GlobalEPD

A VERIFIED ENVIRONMENTAL DECLARATION

AENOR

Confía

Environmental Product Declaration

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

Ceramic Tiles. Earthenware (BIII clasification according to EN 14411: 2016)

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PAMESA cerámica

PAMESA CERÁMICA S.L

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

Holder of the Declaration

PAMESA Cerámica S.L
Camí de l'Alcora, 8
12550 Almassora (Castellón)
España

Tel (+34) 964 50 75 00
Mail marketing@pamesa.com
Web www.pamesa.com

LCA Study

Instituto de Tecnologia Cerámica – (ITC-AICE)
Campus Universitario Riu Sec,
Avda. de Vicent Sos Baynat s/n
12006 Castellón
España

Tel (+34) 964 34 24 24
Mail r_medioambiente@itc.uji.es
Web http://www.itc.uji.es

Operator of the Global EPD Programme

AENOR Internacional S.A.U.
Génova 6
28004 Madrid
España

Tel (+34) 902 102 201
Mail aenordap@aenor.com
Web www.aenor.com

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GlobalEPD-RCP-002 rev. 1
CEN standard EN 15804:2012+A1:2013 serves as the core RCP

Independent verification of the declaration and data, according to EN ISO 14025:2010

☐ Internal ☑ **External**

Verification Body

AENOR

1 General information

1.1. The organization

PAMESA CERÁMICA is the parent company of the Pamesa Group, which aims to be a leading benchmark in the design, manufacture and marketing of ceramic products that satisfies its customers' needs and guarantees excellent quality, design and value for money.

1.2. Scope of the Declaration

This Environmental Product Declaration includes environmental information about a product aggrupation manufactured by PAMESA CERÁMICA, in the geographical and technological environment of Spain in the year 2018.

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

1.3. Lyfe cycle and conformity

This EPD was drafted and verified in accordance with the EN ISO 14025:2010 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-gate.

Title	Ceramic tiles
Registration code	GlobalEPD-RCP-002 rev. 1
Issue date	2018/07/11
Conformity	UNE-EN 15804
Programme	GlobalEPD
Programme Operator	AENOR

Table 1. Information about the PCR

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, Environmental Product 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 EN ISO 14025:2010.

Product stage	A1	Raw material supply	X
	A2	Transport to the manufacturer	X
	A3	Manufacturing	X
Const.	A4	Transport to the building site	MNA
	A5	Installation / construction	MNA
Use stage	B1	Use	NR
	B2	Maintenance	MNA
	B3	Repair	NR
	B4	Replacement	NR
	B5	Refurbishment	NR
	B6	Operational energy use	NR
	B7	Operational water use	NR
End of life	C1	De-construction / demolition	NR
	C2	Transport	MNA
	C3	Waste processing	MNA
	C4	Disposal	MNA
	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 Environmental Product Declaration covers the ceramic tiles pertaining the water absorption group BIII (earthenware tiles), classification based on EN 14411:2016 (equivalent to ISO13006:2018), this is their water absorption is more than 10%.

The porcelain stoneware tiles included in the study cover different models with different formats. The thickness formats included in the scope of this EPD are from 7mm to 9.5mm, with an average weight of 15.6kg/m2.

The results of the formats included in the boundary of the present EDP are shown in the Annexes, they present the maximum and minimum environmental impact, and correspond with the 20x30 cm format of 7mm of thicknesses and 20x60 cm format of 9.5 mm of thicknesses respectively.

2.2. Intended use of the product

The function of the product is to cover surfaces. In this study the environmental behaviour of the earthenware 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 end-product components are included in the Candidate List of substances of very high concern for authorisation.

Raw materials	Content	Units
Clay, feldspar, sand, kaolin, deflocculant, unfired and fired tile scrap	94%	kg/m²
Feldspar, carbonates, quartz, borates, silicates, kaolin, zirconium oxide, clays, zinc oxide, etc.	6%	kg/m²

Table 3. Composition of the product

3 Information regarding the LCA

3.1. Life cycle analysis

The Life Cycle Analysis which is the base of the present EPD has been carried out from the data directly provided by the manufacturer PAMESA CERÁMICA, concerning its porcelain stoneware tiles manufactured in 2018 in six different production centers.

The Life Cycle Analysis in which this declaration is based has been carried out following the ISO 14040 and ISO 14044 standards and the GlobalEPD RCP-002 rev. 1 document of ceramic coverings of the Global EPD Programme administrated by AENOR, which meets the EN 15804:2012+A1:2013 standard.

The results associated to the ceramic tiles of highest and lowest environmental impact (which correspond with 30x30 cm and 8 mm of thickness, and 60x60 cm and 14 mm of thickness formats, respectively), are included in the Annexes I and II. The LCA has been carried out using GaBi 9.1.053 software and the data base version 8.007 (Thinkstep). The characterization factors used are those included in EN 15804:2012+A1:2013 standard.

3.2. Functional Unit

The functional unit considered is the covering of 1 m^2 house indoor surface (walls) for 50 years with ceramic tiles of BIII group.

3.3. Reference service life

The Service Life of the product is the same as that of the building where it is installed if 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.

3.4. Allocation and cut-off criteria

In this cradle-to-gate 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.

Figure 1. Product installed

he 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 tiles 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 datas

The raw data has been directly provided by PAMESA, this data corresponds to six production centres of the enterprise property. The secondary data comes from GaBi database, 8007 compilation and it has been modelized with GaBi 9.1.053 version. All data correspond to a 2018 geographical Spanish scene.

he results presented are representative of ceramic coverings, expressed as average values weighted by the production of the ceramic coverings pertaining BIII 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.

4 System boundaries, scenarios and additional technical information

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

The present environmental product declaration refers to the environmental behaviour of ceramic tiles manufactured by PAMESA.

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

PRODUCT STAGE

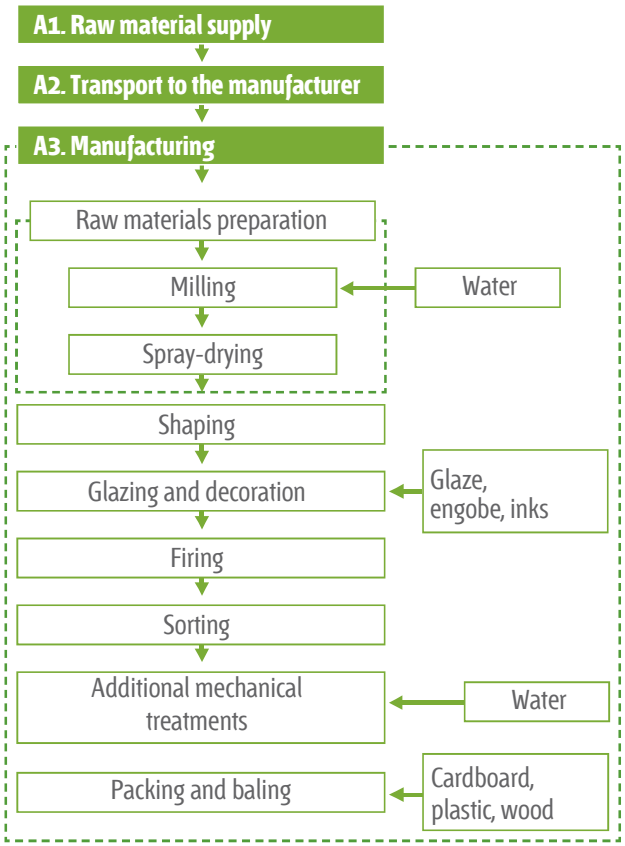

Figure 2. Product stage

Raw materials supply and transport (A1 and A2)

The raw materials required for the ceramic tiles manufacturing are classified as: plastic raw materials and non-plastic or degreasing raw materials. In general, it can be accepted that the proportion among these two types of raw materials should be such that the mixture obtained is as plastic as necessary to correctly mould the piece, and at the same time, it confers the enough resistance on green tiles to process them. The key plastic raw materials are clays and kaolins. The more common non-plastic or degreasing raw materials are silica sands and alkaline feldspars. Other raw materials to consider are the residues of the own plant, these can be sludge or fired or unfired tile scrap, which are introduced into the raw materials milling stage.

Regarding glaze raw materials, the most used in the formulation are the following ones: quartz, kaolin, alkaline feldspars, nepheline, calcium carbonate, dolomite, zircon, wollastomita, calcined alumina and ceramic frits. Moreover, ceramic pigments prepared in an external comany are also used, generally by oxide calcination and additives, (deflocculants, bindings) in order to maintain the optimal rheologic properties of the suspension which would assist the glazing operations and the obtention of the required aspect (texture and colour uniformity).

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 79% of the raw materials used in the glaze applied on porcelain stoneware tiles are submitted to fritting process.

The raw materials used have different origins according to their nature and properties. The raw materials coming from outside Spain are transported by freighter to the port of Castelló, and from there by truck to the production plants. For sea transport the freighter selected is a transoceanic one, whose distance traversed depends on the origin of each case, whereas for road transport a 27t truck which meets the Euro6 standard has been chosen. All raw materials are transported in bulk, that is, they do not require packaging material, except the decoration materials which are transported in a 17,3t payload truck which meets the Euro 5 standard, from the frits and glaze factory to PAMESA CERÁMICA plants.

.Manufacturing (A3)

The raw material preparation of PAMESA CERÁMICA is carried out by enterprises of the same business group. In this process the origin and the proportion of raw materials is defined, adjusting it to the production process characteristics and the final performance required.

Once the spray – dried granule has been obtained, it is

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

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

The tiles coming from the dryer are covered with one or more thin layers of engobe and glaze, which are applied over the ceramic body through spraying and digital glaze techniques. Then, they are decorated using different types of applications, where the most widespread is the inkjet one and to a lesser extent, the decoration using grains and photogravure. 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.

4.2. Benefits and loads beyond the system boundary

It has been considered that loads are avoided in the gestion of packing residues (cardboard, plastic and wood) generated during the manufacturing stage.

5 Declaration of the environmental parameters of the LCA and LCI

The following table includes the averaged data of theLCA parameters.

The results associated with ceramic tiles that have agreater and lesser environmental impact are presented in Annexes I and II.

	A1	A2	A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
GWP	1,5	2,8E-01	7,5	MNA	MNA	NR	MNA	NR	NR	NR	NR	NR	NR	MNA	MNA	MNA	-5,8E-04
ODP	2,2E-08	2,3E-11	-3,9E-10														-9,8E-11
AP	7,2E-03	9,0E-04	3,8E-03														-2,4E-06
EP	1,5E-03	1,3E-04	4,8E-04														-8,2E-07
POCP	5,6E-04	7,2E-05	4,9E-04														-3,2E-07
ADPE	9,6E-07	1,8E-08	-1,7E-07														-5,1E-11
ADFP	22,5	3,8	90,8														-9,5E-03

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 4. Parameters describing environmental impacts defined in EN 15804

	A1	A2	A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
PERE	9,1	2,0E-01	8,4E-11	MNA	MNA	NR	MNA	NR	NR	NR	NR	NR	NR	MNA	MNA	MNA	-8,8E-03
PERM	0	0	0														0
PERT	9,1	2,0E-01	8,4E-11														-8,8E-03
PENRE	26,0	3,8	92,7														-1,5E-02
PENRM	0	0	0														0
PENRT	26,0	3,8	92,7														-1,5E-02
SM	0	0	0														0
RSF	0	0	0														0
NRSF	0	0	0														0
FW	2,9	1,5E-02	2,0E-01														6,8E-05

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 5. Parameters describing resource use

	A1	A2	A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
HWD	2,1E-03	0	8,8E-03	MNA	MNA	NR	MNA	NR	NR	NR	NR	NR	NR	MNA	MNA	MNA	1,3E-05
NHWD	6,1	1,2E-02	33,9														-1,2E-03
RWD	8,9E-04	5,1E-06	3,1E-09														6,9E-07
CRU	0	0	0														0
MFR	0	0	0														-2,8E-03
MER	0	0	0														0
EE	0	0	0														0
EET	0	0	0														0

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	*[kg]*	Exported electric energy
EET	*[kg]*	Exported thermal energy

Table 6. Parameters describing output flows and waste categories

6 Additional environmental information

6.1. Indoor emissions

During the manufacturing process of ceramic tiles, they are put through a thermal process that exceeds 1000 ºC. At such temperatures, any organic compound present in the compositions breaks down, with the result of producing an inert end product that is free of volatile organic compounds that can be emitted in its use phase.

6.2. Release to soil and water

The ceramic tiles do not emit any compounds into the land or into water once installed by the customer in their end use stage, since the product is virtually inert and so does not undergo physical, chemical or biological transformations, is neither soluble nor combustible, does not react either physically or chemically or in any other way, is not biodegradable, does not negatively affect other materials with which it comes into contact in a way that may give rise to environmental pollution or to damage to 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 the LCI for the format of MINIMUM environmental impact

	A1	A2	A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
GWP	1,3	2,1E-01	7,1														-4,7E-04
ODP	2,2E-08	2,2E-11	-5,2E-10														-6,1E-11
AP	6,9E-03	1,3E-03	3,8E-03														-2,1E-06
EP	1,4E-03	1,6E-04	5,5E-04	MNA	MNA	NR	MNA	NR	NR	NR	NR	NR	NR	MNA	MNA	MNA	-5,4E-07
POCP	5,2E-04	8,6E-05	4,9E-04														-2,7E-07
ADPE	9,0E-07	1,3E-08	-3,6E-07														-4,1E-11
ADFP	19,5	2,9	93,5														-9,7E-03

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. Parameters describing environmental impacts defined in EN 15804

	A1	A2	A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
PERE	8,4	1,4E-01	8,2E-11	MNA	MNA	NR	MNA	NR	NR	NR	NR	NR	NR	MNA	MNA	MNA	-5,0E-03
PERM	0	0	0														0
PERT	8,4	1,4E-01	8,2E-11														-5,0E-03
PENRE	22,7	2,9	97,3														-1,3E-02
PENRM	0	0	0														0
PENRT	22,7	2,9	97,3														-1,3E-02
SM	0	0	0														0
RSF	0	0	0														0
NRSF	0	0	0														0
FW	2,7	1,1E-02	2,0E-01														4,7E-05

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 I.2. Parameters describing resource use

	A1	A2	A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
HWD	2,0E-03	0	1,4E-02	MNA	MNA	NR	MNA	NR	NR	NR	NR	NR	NR	MNA	MNA	MNA	1,3E-05
NHWD	5,1	9,2E-03	27,1														-1,2E-03
RWD	7,6E-04	3,9E-06	1,9E-09														6,9E-07
CRU	0	0	0														0
MFR	0	0	0														-1,8E-03
MER	0	0	0														0
EE	0	0	0														0
EET	0	0	0														0

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	*[kg]*	Exported electric energy
EET	*[kg]*	Exported thermal energy

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

ANNEX II Declaration of the environmental parameters of the LCA and the LCI for the format of MAXIMUM environmental impact

	A1	A2	A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
GWP	1,6	3,0E-01	9,0														-1,1E-03
ODP	2,2E-08	2,2E-11	-4,2E-10														-1,5E-10
AP	7,4E-03	1,7E-03	3,2E-03														-5,0E-06
EP	1,5E-03	2,1E-04	5,7E-04	MNA	MNA	NR	MNA	NR	NR	NR	NR	NR	NR	MNA	MNA	MNA	-1,3E-06
POCP	6,0E-04	1,2E-04	5,3E-04														-6,4E-07
ADPE	9,9E-07	1,9E-08	-1,4E-07														-9,7E-11
ADFP	25,8	4,1	108,0														-2,3E-02

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	A2	A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
PERE	9,7	2,0E-01	8,2E-11	MNA	MNA	NR	MNA	NR	NR	NR	NR	NR	NR	MNA	MNA	MNA	-1,6E-02
PERM	0	0	0														0
PERT	9,7	2,0E-01	8,2E-11														-1,6E-02
PENRE	29,7	4,1	110,0														-3,1E-02
PENRM	0	0	0														0
PENRT	29,7	4,1	110,0														-3,1E-02
SM	0	0	0														0
RSF	0	0	0														0
NRSF	0	0	0														0
FW	3,0	1,5E-02	2,4E-01														1,2E-04

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	A2	A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
HWD	2,0E-03	0	6,9E-03	MNA	MNA	NR	MNA	NR	NR	NR	NR	NR	NR	MNA	MNA	MNA	2,0E-05
NHWD	7,3	1,3E-02	52,1														-1,9E-03
RWD	1,0E-03	5,5E-06	6,2E-09														1,0E-06
CRU	0	0	0														0
MFR	0	0	0														-4,6E-03
MER	0	0	0														0
EE	0	0	0														0
EET	0	0	0														0

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	*[kg]*	Exported electric energy
EET	*[kg]*	Exported thermal energy

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

References

[1] General Instructions of the GlobalEPD Programme, 1st 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+A1:2013 Sustainability of construction works - Environmental product declarations - Core rules for the product category of construction products

[4] GlobalEPD-RCP-002 Ceramic coverings. AENOR. July 2018

[5] Life cycle assessment according to GlobalEPD Programme for ceramic coverings. Annex I C194573 of Instituto de Tecnología Cerámica.

Índex

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A verified enviromental declaration

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