GlobalEPD

A VERIFIED ENVIRONMENTAL DECLARATION

AENOR

Environmental Product Declaration

EN ISO 14025:2010
EN 15804:2012+A1:2013

Ceramic tiles, glazed ceramic tiles *(clasificación* BIII clasification according to EN 14411*)*

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CERÁMICA RIBESALBES, S.A

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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Independent verification of the declaration and data, according to EN ISO 14025:2010 ☐ Internal ☑ **External**
Organismo de verificación AENOR

1 General Information

1.1. The organization

The EPD holder is Cerámica Ribesalbes, S.A. The contact details are provided in page 2 of this EPD.

1.2. Scope of the Declaration

This environmental product declaration describes the environmental information related to the life cycle of the glazed tiles (BIII group) manufactured by Cerámica Ribesalbes at its Onda plant (Castellón, Spain). This EPD represents an average product, since it includes different product families of glazed tiles (BIII group).

1.3. Lyfe cycle and conformity

This EPD has been drawn up and verified according to UNE-EN ISO 14025:2010 and the Product Category Rules (PCR) indicated in table 1.

This EPD includes the life cycle stages indicated in table 2. Thus, this EPD is cradle to grave.

Title	Ceramic coverings
Registration code	GlobalEPD-RCP-002 rev. 1
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Table 1. Information about the PCR

This Declaration cannot be subject to comparison with others as drawn up in other Programmes or in accordance with different reference documents. This EPD is not comparable with other EPD not developed according to the standard EN 15804. In the same way, environmental Declarations cannot be subject to comparison if the origin of the data is different (the data sets, for example), if not all the 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 EN ISO 14025, 6.7.2.

Product stage	A1	Raw material supply	X
	A2	Transport to the manufacturer	X
	A3	Manufacturing	X
Construction	A4	Transport to the building site	X
	A5	Installation / construction	X
Use stage	B1	Use	X
	B2	Maintenance	X
	B3	Repair	X
	B4	Replacement	X
	B5	Refurbishment	X
	B6	Operational energy use	X
	B7	Operational water use	X
End of life	C1	De-construction / demolition	X
	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; MNA = Module Not Assessed

Tabla 2. System boundary. Information modules included

2 The product

2.1. Identification of the Product

This EPD refers to the glazed tile products (BIII group), that is ceramic tiles pressed in dry with water absorption E> 10%, manufactured by Cerámica Ribesalbes S.A. for the sizes described in the following table.

7,5x15	10x20	10x30	15x15
15x30	20x20	20x25	20x30
20x33	20x40	30x30	

Table 3. Tiies formats in cm

The models represented correspond to various series. The results expressed in this EPD refer to an average glazed tile product (BIII group according to the UNE-EN 14411).

The results of the sizes included within the scope of this EPD which exhibit the maximum and minimum values of the declared impacts are declared in Annexes.

The main intended use of this product is as wall covering in the construction sector.

The life cycle assessment on which this declaration is based was performed according to standards ISO 14040 and ISO 14044 and the document PCR Ceramic Coverings (GlobalEPD-RCP-002 version 1, 2018-07-11).

This LCA is of the "cradle-to-grave" type; that is, it includes all the stages of the life cycle of the product.

2.2. Intended use of the product

The main recommended use of this product is as wall covering in the construction sector.

2.3. Composition of the product

The glazed tile (BIII group) is made from a mixture of clay and carbonates, which make up 95% of the composition. The composition also contains a 5% addition of unfired tile scrap.

The decoration is obtained using a mixture, 69% of whose composition consists of quartz, feldspar, and carbonates. The rest is consists of borates, kaolins, silicates, zirconium, alumina, zinc oxide, and clay, the quantity of each of these components being less than 8% in every case.

3 Information regarding the LCA

3.1. Life cycle analysis

This environmental product declaration (EPD) describes the environmental information related to the life cycle of the glazed tiles (BIII group) manufactured by Cerámica Ribesalbes in a geographical and technological environment of Spain in 2017.

The information of this EPD is based on the document *INFORME DE ANÁLISIS DE CICLO DE VIDA DE POROSA MEDIA DE CERÁMICA RIBESALBES*, versión 0.0, developed by Helios Pomar Blanco. The contact details can be found in page 2.

The results included in this EPD representes an averaje product.

The life cycle assessment on which this declaration is based was performed according to standards ISO 14040,ISO 14044 and the document GlobalEPD-RCP-002 revision 1 for Ceramic Coverings of the GlobalEPD Programme.

The LCA type is cradle to grave.

3.2. Functional unit

The functional unit is "1 m^2 covering of a (wall) surface in a home with glazed tiles (BIII group) for 50 years considering a residential use".

3.3. Reference service life

According to the PCR, the reference life of the ceramic tile, regardless of its type, is set at 50 years, since it is assumed to be the same as the building where it is placed.

3.4. Allocation and cut-off criteria

In order to allocate the loads for the use of recycled materials and waste recycling, the cut-off methodology has been chosen according to which the recycling of the waste from one process that is reused in another is assigned to the cycle of the second product. Therefore, in this study only those associated with transport from storage to milling have been accounted for as loads associated with the recycled raw materials of the base, without taking into account any previous load. In the same way, for the residues of the process that are going to be reintroduced (raw and cooked discards, filter dust) in the ceramic process, the only loads associated with their management process are the derived loads of transport from its place of generation to its place of storage. For the rest of waste that is not recycled internally, only the loads associated with transport will be counted in the case of external recycling, and all those associated with its final management, in the case that is not recycled.

In this study more than 95% of all the inputs and outputs of mass and energy of the system have been included, leaving out, among others, the diffuse emissions in the factory.

3.5. Representativeness, quality and selection of the data

In order to carry out this study, data for the period 2017 from the productive process of the CERAMICA RIBESALBES production facility located in Onda (Castellón, SPAIN) has been used for the most part.

In some cases, it has been necessary to useo generic data due to the lack of company data or the lack of collaboration of the suppliers of raw materials.

- Production of raw materials enamels, source Sectorial Life Cycle Assessment of the ceramic Tile Report ASCER. 2010.

- Recycled material / waste material ratio, source PEF Default data for End Of Life (EOL) v1.0 (31/07/2015).

3.6. Other calculations rules and hypotheses

This EPD expresses the average performance of a set of products. The results presented in this document are representative of the product "Average glazed tile (Group BIII)". These results have been calculated as the average of the production of the glazed tiles (absorption group BIII) of Cerámica Ribesalbes, S.A. of the year 2017.

At the same time, the impacts generated by the product with the least impact (10 cm x 20 cm, 11.60 kg/m^2) and the product with the greatest impact (30cm x 30 cm, 16.46 kg/m^2) were studied. To verify the representativeness of the average results, the Coefficient of variation was calculated dividing the standard deviation by the value of the arithmetic average of the results of the three products, obtaining a maximum value of 15%. There are no universal criteria to say that a value of the coefficient is "low" or "high", although in practice values lower than 30 or 40% are usually considered low, moderate between those amounts and approximately 80% and when they exceed 120 or 140% is already considered that the dispersion is quite high. Therefore, in view of these results it can be said that the dispersion is generally low, so the representativeness of it is high.

Figure 1. Installed product

4 System boundaries, scenarios and additional technical information

4.1. Upstream processes and manufacturing (A1-A3)

Upstream processes (A1 and A2)

The glazed tile product (group BIII) basically consists of clay.

The raw materials used are extracted in Castellón. All raw materials are transported in bulk, i.e. they require no packaging material. 5% unfired tile scrap from the manufacturing waste generated in the ceramic sector are added to the virgin clay raw material.

Once the different raw materials needed have been received at the spray-dried powder plant, they are stored in various ways, depending on their nature and type of facilities available at the company (open air yard, closed silos, semi-closed silos, hoppers, etc.) for subsequent mixing. After mixing, the raw materials are subjected to wet milling (or grinding) processes. This production process stage enables a homogenous mixture of the different components with a certain particle size to be obtained and conditioned for appropriate tile forming. The material obtained by wet milling (slurry) is then dried. Drying takes place by spray drying, the resulting product being known as spray-dried powder. The spray-dried powder is discharged through the bottom of the spray dryer and then conveyed to a series of silos where it is kept for 2 to 3 days to homogenise the powder moisture content before the forming process starts.

During the spray-drying process, the company uses a heat and electric energy cogeneration system for the spray dryer. The cogeneration process generates electricity using the waste heat from combustion, through a system of steam turbines and alternators. In a cogeneration plant with natural gas as fuel input, hot air is generated by a burner while electricity is produced by a turbine. The generated electric energy and the hot air are incorporated and partly used in the spray drying process itself, thus reducing the power demand from the grid.

The spray-dried poder is transported to the Cerámica Ribesalbes Plant through trucks, which deposit their cargo in silos.

The most common glaze raw materials are quartz, kaolin, alkaline feldspars, calcium carbonate, borates, zircon, clay, calcined alumina, ceramic frits, pigments, and additives such as suspending agents, deflocculants, or binders. The glaze raw materials come from different sources and are transported in bulk by truck and transoceanic freighter.

Manufacturing (A3)

Once the spray-dried powder has been obtained, it is conveyed to the silos. The powder is subsequently sieved and fed into the press, where the tile is formed. Most ceramic tiles are formed by uniaxial dry pressing, in which pressure is only applied on one of the tile surfaces. The widespread use of this technique in ceramic tile manufacture is basically due to the simple geometry of the tiles (rectangular, square, etc.) and to the small thickness/surface ratio. This operation is generally performed using hydraulic presses because they are the most appropriate for controlling the pressing cycle. The formed tiles are fed into a continuous dryer to reduce tile moisture content, thus doubling or tripling tile mechanical strength, which enables further processing.

The glazing operation is performed by successively applying glaze suspensions. The glazing line consists of a system of belts moved by pulleys, on which the ceramic bodies exiting the dryer are automatically placed. The necessary devices are arranged along the line for engobe and glaze application on the tile body, the engobe and glaze both being applied in the form of aqueous suspensions by continuous waterfall bell glazing.

Firing is the most important ceramic tile production process stage because this is when the freshly formed tiles undergo a fundamental change in their properties, giving rise to a hard material that is resistant to the water and chemicals. Tile firing is performed in a complete single-firing cycle.

Once fired and classified, the good tiles (whether rectified or not) are packaged using cardboard, pallets, and polyethylene. Once the pallet has been prepared, it is stored in the logistics area of the plant.

In order to reduce air emissions, so-called fabric filter baghouses and wet filters are used: the former consist of a textile membrane that is permeable to gases but retains dust, while the latter consists of a curtain or shower of recycled water that carries away the dust particles.

The tile factory has a closed water reuse system. Water losses occur by evaporation or by retention of the water in the product (which will eventually be evaporated). To compensate these losses, water inputs are required from the grid in the production processes.

4.2. Transport to site (A4) and construction process (A5)

According to the data obtained, sales of the products studied have been grouped into 3 different geographical areas shown in the following table.

Destination	Type of transport	Percentage (%)
Spain	27 t truck	23,38
Europe	27 t truck	59,49
	Freighter	
Rest of the world	27 t truck	17,13
	Transoceanic freighter	

Table 4. Scenarios applied to transport the product to the place of installation

Once the product is unpacked, it can be installed. According to the data obtained and with a view to applying a real scenario, it is established that installation calls for the use of adhesive mortar (CaSO4). Tile adhesives are cement-based adhesives comprising a mixture of hydraulic binders, mineral fillers and organic additives, mixed with water or added liquid just before use. They consist of a mixture of white or grey cement, siliceous and/or limestone mineral fillers and organic additives, water retainers, water redispersible polymers, rheology modifiers, fibres, etc.

Parameter	Value	Units
Fuel type and consumption of vehicle or vehicle type used for transport e.g. long distance truck, boat etc.	27 t truck: 1,63E-05 kg diesel/kgkm	
Distance	Road transport: 547,89 km Sea transport: 3266,96 km	km
Capacity utilisation (including empty returns)	85 % for Road transport and 100 % for Sea transport	%
Bulk density of transported products	490	kg/m³
Volume capacity utilisation factor (factor: =1 or <1 or ≥ 1 for compressed or nested packaged products)	0,2	

Table 5. A4 Transport to site

Parameter	Value	Units
Ancillary materials for installation (specified by material)	Mortar: 3,5 kg	
Water use	0,875	l
Other resource use	0 kg	kWh
Waste materials on the building site before waste processing, generated by the product's installation (specified by type)	Waste packaging Cardboard 1,10E-01 Plastic 7,82E-02 Wood 2,37E-01	kg
Output materials (specified by type) as result of waste processing at the building site e.g. of collection for recycling, for energy recovery, disposal (specified by route)	Cardboard for incineration: 6,49E-03 kg Cardboard for recyling: 7,95E-02 kg Cardboard to landfill: 2,40E-02 kg Plastic for incineration: 2,11E-02 kg Plastic for recyling: 2,81E-02 kg Plastic to landfill: 2,90E-02 kg Wood for incineration: 5,40E-02 kg Wood for recyling: 1,13E-01 kg Wood to landfill: 7,03E-02 kg	kg

Table 6. A5 Installation of the product in the building

4.3. Use related to the building fabric and the operation of the building

The use phase is divided into the following modules:

- Use (B1)
- Maintenance (B2)
- Repair (B3)
- Replacement (B4)
- Rehabilitation (B5)
- Use of operational energy (B6)
- Use of operational water (B7)

Once installed, the Glazed tile product requires no further energy input for use, nor does it call for maintenance, except normal cleaning operations. For this reason, of all the modules listed above, only the environmental impacts attributable to product maintenance are applicable (module B2).

According to CERÁMICA RIBESALBES, the life cyle of the reference product is the same as that of the building in which it is used. Provided that it is correctly installed, it is a lasting and difficult to access product. Therefore, it is not easy to replace.

Maintenance (B2)

The product should be cleaned with a damp cloth. If the surface is dirty or greasy, cleaning agents such as detergents or bleach may be added. This study considers the consumption of water and disinfectant for a scenario of residential use.

Wall covering tiles: interior residential use. Washing frequency 3 times / year

The consumption of water and detergent to take into account are:

- 0,1 l water/m^2
- 0,134 ml detergent/m^2

Parameter	Value	Units
Maintenance process	Cleaning is done with a damp cloth and, if the surface is dirty or greasy, cleaning agents such as detergents or bleaches can be added.	
Maintenance cycle	3 times/year	
Ancillary materials for maintenance, e.g. cleaning agent, specify materials	0,1 l water/cycle 0,134 ml detergent/ cycle	
Waste material resulting from maintenance (specify materials)	Does not apply	
Net fresh water consumption during maintenance	0,1 l water/cycle	
Energy input during maintenance, e.g. vacuum cleaning, energy carrier type, e.g. electricity, and amount, if applicable and relevant	No	

Table 7. Use stage. B2 Maintenance

4.4. End of life

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

Deconstruction and demolition (C1)

Once it reaches the end of its life cycle, the product will be removed, either in the framework of rehabilitation of the building or during its demolition. In the case of the demolition of a building, the impacts attributable to the removal of the product are negligible..

Transport (C2)

The product waste is transported by truck according to Euro III standards, at a distance of 50 km to its destination. To estimate the 50 km between the demolished building and the nearest landfill, only the Spanish market has been taken into consideration, extrapolating the results to the total market of the ceramics.

Waste processing (C3)

The end-of-life scenarios proposed in the PCR have been studied, shown in the following table.

Waste/Management	Spain	Europe	Rest*
Recycling (%)	70	88	50
Landfil (%)	30	12	50

Table 8. Scenarios for waste management in the End of Life. Source: PCR and Eurostat. For * an assumption is used

Disposal (C4)

The percentage of the product sent to landfill is shown in the following table.

Parameter	Value	Units
Collection process	0	kg collected separately
	12,82	kg collected with construction waste mixture
Recovery system specified by type	0	kg for reuse
	9,91	kg for recycling
	0	kg for energy recovery
Distance to disposal	50	km
Disposal	2,91	kg
Assumptions for scenario development, e.g. transportation	The product waste is transported by truck (24 t) that complies with Euro III regulations. A distance of 50 km is considered, both to the point of final disposal and to the recycling plant. It also includes the return trip of the truck (100% of empty returns) according to the typical scenarios included in the PCR.	

Table 9 End of Life

4.5. Benefits and loads beyond the system boundary

The net impacts of the recycling of the following waste have been considered:

A1-A3:

- Ceramic residual material: unfired clay, particles / dust, sludges and aqueous suspensions.

A5:

- Cardboard.
- Plastic.
- Wood (pallets)

C3

- Construction waste

5 Declaration of the environmental parameters of the LCA and LCI

The following table includes the average data from the LCA.

	A1-A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
GWP	6,85E+00	7,04 E-01	3,52E-01	0,00	4,18 E-02	0,00	0,00	0,00	0,00	0,00	NR	6,63 E-02	0,00	1,60 E-02	-7,20E-02
ODP	1,82E-06	1,07E-07	1,78E-09	0,00	4,93E-09	0,00	0,00	0,00	0,00	0,00	NR	1,07E-08	0,00	4,59E-09	-4,66E-09
AP	3,56E-02	8,44E-03	1,05E-03	0,00	1,95E-04	NR	0,00	0,00	0,00	0,00	NR	4,34E-04	0,00	1,38E-04	-1,16E-04
EP	5,60E-03	1,10E-03	6,18E-04	0,00	1,25E-04	NR	0,00	0,00	0,00	0,00	NR	7,50E-05	0,00	2,46E-05	-2,15E-04
POCP	1,33E-03	2,95E-04	8,53E-05	0,00	3,23E-05	NR	0,00	0,00	0,00	0,00	NR	9,54E-06	0,00	5,82E-06	-1,18E-05
ADPE	3,07E-06	9,78E-08	6,78E-07	0,00	1,65E-07	NR	0,00	0,00	0,00	0,00	NR	3,28E-09	0,00	1,96E-08	-3,23E-07
ADFP	1,48E+02	9,99 E+00	7,09 E+00	0,00	3,60E-01	NR	0,00	0,00	0,00	0,00	NR	9,34E-01	0,00	4,45E-01	-1,66 E+00

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-A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
PERE	6,68E+00	1,05E-01	8,17E-01	0,00	7,81E-02	0,00	0,00	0,00	0,00	0,00	NR	2,59E-03	0,00	1,07E-02	-7,69 E-01
PERM	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	NR	0,00	0,00	0,00	0,00
PERT	6,68E+00	1,05E-01	8,17E-01	0,00	7,81E-02	0,00	0,00	0,00	0,00	0,00	NR	2,59E-03	0,00	1,07E-02	-7,69 E-01
PENRE	1,47E+02	1,08 E+01	6,81 E+00	0,00	5,47E-01	0,00	0,00	0,00	0,00	0,00	NR	1,02 E+00	0,00	4,78E-01	-2,26 E+00
PENRM	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	NR	0,00	0,00	0,00	0,00
PENRT	1,47E+02	1,08 E+01	6,8 1E+00	0,00	5,47E-01	0,00	0,00	0,00	0,00	0,00	NR	1,02 E+00	0,00	4,78E-01	-2,26 E+00
SM	0,74E+00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	NR	0,00	0,00	0,00	0,00
RSF	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	NR	0,00	0,00	0,00	0,00
NRSF	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	NR	0,00	0,00	0,00	0,00
FW	2,26E-02	4,45E-04	2,31E-03	0,00	2,36E-02	0,00	0,00	0,00	0,00	0,00	NR	2,27E-05	0,00	2,96E-05	-1,35 E-03

PERE *[M)]* Use of renewable primary energy excluding renewable primary energy resources used as raw materials

PERM *[M)]* Use of renewable primary energy resources used as raw materials

PERT *[M)]* Total use of renewable primary energy resources

PENRE *[M)]* Use of non renewable primary energy excluding non renewable primary energy resources used as raw materials

PERNRM *[M)]* Use of non renewable primary energy resources used as raw materials

PERNRT *[M)]* Total use of non renewable primary energy resources

SM *[M)]* Use of secondary material

RSF *[M)]* Use of renewable secondary fuels

NRSF *[M)]* Use of non renewable secondary fuels

FW *[m^3]* Net use of fresh water

Table 11. Parameters describing resource use

	A1-A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
HWD	3,63E-03	3,68E-06	1,38E-05	0,00	5,34 E-07	0,00	0,00	0,00	0,00	0,00	NR	2,36E-07	0,00	3,00E-07	-1,29 E-06
NHWD	1,93E-01	5,74E-03	2,45E-01	0,00	5,41 E-03	NR	0,00	0,00	0,00	0,00	NR	1,77E-04	0,00	2,91E+00	-5,22 E-03
RWD	8,26E-05	7,07E-05	2,99E-05	0,00	1,27 E-06	NR	0,00	0,00	0,00	0,00	NR	6,91E-06	0,00	2,97E-06	4,63 E-07
CRU	0,00	0,00	0,00	0,00	0,00	NR	0,00	0,00	0,00	0,00	NR	0,00	0,00	0,00	0,00
MFR	1,82E+00	0,00	2,21E-01	0,00	0,00	NR	0,00	0,00	0,00	0,00	NR	0,00	9,91 E+00	0,00	0,00
MER	0,00	0,00	0,00	0,00	0,00	NR	0,00	0,00	0,00	0,00	NR	0,00	0,00	0,00	0,00
EET	0,00	0,00	0,00	0,00	0,00	NR	0,00	0,00	0,00	0,00	NR	0,00	0,00	0,00	0,00
EET	0,00	0,00	0,00	0,00	0,00	NR	0,00	0,00	0,00	0,00	NR	0,00	0,00	0,00	0,00

HWD	*[kg]*	Hazardous waste disposed
NHWD	*[kg]*	Non hazardous waste disposed
RWD	*[kg]*	Radioactive waste disposed
CRU	*[kg]*	Components for re-use
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. Release to indoor air

Ceramic tiles in their manufacturing process are subjected to a thermal process that exceeds 1000 ºC. At said temperatures, any organic compound present in the compositions decomposes, resulting in a final inert product and free of volatile organic compounds that could be emitted in their phase of use.

6.2. Release to soil and water

Ceramic tiles do not emit any compound to the soil or water in its use stage, since it is a totally inert product, which does not undergo physical, chemical or biological transformations, is neither soluble nor combustible, nor reacts physical nor chemically or in any other way, is not biodegradable, does not adversely affect other matters with which it comes into contact in a way that may lead to environmental contamination or harm to human health. It is a product that does not leach so it does not pose a risk to the quality of surface or groundwater.

The manufacturer declares that the product does not contain substances included in the Candidate List of Substances of Very High Concern for Authorization of the European Chemicals Agency.

ANNEX I Declaration of the environmental parameters of the LCA and LCI for the format with minimum impacts (10x20)

	A1-A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
GWP	6,37E+00	6,39 E-01	3,52E-01	0,00	4,18 E-02	0,00	0,00	0,00	0,00	0,00	NR	6,00 E-02	0,00	1,45 E-02	-8,34E-02
ODP	1,68E-06	9,76E-08	1,78E-09	0,00	4,93E-09	0,00	0,00	0,00	0,00	0,00	NR	9,67E-09	0,00	4,16E-09	-3,81E-09
AP	3,37E-02	7,67E-03	1,05E-03	0,00	1,95E-04	0,00	0,00	0,00	0,00	0,00	NR	3,92E-04	0,00	1,26E-04	-1,48E-04
EP	5,39E-03	9,94E-04	6,18E-04	0,00	1,25E-04	0,00	0,00	0,00	0,00	0,00	NR	6,78E-05	0,00	2,23E-05	-2,08E-04
POCP	1,23E-03	2,68E-04	8,53E-05	0,00	3,23E-05	0,00	0,00	0,00	0,00	0,00	NR	8,64E-06	0,00	5,28E-06	-1,38E-05
ADPE	3,04E-06	8,88E-08	6,78E-07	0,00	1,65E-07	0,00	0,00	0,00	0,00	0,00	NR	2,97E-09	0,00	1,78E-08	-3,02E-07
ADFP	1,37E+02	9,07 E+00	7,09 E+00	0,00	3,60E-01	0,00	0,00	0,00	0,00	0,00	NR	8,45E-01	0,00	4,04E-01	-2,17 E+00

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 I.1. Parámetros que describen los impactos ambientales definidos en la Norma UNE-EN 15804

	A1-A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
PERE	6,66E+00	9,58E-02	8,17E-01	0,00	7,81E-02	0,00	0,00	0,00	0,00	0,00	NR	2,35E-03	0,00	9,69E-03	-7,70 E-01
PERM	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	NR	0,00	0,00	0,00	0,00
PERT	6,66E+00	9,58E-02	8,17E-01	0,00	7,81E-02	0,00	0,00	0,00	0,00	0,00	NR	2,35E-03	0,00	9,69E-03	-7,70 E-01
PENRE	1,36E+02	9,79 E+00	6,81 E+00	0,00	5,47E-01	0,00	0,00	0,00	0,00	0,00	NR	9,19E-01	0,00	4,33E-01	-2,25 E+00
PENRM	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	NR	0,00	0,00	0,00	0,00
PENRT	1,36E+02	9,79 E+00	6,81 E+00	0,00	5,47E-01	0,00	0,00	0,00	0,00	0,00	NR	9,19E-01	0,00	4,33E-01	-2,25 E+00
SM	0,67E+00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	NR	0,00	0,00	0,00	0,00
RSF	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	NR	0,00	0,00	0,00	0,00
NRSF	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	NR	0,00	0,00	0,00	0,00
FW	2,17E-02	4,04E-04	2,31E-03	0,00	2,36E-02	0,00	0,00	0,00	0,00	0,00	NR	2,05E-05	0,00	2,69E-05	-1,34 E-02

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 *[m³]* Net use of fresh water

Table I.2. Parameters describing resource use

	A1-A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
HWD	3,62E-03	3,34E-06	1,38E-05	0,00	5,34 E-07	0,00	0,00	0,00	0,00	0,00	NR	2,13E-07	0,00	2,72E-07	-1,24 E-06
NHWD	1,88E-01	5,22E-03	2,45E-01	0,00	5,41 E-03	0,00	0,00	0,00	0,00	0,00	NR	1,60E-04	0,00	2,64E+00	-4,75 E-03
RWD	8,03E-05	6,42E-05	2,99E-05	0,00	1,27 E-06	0,00	0,00	0,00	0,00	0,00	NR	6,25E-06	0,00	2,69E-06	-4,61 E-07
CRU	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	NR	0,00	0,00	0,00	0,00
MFR	1,64E+00	0,00	1,99E-01	0,00	0,00	0,00	0,00	0,00	0,00	0,00	NR	0,00	8,96 E+00	0,00	0,00
MER	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	NR	0,00	0,00	0,00	0,00
EET	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	NR	0,00	0,00	0,00	0,00
EET	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	NR	0,00	0,00	0,00	0,00

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

Table I.3. Parameters describing output flows and waste categories

ANNEX I Declaration of the environmental parameters of the LCA and LCI for the format with maximum impacts (30x30)

	A1-A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
GWP	8,26E+00	8,97 E-01	3,52E-01	0,00	4,18 E-02	0,00	0,00	0,00	0,00	0,00	NR	8,51 E-02	0,00	2,05 E-02	-8,68E-02
ODP	2,21E-06	1,37E-07	1,78E-09	0,00	4,93E-09	0,00	0,00	0,00	0,00	0,00	NR	1,37E-08	0,00	5,90E-09	-3,63E-09
AP	4,09E-02	1,08E-02	1,05E-03	0,00	1,95E-04	0,00	0,00	0,00	0,00	0,00	NR	5,57E-04	0,00	1,78E-04	-1,46E-04
EP	6,22E-03	1,40E-03	6,18E-04	0,00	1,25E-04	0,00	0,00	0,00	0,00	0,00	NR	9,62E-05	0,00	3,16E-05	-2,34E-04
POCP	1,59E-03	3,77E-04	8,53E-05	0,00	3,23E-05	0,00	0,00	0,00	0,00	0,00	NR	1,23E-05	0,00	7,48E-06	-1,44E-05
ADPE	3,17E-06	1,25E-07	6,78E-07	0,00	1,65E-07	0,00	0,00	0,00	0,00	0,00	NR	4,21E-09	0,00	2,52E-08	-3,84E-07
ADFP	1,79E+02	1,27 E+01	7,09 E+00	0,00	3,60E-01	0,00	0,00	0,00	0,00	0,00	NR	1,20 E+00	0,00	5,72 E-01	-2,24 E+00

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 II.1. Parameters describing environmental impacts defined in EN 15804

	A1-A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
PERE	6,73E+00	1,34E-01	8,17E-01	0,00	7,81E-02	0,00	0,00	0,00	0,00	0,00	NR	3,33E-03	0,00	1,37E-02	-7,66 E-01
PERM	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	NR	0,00	0,00	0,00	0,00
PERT	6,73E+00	1,34E-01	8,17E-01	0,00	7,81E-02	0,00	0,00	0,00	0,00	0,00	NR	3,33 E-03	0,00	1,37E-02	-7,66 E-01
PENRE	1,77E+02	1,37 E+01	6,81 E+00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	NR	1,30 E+00	0,00	6,14E-01	-2,28 E+00
PENRM	0,00	0,00	0,00	0,00	7,81E-02	0,00	0,00	0,00	0,00	0,00	NR	0,00	0,00	0,00	0,00
PENRT	1,77E+02	1,37 E+01	6,81 E+00	0,00	5,47E-01	0,00	0,00	0,00	0,00	0,00	NR	1,30 E+00	0,00	6,14E-01	-2,28 E+00
SM	0,95E+00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	NR	0,00	0,00	0,00	0,00
RSF	0,00	0,00	0,00	0,00	5,47E-01	0,00	0,00	0,00	0,00	0,00	NR	0,00	0,00	0,00	0,00
NRSF	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	NR	0,00	0,00	0,00	0,00
FW	2,52E-02	5,68E-04	2,31E-03	0,00	0,00	0,00	0,00	0,00	0,00	0,00	NR	2,91E-05	0,00	3,81E-05	-1,39 E-03

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 *[m³]* Net use of fresh water

Table II.2. Parameters describing resource use

	A1-A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
HWD	3,65E-03	4,69E-06	1,38E-05	0,00	5,34 E-07	0,00	0,00	0,00	0,00	0,00	NR	3,03E-07	0,00	3,85 E-07	-1,42 E-06
NHWD	2,04E-01	7,32E-03	2,45E-01	0,00	5,41 E-03	0,00	0,00	0,00	0,00	0,00	NR	2,28E-04	0,00	3,74E+00	-6,61 E-03
RWD	8,96E-05	9,01E-05	2,99E-05	0,00	1,27 E-06	0,00	0,00	0,00	0,00	0,00	NR	8,87E-06	0,00	3,82 E-06	5,01 E-07
CRU	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	NR	0,00	0,00	0,00	0,00
MFR	2,33E+00	0,00	1,99E-01	0,00	0,00	0,00	0,00	0,00	0,00	0,00	NR	0,00	1,27 E+01	0,00	0,00
MER	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	NR	0,00	0,00	0,00	0,00
EET	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	NR	0,00	0,00	0,00	0,00
EET	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	NR	0,00	0,00	0,00	0,00

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

Table II.3. Parameters describing output flows and waste categories

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