GlobalEPD

A VERIFIED ENVIRONMENTAL DECLARATION

AENOR

Environmental Product Declaration

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

Clay roofing tiles in accordance with EN 1304

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HISPALYT
CERÁMICA PARA CONSTRUIR

Spanish Association of Clay Brick and Roofing Tile Manufacturers (HISPALYT)

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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AENOR is a founding member of ECO Platform, the European Association of Environmental Declarations verification Programmes

GlobalEPD-RCP-008 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

The holder of this Environmental Product Declaration (EPD) is Hispalyt, the Spanish Association of Clay Brick and Roofing Tile Manufacturers. Its contact data are given on page 2 of this EPD.

This EPD is for the exclusive use of Hispalyt and represents the environmental information of its associates, whose data may be obtained by contacting Hispalyt, or at the following URL:

www.hispalyt.es/tejas/fabricantes

1.2. Scope of the Declaration

This EPD describes one tonne of clay roofing tiles and fittings manufactured in Spain by the member companies of Hispalyt. This EPD was based on 2015 production data.

The Life Cycle Analysis (LCA) results are based on the data provided by the representing manufacturer of the Hispalyt Roofing Tile Sector.

It is considered to cover "from cradle to grave".

The present revision of the EPD is issued to extend the period of validity.

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-grave.

Title	Clay products used in construction
Registration code	GlobalEPD-RCP-008
Issue date	2017/02/20
Conformity	EN 15804:2012+A1:2013
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, 6.7.2.

Product stage	A1	Raw material 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	X
	B2	Maintenance	X
	B3	Repair	X
	B4	Replacement	X
	B5	Refurbishment	NR
	B6	Operational energy use	X
	B7	Operational water use	X
End of life	C1	De-construction / demolition	NR
	C2	Transport	X
	C3	Waste processing	X
	C4	Disposal	X
	D	Reuse, recovery and/or recycling potentials	MNA

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

The products dealt with in this EPD are those defined in EN 1304 Clay roofing tiles and fittings. Product definitions and specifications.

For more information on types of facing brick, see subclause 2.1 of the Hispalyt catalogue of clay solutions for compliance with the Technical Building Code (Catálogo de Soluciones Cerámicas para el cumplimiento del Código Técnico de la Edificación (CTE)), which may be downloaded free over its website.

2.2. Intended use of the product

Clay roofing tiles are products for discontinuous laying on pitched roofs and for wall cladding and lining. They ensure the impermeability of the building. This performance is provided by the features of the material itself, the form of the pieces (over and under, mixed or plain), the overlapping, and their proper installation.

Such roofs may be traditional, whereby the tiles are fixed with mortar, or ventilated, whereby fixing clips or nails are used, providing microventilation under the roofing tile, this latter technique being the more recommendable

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2.3. Composition of the product

Clay roofing tiles and fittings are made from clay or other argillaceous materials, with or without sand, fuel, or other additives, fired at a sufficiently high temperature to achieve ceramic bond.

Raw materials	Content	Unit
Clay	92.4	%
Sand	7.4	%
Additives	1.8	%

Table 3. Composition of the product

Figure 1. Clay

Figure 2. Installed product

3 Information regarding the LCA

3.1. Life cycle analysis

This EPD is based on the Hispalyt Sector LCA Report for Six Clay Construction Products (Informe de ACV sectorial de seis productos de arcilla cocida utilizados en la construcción de Hispalyt), prepared by the UNESCO Chair in Life Cycle and Climate Change.

A representative manufacturer from the Hispalyt Roofing Tile Sector was selected. A study of the main important input and output data (thermal energy consumption, electric energy and emissions) was conducted for the purpose.

Maximums, minimums and weighted averages were obtained as study results (taking production volume into consideration). That manufacturer coming closest to the mean was taken as representative manufacturer.

Data for the study was compiled from four manufacturers accounting for 75% of production.

The AENOR GlobalEPD Programme PCRs for Clay Construction Products were observed in preparing the LCA report.

3.2. Functional Unit

The functional unit is defined as: 1 tonne of clay roofing tile and their fittings, with an expected average reference service life of 150 years.

The gross dry product density under consideration in this EPD is 2000 kg/m3. These data were taken from the Catalogue of construction elements of the Technical Building Code (Código Técnico de la Edificación, or CTE), March 2010 version.

The following conversion factor may be used for transforming the functional unit for one tonne of clay roofing tile into one square metre of roof covering:

Over and under tiles: $$\frac{M \times 10^{-3}}{(l - 0{,}11) \times (w - 0{,}11)}$$

Mixed and plain tiles: $$\frac{M \times 10^{-3}}{(l - 0{,}05) \times (w - 0{,}06)}$$

Whereby, according to the manufacturer's declaration:

M: mass of the roofing tile in kg

l: length of the roofing tile in m

w: width of the roofing tile in m

3.3. Reference service life

A reference product service life of 150 years has been used, in keeping with the PCRs for EPDs for clay construction products, drawn up by the European federation of brick and roofing tile manufacturers (TBE).

Figure 3. Installed product

4 System boundaries, scenarios and additional technical information

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

The industrial manufacturing process for ceramic materials includes the steps below.

Clay Extraction: The clay is extracted from quarries, subject to strict controls for environmental safety and respect. Once quarries have been exploited, they are regenerated for different uses, preferably agricultural. The raw material from the quarries is stockpiled before it enters the production line.

Crushing and Grinding: The preparation of the raw material used in making ceramic products consists of crushing prior to entry in the plant and grinding at the plant.

Crushing reduces the size of the grains of clay, achieving homogenisation of the material, preventing greater energy consumption, and lengthening the service life of equipment. Once they are crushed, the different types of clay are stored in box feeders.

Grinding consists of a second reduction in the size of clay particles, using pan mills, disintegrators, rollers, etc.

Blending: Once the granulometric levels required for the raw material have been achieved, the clay is introduced into the mixer, where the first addition of water takes place to obtain a plastic mouldable material for extrusion.

Forming: The clay afterwards passes through the extruder, where a vacuum pump extracts all the air it may contain and presses it against a mould, obtaining a column shaped in the form of the product. This system reduces industrial water consumption and facilitates working with dryer ceramic pastes.

Cutting and Stacking: After its passage through the extruder, the column is then cut using a set of wires and the final product dimensions are set. The ceramic product is placed onto steel rails or pallets before introduction into the drying area.

Drying and Firing: The stacked product is introduced into the drying area, which seeks to reduce the content in humidity of the items by up to 1-2%. The material from the drying area enters the tunnel kiln for the firing process. Current technology allows for industrial production with excellent thermal performance. A reduction in energy consumption as well as gas emissions into the atmosphere is thus achieved.

Packing and Storage: Once the firing process is finished, the ceramic product from the kiln carts is removed and unloaded on the packing and bagging conveyors. Lastly, the packages are stored in the stockyard to await transport to the building site.

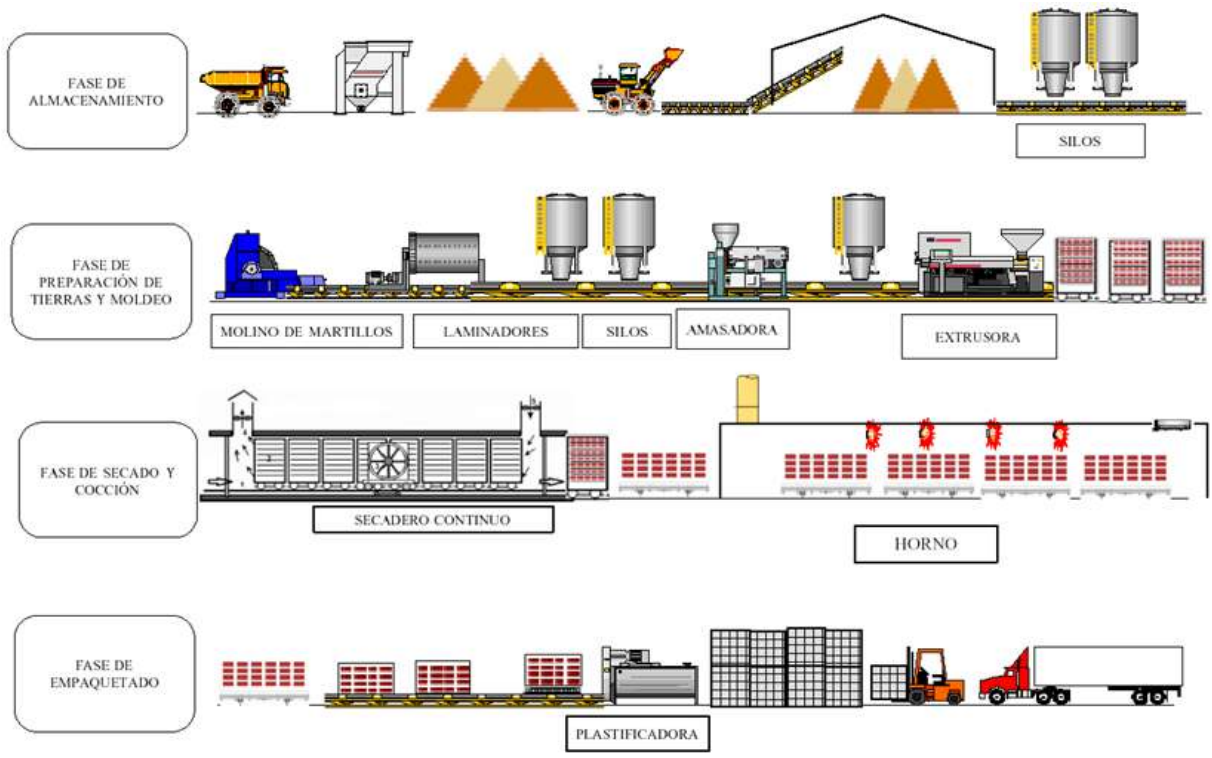

Figure 4. Product stage

4.2. Transport and Construction (A4-A5)

The representative manufacturer bases the calculation of transport distances on the orders served during reference year 2015. The gross dry density of 2000 kg/m3 is based on the Catalogue of construction elements of the Technical Building Code (CTE), March 2010 version.

Parameter	Value (per functional unit)	Unit
Fuel type and consumption of vehicle or vehicle type used for transport	0.297 l diesel/km in 28-34-tonne lorry	
Distance	287	km
Capacity utilisation (including empty returns)	85	%
Bulk density of transported products	2000	kg/m³
Volume capacity utilisation factor (factor: =1 or <1 or ≥ 1 for compressed or nested packaged products)	< 1	

Table 4. A4 Transport to the building site

In general terms, the installation of ceramic products at the building site is mainly manual and little or negligible use of energy or water is required. The storage of clay products at the building site does not require any special care aside from the usual good safety and health practices. A 2% loss of material (in mass) during the installation has been considered.

Parameter	Value (per functional unit)
Waste materials on the building site before waste processing, generated by the product's installation (specified by type)	20 kg waste 3.23 kg in packaging
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)	11.06 kg recycled 0.40 kg recovered 11.78 kg disposal

Table 5. A5 Installation of the product in the building

4.3. Use related to the building fabric (B1-B5)

The PCRs used consider the impact during the phase of use (B1) null or negligible.

The PCRs used consider that ceramic tiles require neither maintenance nor repair during their use phase, and therefore, no impact is declared in modules B2 and B3.

Clay roof tiles may require occasional inspections to reposition elements, restoring connections and overlaps or to replace single elements damaged for example by extreme atmospheric agents or vandalism. Impacts associated to these operations are very low and considered as negligible, thus, no impact is declared in module B4.

The impact associated to refurbishing a building with clay roofing tiles is not considered relevant and is therefore declared as such in module B5.

4.4. Use related to the operation of the building (B6-B7)

Modules B6-B7 are not relevant for clay roofing tiles and therefore the impact on these modules is considered null.

4.5. End of life (C1-C4)

Parameter	Value (per functional unit)	Unit
Collection process specified by type	0	kg collected separately
	1000	kg collected with mixed construction waste
Recovery system, specified by type	0	kg for re-use
	460	kg for recycling
	0	kg for energy recovery
Disposal, specified by type	540	kg product or material for final deposition
Assumptions for scenario development	Waste intended for landfill is transported 62 km by road to a controlled inert landfill, while waste intended for recycling is transported 40.5 km	

Table 6. C1-C4 End of life

4.6. Benefits and burdens beyond the limits of the system (D)

Module D has not been taken into consideration

5 Declaration of the environmental parameters of the LCA and LCI

Tables 7, 9 and 10 include the parameters describing environmental impacts, resource use, waste categories and the output flows defined in EN 15804.

In addition, Table 8 includes data on the parameters describing environmental impact additional to that defined in EN 15804.

The data in the following tables refer to the functional unit contemplated in this EPD.

The system boundaries and the information modules considered as well as the nomenclature used may be consulted in Table 2, found on page 3 of this EPD.

	A1 - A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
GWP	1.99E+02	1.67E+01	1.90E+00	0.00	0.00	0.00	0.00		0.00	0.00		3.85E+00	1.21E+00	8.67E+00	
ODP	8.78E-08	4.21E-11	1.09E-09	0.00	0.00	0.00	0.00		0.00	0.00		9.72E-12	1.26E-11	9.62E-11	
AP	7.29E-01	4.12E-02	1.46E-03	0.00	0.00	0.00	0.00		0.00	0.00		9.16E-03	8.36E-03	5.20E-02	
EP	7.95E-02	1.01E-02	3.47E-04	0.00	0.00	0.00	0.00	NR	0.00	0.00	NR	2.25E-03	2.02E-03	7.07E-03	MNA
POCP	7.85E-02	-1.27E-02	3.46E-04	0.00	0.00	0.00	0.00		0.00	0.00		-2.74E-03	1.22E-03	5.00E-03	
ADPE	2.70E-05	1.30E-06	-1.05E-07	0.00	0.00	0.00	0.00		0.00	0.00		2.99E-07	2.15E-06	2.99E-06	
ADFP	3.34E+03	2.27E+02	3.57E+00	0.00	0.00	0.00	0.00		0.00	0.00		5.25E+01	2.29E+01	1.13E+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 7. Parameters describing environmental impacts defined in EN 15804

	A1 - A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
SW-ECOTOX	1.45E+00	1.05E-01	1.12E-03	0.00	0.00	0.00	0.00		0.00	0.00		2.43E-02	1.00E-02	4.01E-02	
H-TOX	4.99E+02	4.02E-01	1.22E-02	0.00	0.00	0.00	0.00		0.00	0.00		9.26E-02	8.75E-02	5.62E-01	
M-ECOTOX	7.07E+06	2.30E+02	5.15E+01	0.00	0.00	0.00	0.00	NR	0.00	0.00	NR	5.32E+01	4.89E+01	1.84E+03	MNA
T-ECOTOX	1.55E-02	6.02E-02	5.35E-03	0.00	0.00	0.00	0.00		0.00	0.00		1.39E-02	3.83E-03	2.11E-01	

SW-ECOTOX *[kg DCB eq]* Freshwater ecotoxicity

H-TOX *[kg DCB eq]* Human toxicity

M-ECOTOX *[kg DCB eq]* Marine ecotoxicity

T-ECOTOX *[kg DCB eq]* Terrestrial ecotoxicity

Table 8. Parameters describing additional environmental impact other than those defined in EN 15804

	A1- A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
PERE	2.68E+02	1.57E+01	3.46E-01	0.00	0.00	0.00	0.00		0.00	0.00		3.62E+00	1.77E+00	1.33E+01	
PERM	0.00	0.00	0.00	0.00	0.00	0.00	0.00		0.00	0.00		0.00	0.00	0.00	
PERT	2.68E+02	1.57E+01	3.46E-01	0.00	0.00	0.00	0.00		0.00	0.00		3.62E+00	1.77E+00	1.33E+01	
PENRE	3.44E+03	2.28E+02	3.73E+00	0.00	0.00	0.00	0.00		0.00	0.00		5.27E+01	2.35E+01	1.17E+02	
PENRM	0.00	0.00	0.00	0.00	0.00	0.00	0.00		0.00	0.00		0.00	0.00	0.00	
PENRT	3.44E+03	2.28E+02	3.73E+00	0.00	0.00	0.00	0.00	NR	0.00	0.00	NR	5.27E+01	2.35E+01	1.17E+02	MNA
SM	0.00	0.00	0.00	0.00	0.00	0.00	0.00		0.00	0.00		0.00	0.00	0.00	
RSF	1.33E-03	0.00	0.00	0.00	0.00	0.00	0.00		0.00	0.00		0.00	0.00	0.00	
NRSF	1.44E-02	0.00	0.00	0.00	0.00	0.00	0.00		0.00	0.00		0.00	0.00	0.00	
FW	9.39E+00	1.17E+00	1.71E-01	0.00	0.00	0.00	0.00		0.00	0.00		2.69E-01	5.48E-01	6,53E-00	

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 9. Parameters describing resource use

	A1 - A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
HWD	4.80E-02	0.00	0.00	0.00	0.00	0.00	0.00		0.00	0.00		0.00	0.00	0.00	
NHWD	5.68E-01	0.00	1.18E+01	0.00	0.00	0.00	0.00		0.00	0.00		0.00	0.00	5.40E+02	
RWD	3.38E-02	3.95E-04	6.17E-05	0.00	0.00	0.00	0.00		0.00	0.00		9.12E-05	2.28E-04	1.63E-03	
CRU	NR	NR	NR	0.00	0.00	0.00	0.00		0.00	0.00		NR	NR	NR	
MFR	8.61E-01	0.00	1.11E+01	0.00	0.00	0.00	0.00	NR	0.00	0.00	NR	0.00	4.60E+02	0.00	MNA
MER	2.05E-01	0.00	3.99E-01	0.00	0.00	0.00	0.00		0.00	0.00		0.00	0.00	0.00	
EE	2.31E+02	0.00	2.13E+00	0.00	0.00	0.00	0.00		0.00	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	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	*[kg]*	Exported energy
EET	*[kg]*	Exported thermal energy

Table 10. 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-008 Productos de arcilla cocida utilizados en construcción. AENOR. February 2017.

[5] LCA sectoral report prepared by the UNESCO Chair in Life Cycle and Climate Change

[6] Product Category Rules for developing EPDs for clay construction products, prepared by the European federation of brick and tile manufacturers (TBE)

[7] EN 1304:2013 Clay roofing tiles and fittings. Product definitions and specifications

[8] Catálogo de Soluciones Cerámicas para el cumplimiento del Código Técnico de la Edificación (CTE) by Hispalyt

[9] Catálogo de elementos constructivos del Código Técnico de la Edificación (CTE) by the Ministry of Development

Índex

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A verified enviromental declaration

GlobalEPD