramic pieces are formed by dry uniaxial pressing mainly and/or by extrusion. Currently, continuous presses are being installed to obtain tiles pieces of large sizes and reduced thicknesses.

The formed pieces are introduced into a continuous drier to reduce tile moisture content, thus doubling or tripling tile mechanical strength for subsequent processing, thus allowing next processing.

Most of the pieces are decorated with one or more thin layers of ceramic glaze. The body is also decorated with applying different techniques, being the majority, the injection of inks.

Subsequently, the ceramic coverings go on the firing stage that uses natural gas as fuel. The firing is the most important stage in the production process, as the materials have a fundamental change in the properties, obtaining a hard material, resistant to water and to chemical products. The products are subjected to firing cycles with temperatures between 1000-1300°C.

The search for new effects in ceramic covering has led to a series of additional treatments to the fired pieces: pre-cutting, cutting, surface polishing, grinding, bevelling, etc.

After the quality control processes, also known as sorting, the pieces are packaged using cardboard, pallets and polyethylene.

4.2. Transport and construction process

Transport (A4)

Product distribution is as follows: 35% of the product is distributed in Spain, 28% in Europe and 36% to the rest of the world.

For road transport a 27t truck, EURO 6 class is considered. For transcontinental transport, an average transoceanic freighter was considered. All models used are included in the database GaBi version 8.7.0.18.

Parameter	Result	Unit
Fuel tipo and consumption	0.17l diesel oil (camión Euro 6 de 27t) 0.003l fuel oil (freighter)	
Distance	35% in Spain (300 km) 28% to the rest of Europe (1390 km) 36% to the rest of the world (6520 km)	km
Capacity utilisation (including empty returns)	85 % para transporte por carretera 100 % para carguero	%
Bulk density of the transported products	415.4	kg/m ³
Volume capacity utilisation factor (factor: = 1 or < 1 or ≥ for compressed or nested packaged products)	0.2	N/A

Table 5. A4 Transport to the building site

Installation process and construction (A5)

The product is then duly unpacked for installation. Data show that, in a real scenario, the ceramic coverings need to be installed with fast-setting mortars. Waste from packaging waste is handled separately depending on the geographic location of the installation site.

Parameter	Results	Units
Auxiliary materials for the installation (to specify each material)	Cementitious adhesive: 2.73 kg	
Use of fresh water	0.00068	m ³
Use of other resources	Not applicable	
Quantitative description of energy type (regional mix) and consumption during the installation process	Not applicable	
Wastage of materials on the construction site before waste processing, generated by the product's installation (specified by type)	Packing waste: Cardboard: 0.2 Film: 0.04 Strip: 0.01 Wood: 0.3	kg
Output materials (specified by type) as a result of waste processing at the construction site (recycling, energy recovery, disposal)	Incineration of cardboard: 0.011 Recycled cardboard: 0.106 Landfill disposal of cardboard: 0.032 Incineration of plastics: 0.0053 Recycled plastics: 0.0307 Landfill disposal of plastics: 0.0133 Incineration of wood: 0.019 Recycled wood: 0.173 Landfill disposal of wood: 0.055	kg
Direct emissions to ambient air, soil and water	Not applicable	

4.3. Use linked to the structure and operation of the building

The use stage consists of the following modules:

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

Use (B1)

Once installed, the tile requires no energy input for use nor require any maintenance after installation, except normal cleaning operations. Consequently, of all the modules mentioned previously, only the environmental loads relating to product maintenance are considered (Module B2).

The reference service life (RSL) of the product is the same as that of the building where it is installed because, provided it is properly installed, it is a durable product that will not require replacement. A RSL of 50 years has been considered.

Maintenance (B2)

Cleaning is performed with a moist cloth and, if the surface exhibits any dirt or grease, cleaning agents such as detergents or bleaches can be added. In this study it has been considered the PCR's scenario according to the site of the installation:

- Cleaning frequency of wall coverings: three times a year.
- Cleaning frequency of floor coverings: once a week with water and once every two weeks with water and detergents.

The consumption of water and detergent to be taken into account are: 0.1 l water/m² and 0.134 ml detergent/m². The values used for the calculation of environmental impacts have been obtained from weightings for the productions provided by the participating companies.

Parameter	Values
Maintenance process	0.62 times a week (water+detergent)*
Maintenance cycle	Not applicable
Auxiliary materials for maintenance (specify materials)	Detergent: 1.34E-04 kg/cleaning
Wastage material during maintenance (specify materials)	Not applicable
Net fresh water consumption	0.1 l water/cleaning
Energy input during maintenance, energy carrier type and amount, if applicable and relevant	Not applicable

Table 7. Use stage. B2 Maintenance

* According to PCR 2 V.02 GlobalEPD. Weightings by wall and floor coverings. Cleaning frequency of wall coverings: three times a year; wash frequency of floor coverings once a week with water and twice a month with water and detergent.

End of life

Deconstruction and demolition (C1)

When its service life has ended, the product will be removed, either as part of building refurbishment or building demolition. In building demolition, the impacts assignable to product disassembly are negligible.

Transport (C2)

Product wastes are transported in a truck according to Euro 6 standards, over 50km to the destination.

Waste processing (C3)

According to the distribution sites of the ceramic coverings declared by de manufacturers (A5) and to the last statistics dates (Eurostat, 2016), 75% of the construction and demolition waste is assumed to go to reuse, recovery and recycling.

Final disposal (C4)

Twenty-five percent of the product is sent to a controlled landfill.

4.4. Benefits and loads beyond the system boundary, information module from reuse, recovery and/or recycling (D)

It is assumed that there are avoided loads in the manufacturing (such as cardboard, film and wood waste), in product installation (such as cardboard, plastics and wood packing waste) and in product end of life.

Parameter	Results	Units
Collection process	0	kg collected separately
	23	kg collected with mixed construction waste
Recovery system specified by type	0	kg for reuse
	17.3	kg for recycling
	Not applicable	kg for energy valorisation
Distance to disposal	50	km
Disposal (specify by type)	5	kg to a controlled landfill
Assumptions for scenario development	The product waste is transported in a large-tonnage truck (24t) that meets Euro 6. A distance of 50 km is assumed both to the final disposal site and to the recycling plant. A truck return trip (100% empty returns) is also included in accordance.	

Table 8. End of life.

5 Declaración de los parámetros ambientales del ACV y del ICV

The following table includes the averaged data of the LCA parameters.

	A1-A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
 GWP	10.7	3.8E-01	5.2E-01		3.9E-02							8.8E-02	0	6.1E-02	-2.7E-01
 ODP	5.9E-08	1.0E-14	2.6E-13		1.3E-10							2.4E-15	0	6.2E-14	-4.6E-09
 AP	1.7E-02	3.3E-04	8.0E-04		4.1E-05							6.7E-05	0	3.6E-04	-10.0E-04
 EP	2.8E-03	7.0E-05	1.7E-04	NR	2.0E-05	NR	NR	NR	NR	NR	NR	1.6E-05	0	4.9E-05	-1.1E-04
 POCP	1.5E-03	4.3E-05	7.0E-05		3.6E-06							9.7E-06	0	2.8E-05	-1.1E-04
 ADPE	2.5E-05	3.1E-08	7.3E-07		6.9E-09							7.2E-09	0	2.2E-08	-5.3E-08
 ADPF	148.1	5.1	2.5		2.2E-01							1.2	0	7.9E-01	-6.3

GWP	[kg CO ₂ eq]	Global warming potential
ODP	[kg CFC-11 eq]	Depletion potential of the stratospheric ozone layer
AP	[kg SO ₂ eq]	Acidification potential of soil and water
EP	[kg (PO ₄) ³⁻ eq]	Eutrophication potential
POCP	[kg etileno eq]	Formation potential of tropospheric ozone
ADPE	[kg Sb eq]	Abiotic depletion potential for non-fossil resources
ADPF	[MJ]	Abiotic depletion potential for fossil resources

Table 10. Parameters describing environmental impacts defined in EN 15804+A1.

		A1-A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
	PERE	15.3	2.8E-01	5.9E-01		1.7E-02							6.6E-02	0	9.5E-02	-1.3
	PERM	0	0	0		0							0	0	0	0
	PERT	15.3	2.8E-01	5.9E-01		1.7E-02							6.6E-02	0	9.5E-02	-1.3
	PENRE	154.3	5.1	2.8		2.2E-01							1.2	0	8.1E-01	-6.9
	PENRM	0	0	0		0							0	0	0	0
					NR		NR	NR	NR	NR	NR	NR				
	PENRT	154.3	5.1	2.8		2.2E-01							1.2	0	8.1E-01	-6.9
	SM	0	0	0		0							0	0	0	0
	RSF	0	0	0		0							0	0	0	0
		0	0	0		0							0	0	0	0
		3.4	2.2E-02	2.2E-01		1.0E-01							5.2E-03	0	4.5E-02	-3.2E-01

PERE [MJ] Use of renewable primary energy excluding renewable primary energy resources used as raw materials

PERM [MJ] Use of renewable primary energy resources used as raw materials

PERT [MJ] Total use of renewable primary energy resources

PENRE [MJ] Use of non-renewable primary energy excluding non-renewable primary energy resources used as raw materials

PERNRM	[MJ]	Use of non-renewable primary energy resources used as raw materials
PERNRT	[MJ]	Total use of non-renewable primary energy resources
SM	[MJ]	Use of secondary material
RSF	[MJ]	Use of renewable secondary fuels
NRSF	[MJ]	Use of non-renewable secondary fuels
FW	[m ³]	Net use of fresh energy

Table 11. Parameters describing resource use

		A1-A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
	HWD	1.4E-01	0	0		0							4.5E-02	4.5E-02	4.5E-02	4.5E-02
	NHWD	62.8	1.9E-02	8.0E-01		4.5E-02							3.4E-06	3.4E-06	3.4E-06	3.4E-06
	RWD	1.9E-03	7.0E-06	1.3E-04		3.4E-06							4.5E-02	4.5E-02	4.5E-02	4.5E-02
	CRU	0	0	0		0							0	0	0	0
	MFR	0	0	1.3E-01	NR	0	NR	NR	NR	NR	NR	NR	0	11.3	0	-1.3E-01
	MER	0	0	0		0							0	0	0	0
	EET	0	0	0		0							0	0	0	0
	EET	0	0	0		0							0	0	0	0

HWD	[kg]	Hazardous waste disposed
NHWD	[kg]	Non-hazardous waste disposed
RWD	[kg]	Radioactive waste disposed
CRU	[kg]	Components for reuse
MFR	[kg]	Materials for recycling
MER	[kg]	Materials for energy recovery
EE	[MJ]	Exported electric energy
EET	[MJ]	Exported thermal energy

Table 12. Parameters describing output flows and waste categories.

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 use stage.

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 not adversely affect 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.



Figure 4. Installed product.

References

- [1] General Instructions of the GlobalEPD Programme, 2nd revision. AENOR. February 2016
- [2] EN ISO 14025:2010 Environmental labels and declarations – Type III environmental declarations – Principles and procedures (ISO 14025:2006)
- [3] EN 15804:2012+A1:2014 Sustainability of construction Works – Environmental product declarations – Core rules for the product category of construction products.
- [4] GlobalEPD-RCP-002 Ceramic coverings. AENOR
- [5] Life cycle assessment for sectorial ceramic coverings. Report reference C184570 (ITC-AICE).

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AENOR



A verified Environmental Declaration

GlobalEPD