

ENVIRONMENTAL PRODUCT DECLARATION

In accordance with ISO 14025 & EN 15804:2012 + A2:2019

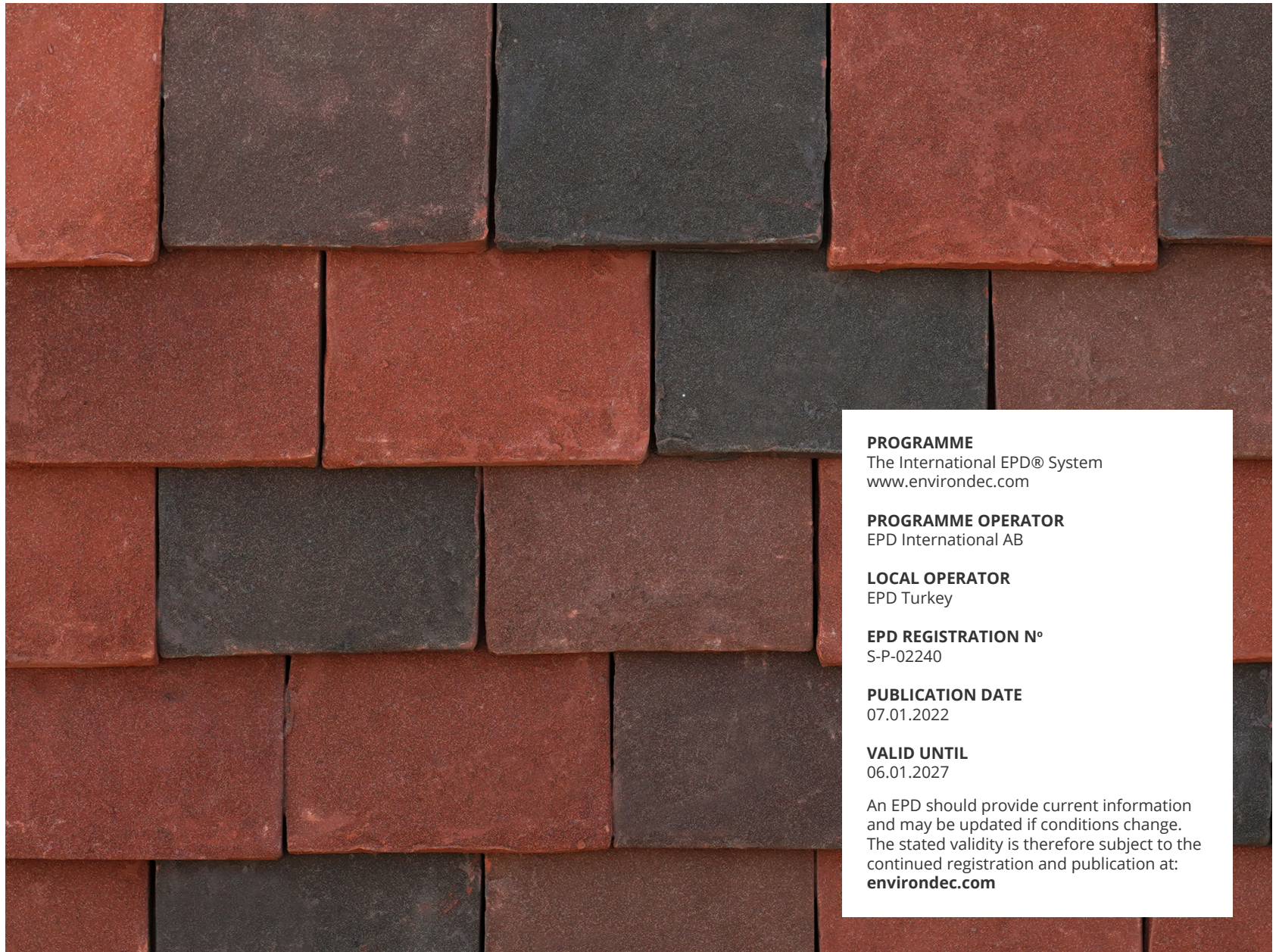


TerraCotta Tiles

from

SAHTAS

terracotta products



PROGRAMME

The International EPD® System
www.environdec.com

PROGRAMME OPERATOR

EPD International AB

LOCAL OPERATOR

EPD Turkey

EPD REGISTRATION N°

S-P-02240

PUBLICATION DATE

07.01.2022

VALID UNTIL

06.01.2027

An EPD should provide current information and may be updated if conditions change. The stated validity is therefore subject to the continued registration and publication at: environdec.com

Programme Information

_ Programme Information

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Information about verification and reference PCR:

CEN standard EN 15804 serves as the Core Product Category Rules (PCR)

Product category rules (PCR)

PCR 2019:14 Construction products (EN 15804:A2) Version 1.1
 PCR 2019:14-c-PCR-002 Ceramic tiles (EN 17160) (2019-12-20)

PCR review was conducted by

*The Technical Committee of the International EPD® System. See www.environdec.com/TC for a list of members.
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Independent third-party verification of the declaration and data, according to ISO 14025:2006:

EPD process verification EPD verification

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 supported by the Secretariat

Procedure for follow-up of data during EPD validity involves third party verifier:

Yes No

_ LCA Study & EPD Design Conducted by

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Company Information

_ Owner of the EPD

Şahtaş Seramik ve Toprak A.Ş.
Yeniköy OSB Mah. 507 Sok. No:5
Torbalı/İzmir

Contact
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Şahtaş was established as a family business in 1979 to produce machine made earthenware products in Izmir, Turkey.

In 2002, Şahtaş converted its production to 100% handmade earthenware due to an increase in customer demand for this type of product. Şahtaş's roof and wall products have been thoroughly and independently tested for compliance across multiple international standards. Şahtas has its own in-house laboratory which conducts continuous testing to meet necessary standards, one of which includes acoustic testing on all products prior to dispatch.

Şahtaş celebrated its 40th anniversary of production in 2019. A significant milestone was achieved in January 2021 with the export of the one hundred millionth Şahtaş tile and brick, which was exported to the United Kingdom. Şahtaş products are available through a large and growing network of stockists and distributors around the UK. Şahtaş have recently commissioned a new state-of-the-art factory, which marks the introduction of the third generation of family ownership. The new factory will also allow the company to extend its global reach with established distribution operations in the UK, EU, USA, Canada, Australia, New Zealand, and Japan.



_ Production Site

Şahtaş Seramik ve Toprak A.Ş.
Yeniköy OSB Mah. 507 Sok. No:5
Torbalı/İzmir

Şahtaş's production facilities are composed of two large factories which incorporate all aspects of both traditional and modern manufacturing methods. Şahtaş's clay pits go through a thorough quality control process. Any raw material entering the production system undergoes a process known as "clay washing", which removes all deleterious material including vegetable matter and soluble salts. This process ensures that the clay is clean, fine grained, and dense so that it is suitable for both hand making and machine manufacturing methods. Şahtaş offers its customers a wide variety of high quality building and landscaping products. The range of products include but are not limited to roof tiles, facing bricks, floor tiles, garden statuary, architectural faience, Italianate pottery, and handmade glazed terracotta ceramic tiles.



The company philosophy is built around offering its customers an excellent quality product, based on traditional production methods, whilst utilizing the latest analytical and raw material processing techniques. The fundamental objective for Şahtaş is to produce products that exceed the quality expectations of its own industry and customers. This goal is achieved through stringent in-house quality control at all levels, as well as continuous external independent testing. All Şahtaş products are produced in-house at their own factory.

Şahtaş became a certified zero waste manufacturer in 2021. The raw material used by Şahtaş is excavated from their own clay quarry which is CED certified through an Environmental Effects Evaluation. All fired material which does not meet Şahtaş's rigorous standards is crushed, ground, and recycled. Şahtaş offices operate on a largely paper-free basis and any paper waste is sent for recycling. Şahtaş collects glass waste from local businesses which is then crushed and ground to be used in the production of glazed and decorative products. Şahtaş also collects and stores rainwater which allows them to re-use over 50% of the water used in the manufacturing and clay washing process. Şahtaş has also planted over one-thousand olive trees around their facility in order to benefit the local economy by minimizing its visual and environmental impact.

Product Information

_ Product Name

TerraCotta Tiles



The TerraCotta Tiles collection has a granular sand-mix added to the premium natural clay. The slight variations of camber, size, and texture make this collection a pure unique clay art. TerraCotta Tiles can be used for wall cladding and roofs.

Intended use of Product

The Terracotta Tiles, which are based on thousands of years of use and tradition, are extremely useful. The products, which every foreman can lay with a simple lath or rope, have been preferred both indoors and outdoors for years.

Thanks to its production based on natural materials, the clay products provide a high level of sound and heat insulation. Şahtaş Terracotta Solid English Bricks and other Terracotta products, have been used as masonry in houses in England for 17 years and provide natural heat and sound insulation without the need for any additional measures.

Production

The different types of clay that are excavated are transported to the factory and blended in order to obtain the desired quality. The clay is then mixed with water to get a slurry, and sieved to separate stones and any other unwanted material. The slurry is then pumped through the filter-presses to decrease the excess water content and achieve the desired moisture level for the clay shaping process. The clay is then shaped by extrusion which consists of pressing and molding (depending on the specific product). The shaped pieces are then dried in order to remove excess water; the drying process consists of stacking the product on kiln cars and firing the kiln with natural gas. Fired products are then packaged on wooden pallets for export and distribution.

The final products are lastly subjected to quality control, which is considered crucial in Şahtaş. Clay products may differ in shades, and the variation spectrum span should and is directly controlled by skilled workers and experts of Şahtaş. Colour spectrum in the pallet to be shipped is therefore assured by Şahtaş to be eye pleasing with smooth variations in shade. The variations aids in the overall aesthetic level of the building, giving a natural, wavy yet consistent hue; and securing the uniqueness in every pallet to be used in building projects.

_ Technical Specifications

Product Group Classification

UN CPC Code: 37310 - Bricks, blocks, tiles and other ceramic goods of siliceous earths

| Product | Standards | Sub-standards |
|---------------------------|-----------|---------------|
| Clay Tile & Facade | EN 1304 | EN 538 |
| | | EN 539-1 |
| | | EN 539-2 |
| | | EN 1024 |
| | | EN 13501-1 |
| | | EN 13501-5 |
| Clay Bricks & Slip Bricks | EN 771-1 | EN 772-16 |
| | | EN 772-19 |
| | | EN 772-20 |
| | | EN 772-21 |
| | | EN 1052-3 |
| | | EN 1745 |
| | | EN 13501-1 |
| | | EN ISO 12572 |

Functional Unit

| Name | Value | Amount |
|--------------------------|--------|-------------------|
| Functional Unit | 1 | m ² |
| Grammage | 60.02 | kg/m ² |
| Conversion factor to 1kg | 0.0167 | - |

_ LCA Information

Functional Unit

1 square meter of TerraCotta Tiles manufactured in Torbalı facillitate (TR).

Reference service life

Not applicable.

Time representativeness

The production data in this LCA study represents the period of 1st September 2020 and 1st September 2021.

Database(s) and LCA software used

SimaPro v9.2 and Ecoinvent v3.7.1

Description of system boundaries

Cradle to gate (A1-3) with options, modules C1-C4, module D.

Data quality and data collection

According to EN 15804:2012+A2:2019, with c-PCR-002 Ceramic Tiles (EN 17160:2019) specific data was used for

module A3 (Processes the manufacturer has influence over) and was gathered from Şahtaş (Şahtaş Seramik ve Toprak A.Ş.) plants. Specific data includes actual product weights, amounts of raw materials used, product content, energy consumption, transport figures, and amounts of wastes. Water consumption is determined by mass allocation for A1 and A2 modules, according to EN 15804:2012+A2:2019, generic data was applied and was obtained from Ecoinvent v3.7.1

Allocation

Mass allocation has been applied for preconsumer recycled materials according to EN 15804:2012+A2:2019.

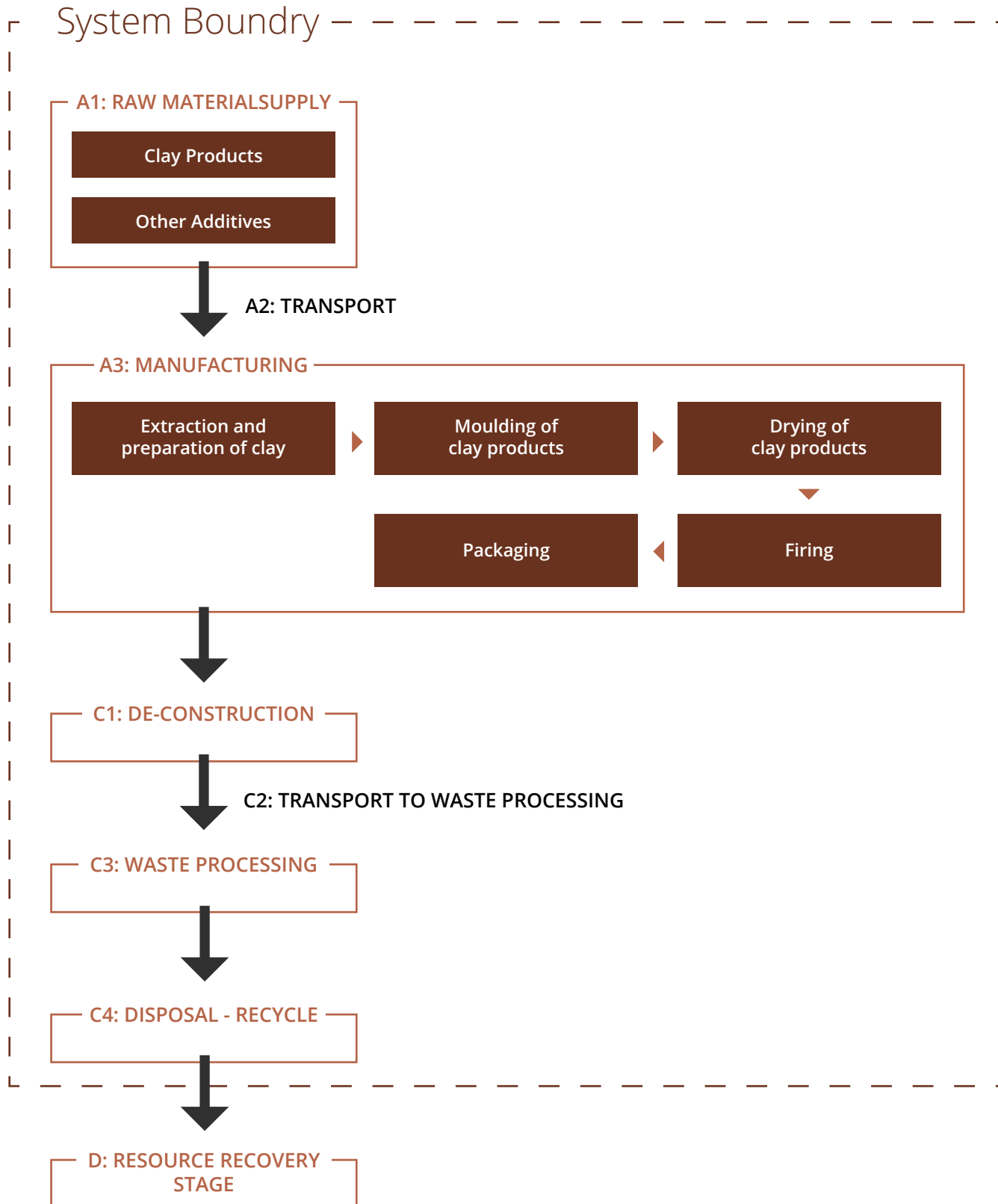
Cut-off rules

Life Cycle Inventory data for a minimum of 99% of total inflows to the life cycle assesment have been included and a cut-off rule of 1% regarding energy, mass and environmental relevance was applied. Impacts caused by treatment operations have been calculated lower than 1% environmental relevance.

_ Modules declared, geographical scope, share of specific data (in GWP-GHG indicator) and data variation

| | Product Stage | | | Construction Process Stage | | Use Stage | | | | | | | End of Life Stage | | | | Resource Recovery Stage |
|--------------------|---------------------|-----------|---------------|-------------------------------------|----------|-----------|-------------|--------|-------------|---------------|------------------------|-----------------------|-------------------|-----------|------------------|----------|--|
| | Raw material supply | Transport | Manufacturing | Transport from the gate to the site | Assembly | Use | Maintenance | Repair | Replacement | Refurbishment | Operational energy use | Operational water use | De-construction | Transport | Waste processing | Disposal | Reuse - Recovery - Recycling Potential |
| Modules | A1 | A2 | A3 | A4 | A5 | B1 | B2 | B3 | B4 | B5 | B6 | B7 | C1 | C2 | C3 | C4 | D |
| Module declared | X | X | X | ND | ND | ND | ND | ND | ND | ND | ND | ND | X | X | X | X | X |
| Geography | GLO | GLO | TR | - | - | - | - | - | - | - | - | - | GLO | GLO | GLO | GLO | GLO |
| Specific data used | >99.5% | | | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| Variation-products | Not Relevant | | | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| Variation-sites | Not Relevant | | | - | - | - | - | - | - | - | - | - | - | - | - | - | - |

_ System Diagram



_ Description of Declared Modules

A1 - Raw Materials Supply

This module into account raw material extraction, processing and energy used in the raw material production process, handled by the raw material manufacturer.

A2 - Transport to the Manufacturer

This module include transportation of the raw materials from supplier to factory gate. Transportation types are considered as seaway and road. Internal transport in the manufacture area of the EPD owner is also considered in this module.

A3 - Manufacturing

This module includes energy and water consumption and waste generation during. Additionally, packaging materials are covered in this module. Followed production processes are as;

- Extraction and preparation of clay
- Moulding of clay products
- Drying of clay products
- Firing
- Packaging

C1 - De-construction

The dismantling of clay product has a very low impact considering the impact throughout the life of the de-construction. C1 can be ignored according to the PCR, whereas the rest of the modules are included using national and UK scenarios. Deconstruction process is handled via electric energy and diesel consumption; however dismantling only 1m² of TerraCotta Tiles from the building is in need for an insignificant amount of energy, and following the cut-off rules of LCA study, the amount constitutes for <%1, therefore a cut-off rule is applied and environmental impact of de-construction process is not considered in this study.

C2 - Transport to Waste Processing

An average distance of 100 km has been assumed for the transport to recycling facility. Transport is calculated on the basis of a scenario with the parameters described in the following table.

Parameters C2 Module

| | |
|--------------------|-------------------------|
| Transport by road* | Lorry, 16-32 metric ton |
| Distance (km) | 100 |
| Database | Ecoinvent v3.7 |

*Technology is euro 6

C3 - Waste processing for reuse, recovery and/or recycling

This module includes the energy consumption required for sorting and crushing the clay product in the recycling process.

C4 - Final disposal

100% of used product after the lifetime will be collected and recycled into the manufacturing system. It is assumed that 3% of the product is lost during de-construction and 97% reached the sorting/recycling facility. The recycling rate of clay products is assumed to be 99%; making up a total of %96,07 end-of-life products recycled to be used again in construction projects or construction material manufacture process, and the remaining %3.97 end-of-life products being sent to landfill.

D - Reuse, Recovery or Recycling Potential

Recycled clay inputs to the production stage are subtracted from clay product to be recycled at end of life in order to obtain the net clay output from the product system. This remaining net clay is then sent to recycling. Module D reports the environmental aspects of recycled clay generated at the end of life minus that used at the production stage.

Information on which life cycle stages are not considered

This EPD only cover the Cradle to Gate A1-3, C1-4 and D modules because other modules are very dependent on particular scenarios and are better developed for specific building or construction works.

Content Declaration

Content Declaration of Terracotta Tiles

| Material | Amount |
|--------------------|--------|
| Clay | 95-99% |
| Barium Carbonate | 1-5% |
| Ferric Oxide | <1% |
| Manganese Oxide | <1% |
| Renewable Material | 0 |
| Biogenic Carbon | 0 |

Content Declaration of Packaging Material

| Material | Amount |
|-----------------------------|-------------|
| PE, Shrink nylon | <1% |
| Wooden Pallet | <1% |
| PE, Mattress packaging film | <1% |
| Cardboard | <1% |
| PET, Plastic Hoop | <1% |
| Biogenic carbon, kg C | 0.005-0.001 |

Biogenic carbon is arising from wooden pellet packaging material. No substances included into "Candidate List of Substances of Very High Concern (SVHC) for authorisation". No recycling content included in packaging materials.

Environmental Performance

_ Potential Environmental Impact *Mandatory Indicators According to EN 15804*

| Results for 1m ² Terracotta Tiles | | | | | | | |
|--|-------------------------|----------|----|----------|----------|----------|-----------|
| Indicator | Unit | A1:A3 | C1 | C2 | C3 | C4 | D |
| GWP-fossil | kg CO ₂ eq | 34.1 | 0 | 0.988 | 0.191 | 0.019 | -0.497 |
| GWP-biogenic | kg CO ₂ eq | -2.86 | 0 | 0.002 | 1.51E-04 | 1.39E-04 | 4.08E-03 |
| GWP-luluc | kg CO ₂ eq | 0.071 | 0 | 3.58E-04 | 1.52E-05 | 8.21E-06 | -0.001 |
| GWP-total | kg CO ₂ eq | 31.3 | 0 | 0.990 | 0.191 | 0.019 | -0.493 |
| ODP | kg CFC 11eq | 3.09E-06 | 0 | 2.14E-07 | 4.12E-08 | 4.82E-09 | -6.37E-08 |
| AP | mol H+ eq | 0.137 | 0 | 0.003 | 0.002 | 1.40E-04 | -0.004 |
| EP-Freshwater | kg PO4 ³⁻ eq | 0.016 | 0 | 3.04E-04 | 3.12E-04 | 1.89E-05 | -0.001 |
| EP-Aquatic Freshwater | kg P eq | 0.001 | 0 | 8.68E-06 | 6.32E-07 | 2.61E-07 | -1.73E-05 |
| EP-Marine | kg N eq | 0.036 | 0 | 0.001 | 0.001 | 4.91E-05 | -0.001 |
| EP-Terrestrial | kg N eq | 0.402 | 0 | 0.006 | 0.010 | 0.001 | -0.017 |
| POCP | kg NMVOC eq | 0.117 | 0 | 0.002 | 0.003 | 1.54E-04 | -0.004 |
| ADP-minerals & metals* | kg Sb eq | 8.26E-05 | 0 | 3.52E-06 | 7.73E-08 | 6.35E-08 | -3.17E-05 |
| ADP-fossil* | MJ | 464 | 0 | 14.6 | 2.63 | 0.358 | -5.97 |
| WDP | m ³ | 5.43 | 0 | 0.049 | 0.004 | 0.010 | -0.132 |

Acronmys

GWP-fossil = Global Warming Potential fossil fuels; **GWP-biogenic** = Global Warming Potential biogenic; **GWP-luluc** = Global Warming Potential land use and land use change; **ODP** = Depletion potential of the stratospheric ozone layer; **AP** = Acidification potential, Accumulated Exceedance; **EP-freshwater** = Eutrophication potential, fraction of nutrients reaching freshwater end compartment; **EP-aquatic freshwater** = Eutrophication potential, fraction of nutrients reaching aquatic freshwater end compartment; **EP-marine** = Eutrophication potential, fraction of nutrients reaching marine end compartment; **EP-terrestrial** = Eutrophication potential, Accumulated Exceedance; **POCP** = Formation potential of tropospheric ozone; **ADP-minerals&metals** = Abiotic depletion potential for non-fossil resources; **ADP-fossil** = Abiotic depletion for fossil resources potential; **WDP** = Water (user) deprivation potential, deprivation-weighted water consumption

* Disclaimer: The results of this environmental impact indicator shall be used with care as the uncertainties of these results are high or as there is limited experience with the indicator.

_ Potential Environmental Impact *Additional Mandatory and Voluntary Indicators*

| Results according to PCR2019:14 for 1m ² Terracotta Tiles | | | | | | | |
|---|-----------------------|----------|----|----------|----------|----------|-----------|
| Indicator | Unit | A1:A3 | C1 | C2 | C3 | C4 | D |
| GWP-GHG¹ | kg CO ₂ eq | 30.4 | 0 | 0.978 | 0.190 | 0.018 | -0.475 |
| Results according to EN 15804+A2 for 1m ² Terracotta Tiles | | | | | | | |
| PM | [disease inc] | 4.85E-06 | 0 | 6.20E-08 | 2.83E-07 | 2.45E-09 | -8.39E-08 |
| IRP | [kBq U235 eq] | 0.431 | 0 | 0.061 | 0.011 | 0.001 | -0.021 |
| ET-freshwater | [CTUe] | 5550 | 0 | 12.5 | 1.50 | 0.300 | -17.2 |
| HT-cancer | [CTUh] | 1.21E-08 | 0 | 4.01E-10 | 7.35E-11 | 1.33E-11 | -2.31E-09 |
| HT-non-cancer | [CTUh] | 4.44E-07 | 0 | 1.12E-08 | 1.07E-09 | 2.18E-10 | -1.51E-08 |
| SQP | [pt] | 319 | 0 | 10.1 | 0.341 | 0.655 | -6.37 |

Acronmys

GWP-GHG = Global Warming Potential total excl. biogenic carbon following IPCC AR5 methodology; **IRP** = Ionizing radiation, human health; **ET-freshwater** = Eco-toxicity (freshwater); **HT-cancer** = Human toxicity, cancer effects; **HT-non-cancer** = Human toxicity, non-cancer effects; **SQP** = Potential soil quality index (SQP)

¹ The indicator includes all greenhouse gases included in GWP-total but excludes biogenic carbon dioxide uptake and emissions and biogenic carbon stored in the product. This indicator is thus equal to the GWP indicator originally defined in EN 15804:2012+A1:2013.

_ Use of Resources

| Results according to PCR2019:14 for 1m ² Terracotta Tiles | | | | | | | |
|--|----------------|-------|----|-------|-------|-------|--------|
| Indicator | Unit | A1:A3 | C1 | C2 | C3 | C4 | D |
| PERE | MJ | 61.5 | 0 | 0.168 | 0.014 | 0.006 | -0.395 |
| PERM | MJ | 0 | 0 | 0 | 0 | 0 | 0 |
| PERT | MJ | 61.5 | 0 | 0.168 | 0.014 | 0.006 | -0.395 |
| PENRE | MJ | 509 | 0 | 15.5 | 2.79 | 0.381 | -6.35 |
| PENRM | MJ | 0 | 0 | 0 | 0 | 0 | 0 |
| PENRT | MJ | 509 | 0 | 15.5 | 2.79 | 0.381 | -6.35 |
| SM | kg | 0 | 0 | 0 | 0 | 0 | 0 |
| RSF | MJ | 0 | 0 | 0 | 0 | 0 | 0 |
| NRSF | MJ | 0 | 0 | 0 | 0 | 0 | 0 |
| FW | m ³ | 0.910 | 0 | 0.012 | 0.001 | 0.001 | -0.017 |

Acronmys

PERE = Use of renewable primary energy excluding renewable primary energy resources used as raw materials; **PERM** = Use of renewable primary energy resources used as raw materials; **PERT** = Total use of renewable primary energy resources; **PENRE** = Use of non-renewable primary energy excluding non-renewable primary energy resources used as raw materials; **PENRM** = Use of non-renewable primary energy resources used as raw materials; **PENRT** = Total use of non-renewable primary energy resources; **SM** = Use of secondary material; **RSF** = Use of renewable secondary fuels; **NRSF** = Use of non-renewable secondary fuels; **FW** = Use of net fresh water

_ Waste Production

| Results according to PCR2019:14 for 1m ² Terracotta Tiles | | | | | | | |
|--|------|-------|----|----|----|------|---|
| Indicator | Unit | A1:A3 | C1 | C2 | C3 | C4 | D |
| Hazardous waste disposed | kg | 0 | 0 | 0 | 0 | 0 | 0 |
| Non-hazardous waste disposed | kg | 0 | 0 | 0 | 0 | 2.38 | 0 |
| Radioactive waste disposed | kg | 0 | 0 | 0 | 0 | 0 | 0 |

_ Output Flows

| Results according to PCR2019:14 for 1m ² Terracotta Tiles | | | | | | | |
|--|------|-------|----|----|----|------|---|
| Indicator | Unit | A1:A3 | C1 | C2 | C3 | C4 | D |
| Component for re-use | kg | 0 | 0 | 0 | 0 | 0 | 0 |
| Materials for recycling | kg | 0 | 0 | 0 | 0 | 56.1 | 0 |
| Materials for energy recycling | kg | 0 | 0 | 0 | 0 | 0 | 0 |
| Exported energy, electricity | MJ | 0 | 0 | 0 | 0 | 0 | 0 |
| Radioactive waste disposed | MJ | 0 | 0 | 0 | 0 | 0 | 0 |

References

_ ISO 14020:2000

Environmental labels and declarations — General principles

_ ISO 14040:2006

Environmental management — Life cycle assessment — Principles and framework

_ ISO 14044:2006

Environmental management — Life cycle assessment — Requirements and guidelines

_ ISO 14025:2006

Environmental labels and declarations — Type III environmental declarations — Principles and procedures

_ EN 15804:2012+A2:2019

Sustainability of construction works — Environmental product declarations — Core rules for the product category of construction product

_ The International EPD® System

www.environdec.com

_ The International EPD® System The General Programme Instructions v3.01

_ The International EPD® System PCR 2019:14 Construction products v1.1 (EN 15804:A2)

_ The International EPD® System, c-PCR to PCR 2019:14, c-PCR 002 Ceramic Tiles (EN 17160:2019)

_ Ecoinvent 3.7

www.ecoinvent.org

_ SimaPro LCA Software

www.simapro.com

_ Şahtaş Terracotta Products

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