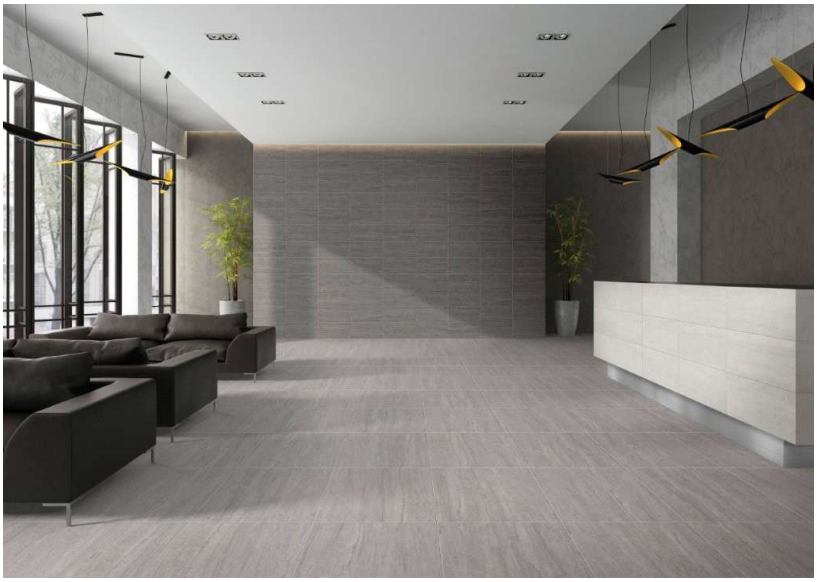
# CERAMICA VALSECCHIA S.P.A.
# ENVIRONMENTAL PRODUCT DECLARATION



## PRODUCT NAME

PORCELAIN STONEWARE TILES FOR INDOOR AND OUTDOOR FLOORING AND CLADDING – 9,2 MM THICKNESS

## SITE PLANT

**SEDE PRODUZIONE PIASTRELLE:** VIA CANALE N. 200 – 42013 CASALGRANDE (RE) LOC. VILLALUNGA ITALY

**SEDE PRODUZIONE ATOMIZZATO:** VIA FELEGHETTI NN. 14/16 – 42030 VIANO (RE) ITALY

**In compliance with ISO 14025 and EN 15804+A2:2019**

| | |
|---|---|
| Program Operator | EPDItaly |
| Publisher | EPDItaly |
| Declaration number | VAL-20242025-9,2 |
| Registration number | EPDITALY1266 |
| Date of publication (first issue) | *11/03/2026* |
| Date of validity | *11/03/2031* |

# 1. GENERAL INFORMATION

| EPD OWNER | |
|---|---|
| *COMPANY NAME* | ***Ceramica Valsecchia S.p.A.*** |
| *LEGAL HEAD OFFICE* | Via Canale n.200 – 42013 Casalgrande (RE) loc. Villalunga Italy |
| *CONTACTS FOR INFORMATION ON THE EPD* | HSE MANAGER, ING. SILVIA PRETI<br>ambiente.sicurezza@ceramicavalsecchia.it |
| **PROGRAM OPERATOR** | |
| EPDITALY (www.epditaly.it) | Via Gaetano De Castillia n° 10 - 20124 Milano, Italia |
| **INFORMATION ON THE EPD** | |
| PRODUCT NAME | **Porcelain stoneware tiles for indoor and outdoor flooring and cladding – 9,2 mm thickness** |
| PLANTS INVOLVED IN THE DECLARATION | Atomized powder production: via Feleghetti n. 14-16 – 42030 Viano (RE) Italy<br>Tiles production: via Canale n. 200 – 42013 Casalgrande (RE) loc. Villalunga Italy |
| FUNCTIONAL UNIT | 1 $m^2$ |
| APPLICATION AREA | Ceramic tiles for indoor and outdoor flooring and cladding, suitable for residential and commercial use. |
| *EPD TYPE* | Average EPD |
| CPC CODE | 37370 |
| **VERIFICATION INFORMATION** | |
| PRODUCT CATEGORY RULES (PCR) | EN 15804:2012+A2:2019 is the framework reference for PCRs.<br>PCR ICMQ-001/15 rev3.2 |
| EPDITALY REGULATION | General Programme Instruction document of EPDItaly v.6 |
| LCA TOOL | EPD based on a verified LCA tool: LCA tool creator for Ceramic Tile V6 [(27/11/2023) - DB version 2023.2] |
| PROJECT REPORT | Background report for LCA tool for Confindustria Ceramica, 27/11/2023 |
| INDEPENDENT CHECK | PCR review was conducted by Chiara Maran. Contact via info@epditaly.it.<br>Independent verification of the declaration and data, according to EN ISO 14025:2010.<br>Internal □ External ☑<br>Third party verifier: Daniele Pace |
| COMPARABILITY | Environmental statements published within the same product category, but from different programs, may not be comparable. In particular, EPDs of construction products may not be comparable if they do not comply with EN 15804:2012+A2:2019. |
| ACCOUNTABILITY | Ceramica Valsecchia S.p.A. relieves EPDItaly from any non-compliance with environmental legislation. The holder of the declaration will be responsible for the information and supporting evidence; EPDItaly declines all responsibility for the manufacturer's information, data and results of the life cycle assessment. |
| **Additional information** | |
| TECHNICAL SUPPORT | SPHERA HTTPS://WWW.SPHERA.COM |

# 2. THE COMPANY

Founded in 1956, Ceramica Valsecchia S.p.A. is counted among the historical and most significant companies in the Sassuolo ceramic district. It boasts a unique record: it was the first production facility to settle on the left bank of the Secchia river, a detail that underscores its pioneering role in the development of the ceramic district.

Ceramica Valsecchia S.p.A. specializes in the production of porcelain stoneware floor and wall tiles, a material known for its excellent technical characteristics. Its collections are distinguished by high resistance, durability, and refined aesthetics. We offer a complete and versatile range of solutions, ideal for every type of application, ensuring impeccable performance both in residential contexts and in high-traffic commercial projects.

Ceramica Valsecchia S.p.A. 's attention extends to all phases of the production cycle: from cutting-edge aesthetic research to anticipate design trends, to the rigorous selection of material quality and the latest generation machinery.

This production process is intrinsically linked to the concepts of sustainability and innovation. It is not just about compliance, but a proactive and constant commitment:

Our goal is to achieve the highest standards of environmental sustainability in the sector. We actively promote a responsible supply chain, investing in technologies for energy efficiency, the recovery of production waste, and the reduction of water impact. The company constantly looks towards a future where product excellence is combined with respect for the environment, placing quality of life and resource protection at the heart of its strategy, in line with the principles of the Circular Economy.

## Environmental Management Systems and Quality Marks

The reduction of risk factors and the rigorous respect for the environment are the guiding principles of our corporate policy and development strategy. To ensure a structured approach and the continuous improvement of our performance, Ceramica Valsecchia S.p.A. internally adopts operational practices and methodologies that align with the principles of international management systems.

This approach requires us to pursue renewal at all levels, investing in methodologies, technologies, and plants that are at the forefront of the sector. This strategic choice allows us to achieve a dual objective: to elevate the technical and aesthetic performance of the final product and to obtain a documented reduction of the environmental impact associated with our production processes.

The substantial investments in latest-generation technologies made in recent years have been specifically directed towards increasing energy and material efficiency.

These efforts directly contribute to the decrease in the specific consumption of raw materials and energy. As evidence of our commitment to emission reduction and energy self-sufficiency, we have implemented an extensive photovoltaic system on the roof of the production warehouse, with a capacity of 630 kWp. This structural investment allows us to generate a significant portion of our energy needs from a renewable source, drastically reducing the grid withdrawal and the specific carbon footprint of every tile produced.

Our philosophy fully adheres to the principles of the Circular Economy, maximizing the on-site reuse of wastewater and ceramic processing waste, reintroducing them into the production cycle to minimize the amount of waste destined for disposal. Concurrently, the adoption of advanced filtration and control systems ensures the constant monitoring and reduction of atmospheric emissions, in full compliance with current regulations.

The use of these control practices and the constant approach to Life Cycle Thinking (LCT) represent the operational and informational basis for the transparency and verifiability of environmental data. Such data are essential for obtaining the Environmental Product Declaration (EPD), providing our customers with objective and rigorous information about the product's ecological footprint.

# 3. GOAL AND SCOPE OF EPD

The entire life cycle of the product is considered (Type of EPD: cradle to grave) and the modules described below are declared in this EPD:

**Modules A1 - A3** include those processes that provide energy and material input for the system (A1), transport up to the factory gate of the plant (A2), and manufacturing processes as well as waste processing (A3).
**Module A4** includes the transport from the production site to the customer or to the point of installation of the tiles.
**Module A5** considers all tile installation steps and packaging waste processing (recycling, incineration, disposal). Credits from energy substitution are declared in module D. During this phase, a ceramic material loss of 6,5% has been considered, so 1 $m^2$ of tile surface is the net of material losses.
**Module B2** covers cleaning activities which only require water and detergent; no energy is needed for cleaning. The water used for cleaning as part of maintenance will be included in module B2, not in modules B6 and B7. Additionally, the treatment process for the cleaning water will also be accounted for in module B2.

**Modules C1 and C2** concern the process of demolition and deconstruction of the tiles from the building. The module considers an excavator (with its fuel consumption) and the transportation of the discarded tile to a recycling or disposal process.
For further operation (C3 and C4), one EoL scenario for the ceramic tiles is considered 100% landfill.
**Module D** includes benefits from all net flows in the end-of-life stage that leave the product boundary system after having passed the end-of-waste stage. Typically, this is classified as either A5 or C3. However, since no incineration scenario is available for C3, this study will only consider scenario A5. Resulting credits for thermal and electrical energy are then declared in module D.

| PRODUCTION | | | INSTALLATION | | USE STAGE | | | | | | | END-OF-LIFE | | | | NEXT PRODUCT SYSTEM |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Raw material supply | Transport to manufacturer | Manufacturing | Transport to building site | Installation into building | Use / application | Maintenance | Repair | Replacement | Refurbishment | Operational energy use | Operational water use | Deconstruction / demolition | Transport to EoL | Waste processing | Disposal | Reuse, recovery or recycling potential |
| A1 | A2 | A3 | A4 | A5 | B1 | B2 | B3 | B4 | B5 | B6 | B7 | C1 | C2 | C3 | C4 | D |
| X | X | X | X | X | X | X | X | X | X | X | X | X | X | X | X | X |

Modules B1, B3, B4, B5, B6 and B7 can be considered to have no impact (negligible); ceramic tiles are intrinsically inert and therefore do not have environmental impacts during their use to be addressed in module B1 “Use/application”. The environmental impacts generated during the B1 phase are therefore negligible. The ceramic tile is a long-lasting product, the repair is not expected to apply to ceramic tiles, and the impacts in module B3 can, therefore, be neglected. Moreover, tiles require neither replacement nor refurbishment during the use phase, and therefore, no impacts should be declared in modules B4 and B5. Likewise, tiles require no energy and water use once they are installed in a building, so modules B6 and B7 also have no impacts.

Impacts and aspects related to waste are considered in the module in which the waste occurs.

### EPD TYPE

Average EPD

### PRODUCT NAME

Porcelain stoneware tiles for indoor and outdoor flooring and cladding – 9,2 mm thickness

### DECLARED UNIT AND REFERENCE FLOW

The functional unit for this study is 1 $m^2$ of an average installed ceramic tile produced by Ceramica Valsecchia S.p.A. covering walls and floors, following the normative constraints in terms of installation for 50 years (BNB (2011)).

## GEOGRAPHICAL VALIDITY

Performance was calculated with reference to the company sites (Italy). The reference market is worldwide.

## REFERENCE SERVICE LIFE (RSL)

A reference life according to ISO 15686 (2011) is not reported. For this study, the service life is 50 years (NF EN 15804+A2/CN (2022)). The service life of tiles is typically more than 50 years (BNB (2011)). Furthermore, according to the US Green Building Council, the useful life of tiles could be the same as the useful life of the building itself.

**DATABASE:** Managed LCA Content (version 2023.2)

**SOFTWARE:** LCA for Experts v10.8

# 4. DETAILED PRODUCT DESCRIPTION

## MANUFACTURING PROCESS DESCRIPTION:

The production of Ceramica Valsecchia S.p.A. 's porcelain stoneware tiles is structured in sequential phases that ensure the high quality of the finished product and the efficiency of the processes, in accordance with the principles of Life Cycle Thinking (LCT).

### *Raw Material Input and Storage*

The ceramic body mixture is formulated using precisely selected and dosed components, which guarantee the excellent technical characteristics of the final product. The main constituents are:

- A plastic component (clays) for workability.
- A fluxing agent (feldspars) to lower the firing temperature.
- A structural component (sands and granites) which provides mechanical resistance.
- A significant percentage of recovered material (pre-firing waste) to adhere to the principles of the Circular Economy.

### *Milling*

The raw materials, appropriately dosed according to established recipes, are introduced into the milling machines. The process is conducted using the wet method with the addition of water, grinding media, and specific deflocculants. The resulting homogeneous suspension is defined as slip.

### *Atomization*

This phase consists of the spray drying (atomization) of the slip. Through contact with hot gases, the water is almost completely removed, forming the spray-dried powder: small, almost spherical grains with a controlled residual moisture content (typically 5-6%). The atomized powder is then stored in specific silos.

### *Pressing*

The forming of the tiles takes place using powerful hydraulic presses. The spray-dried powder is compacted at high pressure inside moulds, defining the desired format. This produces the green tile (or pressed support), which is then transferred to the dryers.

### *Drying*

To prevent defects during firing, the pressed support undergoes rapid drying. The process reduces the residual moisture to extremely low levels, not exceeding 0.5%.

### *Glazing and Glaze Preparation*

In the single-firing production process, the glazes and decorations are applied to the already dried ceramic support, before firing. The glazes are prepared by wet milling the various constituents in drum mills, following specific recipes.

### *Firing*

Firing is the most important thermal phase. It takes place in a high-energy efficiency tunnel kiln. The objective is to trigger the chemical-physical reactions (such as sintering) that give the piece its definitive mechanical strength and confer the final technical-aesthetic characteristics of porcelain stoneware to the glazed surface.

### *Sorting and Classification Department*

The sorting department is located at the end of the production cycle, after the tile has acquired all its physical and aesthetic properties. Using automatic vision systems and manual checks, the tiles are classified by shade, calibre, and quality (1st, 2nd choice, etc.).

### *Packaging and Warehouse*

Suitable material is boxed, labelled, and palletized. The finished product units are transported from the sorting department to the Finished Products Warehouse for storage awaiting shipment, which is managed by a dedicated Shipping Warehouse.

## HEALTH AND SAFETY OF WORKERS

Worker health and safety are a fundamental priority at every stage of the ceramic tile production lifecycle. The company adopts a rigorous safety policy in compliance with current national and international regulations, including full adherence to Italian Legislative Decree 81/08 (D.Lgs. 81/08), and is committed to the continuous improvement of working conditions.

Key measures adopted to mitigate specific risks in the ceramic sector include:

- Prevention of Occupational Diseases: Particular attention is paid to the management of fine dust (in particular respirable crystalline silica) through the implementation of high-efficiency extraction and ventilation systems and the mandatory use of specific Personal Protective Equipment (PPE) (such as respiratory masks).
- Machinery Safety: Operator safety is ensured through preventive maintenance and the installation of guards and safety lock devices on all machinery (presses, kilns, glazing machines) to prevent injuries related to moving parts or high temperatures.
- Training and Instruction: All employees receive periodic and specific training on the risks of their work environment, the correct use of machinery, and emergency management, in order to promote a proactive safety culture.
- Monitoring and Health Surveillance: The company carries out constant monitoring of the work environment and subjects workers to periodic and targeted health surveillance to ensure the maintenance of optimal health conditions.

The commitment to health and safety is constantly monitored and contributes to a safe and sustainable work environment.

## ENVIRONMENTAL PROTECTION

The company is firmly committed to environmental protection and minimizing the environmental impacts generated at every stage of the ceramic tile production cycle, in line with the principles of the Circular Economy. The adopted environmental policies focus on the following key aspects:

- Resource Management: The rational use and optimization of water consumption are guaranteed through the closure of the process water cycle, allowing for the near-total reuse of water. Furthermore, constant monitoring for energy efficiency is implemented, promoting the use of electricity from renewable sources when technically and economically feasible, and adopting high-efficiency kilns and machinery to reduce natural gas consumption.
- Emission Reduction: Emissions into the atmosphere (including $NO_x$ and CO) are rigorously monitored and managed, with the installation of state-of-the-art filtration and abatement systems to comply with legal limits and the Best Available Techniques (BAT).
- Waste Management: The company aims for a very high recovery and recycling rate for process waste materials. Unfired ceramic scraps, dusts, and ashes are reintroduced into the production cycle as secondary raw materials, significantly reducing the quantity of waste destined for landfill disposal.

### *Technical data*

Porcelain stoneware is composed of raw materials based on clay, quartz, and feldspar, mixed and fired at temperatures exceeding 1200°C to obtain a vitrified and inert product with practically zero water absorption and high resistance to mechanical stress and scratching. It is decorated with digital applications of glazes and inks.

The ceramic tiles produced by Ceramica Valsecchia S.p.A. comply with the following standards and technical specifications: EN 14411 for the European market and ISO 13006 for the rest of the world.

For the purpose of placing ceramic tiles on the market, Regulation (EU) No 305/2011 applies. The products require a Declaration of Performance (DoP) which refers to the EN 14411 standard.

| Name | Value | Unit |
|---|---|---|
| Processing according to EN 14411 | Conforming | / |
| Small differences in shade according to ISO 10545-16 | Conforming | / |
| Surface quality according to ISO 10545-2 § 7 | Conforming | / |
| Water absorption according to ISO 10545-3 | < 0.1 | % |
| Breaking strength (Modulus of Rupture) according to ISO 10545-4 | S > 1300 | N |
| Breaking load according to ISO 10545-4 | > 45 | N/mm2 |
| Resistance to deep abrasion – Unglazed tiles acc. to ISO 10545-6 | < 140 | mm3 |
| Surface wear resistance – Glazed tiles according to ISO 10545-7 | 0-5 | Category |
| Linear thermal expansion coefficient according to ISO 10545-8 | 6.8x10-6 | °C-1 |
| Resistance to thermal shock according to ISO 10545-9 | Resistant | / |
| Resistance to crazing according to ISO 10545-11, glazed tiles | Resistant | / |
| Frost resistance according to ISO 10545-12 | Resistant | / |
| Anti-slip properties (class A, B, or C) according to CEN/TS 16165 | Conforming | / |
| Impact resistance according to ISO 10545-5 | Resistant | / |
| Reaction to fire test NO (CWT) | A1FL | Category |
| Resistance to low concentrations of acids and alkalis according to ISO 10545-13 | from LA, LB to LC | Category |
| Resistance to household chemicals and swimming pool salts according to ISO 10545-13 | min B | Category |
| Resistance to low concentrations of acids and alkalis according to ISO 10545-13 | LA | Category |
| Resistance to high concentrations of acids and alkalis according to ISO 10545-13 | Available on request | Category |
| Stain resistance according to ISO 10545-14 | 5 | Category |
| Release of lead and cadmium – Glazed tiles according to ISO 10545-15 | If requested | / |
| Moisture expansion according to ISO 10545-10 | Available on request | / |

## CONTENT INFORMATION

### *MAIN RAW MATERIALS FOR THE PRODUCT*

Body Raw Materials

- Clays: 35% - 58%
- Feldspars: 19% - 27%
- Sands: 10% - 15%
- Ceramic waste: 3% - 6%

Glaze Components

- Powdered clays
- Powdered kaolins
- Powdered sodium-potassium feldspars
- Powdered quartz
- Powdered alumina
- Ceramic frits
- Ceramic stains

Auxiliary Additives

- Fluidifying agents
- Pigments for dry coloring
- Suspending agents
- Dispersants
- Binders
- Glaze fixers
- Primers for inkjet
- Mediums (vehicles) for digital inks

### *PRODUCT INSTALLATION*

Tiles are fixed to wall and floor surfaces using different materials and amounts, such as dispersion and cementitious adhesives and mortars, sealants, or liquid applied membranes.

### *RELEVANT EFFECTS DURING USE*

**Interaction with fire:** In accordance with standard EN 13501-1:2007+A1:2009, ceramic tiles can be classified in fire resistance class A1, as they are non-flammable. It has been demonstrated that the ceramic tile coating in case of fire reduces the heat input to them and therefore the risk of collapse.

**Interaction with water:** Ceramic tiles are insoluble materials and do not react with water.

### *ENVIRONMENT AND HEALTH DURING USE*

During installation, no emissions occur and no health or environmental risks derive from the installation of ceramic tiles.

# 5. LCA RESULTS

The tables below show the results of the LCA (Life Cycle Assessment). Basic information on all declared modules can be found in chapter 3.

## Environmental Impact Indicators for 1m² of ceramic tiles

| Indicator | Unit | A1 | A2 | A3 | A4 | A5 | B1 | B2 | B3-B7 | C1 | C2 | C3 | C4 | D |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| GWP-total | kg $CO_2$ eq. | 4,75E+00 | 6,93E-01 | 3,90E+00 | 4,17E-01 | 2,58E+00 | 0 | 1,18E-02 | 0 | 1,60E-02 | 7,44E-02 | 4,40E-02 | 1,12E-01 | -1,30E-01 |
| GWP-fossil | kg $CO_2$ eq. | 4,73E+00 | 6,64E-01 | 4,34E+00 | 4,00E-01 | 1,97E+00 | 0 | 8,90E-03 | 0 | 1,53E-02 | 7,12E-02 | 4,42E-02 | 1,11E-01 | -1,29E-01 |
| GWP-biogenic | kg $CO_2$ eq. | 2,19E-02 | 2,93E-02 | -4,46E-01 | 1,67E-02 | 6,14E-01 | 0 | 2,85E-03 | 0 | 7,01E-04 | 3,25E-03 | -4,56E-04 | 3,12E-04 | -1,68E-04 |
| GWP-luluc | kg $CO_2$ eq. | 7,79E-04 | 4,28E-05 | 5,02E-04 | 2,39E-05 | 1,02E-03 | 0 | 1,34E-06 | 0 | 9,61E-07 | 4,54E-06 | 3,38E-04 | 3,51E-04 | -1,15E-04 |
| ODP | kg CFC-11 eq. | 3,54E-11 | 2,72E-13 | 2,63E-11 | 4,61E-14 | 7,84E-12 | 0 | 4,19E-14 | 0 | 1,81E-15 | 8,53E-15 | 7,52E-14 | 2,88E-13 | -1,09E-12 |
| AP | mole of $H^+$ eq. | 1,09E-02 | 2,46E-03 | 3,33E-03 | 1,62E-03 | 3,31E-03 | 0 | 1,55E-05 | 0 | 7,68E-05 | 1,07E-04 | 2,35E-04 | 8,02E-04 | -2,90E-04 |
| EP-freshwater | kg P eq. | 6,20E-06 | 1,78E-07 | 1,17E-06 | 9,75E-08 | 8,69E-06 | 0 | 3,56E-06 | 0 | 3,70E-09 | 1,75E-08 | 1,53E-07 | 2,28E-07 | -4,06E-07 |
| EP-marine | kg N eq. | 2,87E-03 | 1,13E-03 | 1,62E-03 | 4,23E-04 | 1,18E-03 | 0 | 1,75E-05 | 0 | 3,65E-05 | 4,26E-05 | 1,08E-04 | 2,07E-04 | -9,76E-05 |
| EP-terrestrial | mole of N eq. | 3,20E-02 | 1,25E-02 | 1,79E-02 | 4,69E-03 | 1,32E-02 | 0 | 4,59E-05 | 0 | 3,99E-04 | 4,70E-04 | 1,19E-03 | 2,28E-03 | -1,06E-03 |
| POCP | kg NMVOC eq. | 7,98E-03 | 2,30E-03 | 4,50E-03 | 1,20E-03 | 2,73E-03 | 0 | 1,94E-05 | 0 | 1,03E-04 | 1,02E-04 | 2,92E-04 | 6,25E-04 | -2,94E-04 |
| ADPE | kg Sb eq. | 3,67E-05 | 9,04E-09 | 1,02E-07 | 4,90E-09 | 5,23E-06 | 0 | 3,96E-10 | 0 | 1,89E-10 | 8,94E-10 | 4,81E-08 | 5,23E-09 | -1,09E-08 |
| ADPF | MJ | 1,35E+02 | 9,81E+00 | 4,01E+00 | 5,74E+00 | 1,74E+01 | 0 | 1,98E-01 | 0 | 2,20E-01 | 1,04E+00 | 8,85E-01 | 1,51E+00 | -2,60E+00 |
| WDP | $m^3$ world eq. | 5,57E-01 | 3,23E-03 | 8,69E-02 | 9,48E-04 | 1,32E-01 | 0 | 1,56E-03 | 0 | 3,68E-05 | 1,74E-04 | 8,74E-03 | 1,24E-02 | -8,68E-03 |

Caption

**GWP (tot, fossil, bio and luluc)** = Global Warming Potential total, fossil, biogenic and land use and land use change;
**ODP** = Ozone Depletion Potential;
**AP** = Acidification Potential;
**EP (fresh, marine and terrestrial)** = Eutrophication Potential freshwater, marine and terrestrial;
**POCP** = Photochemical Ozone Creation Potential;
**ADPE** = Abiotic Depletion Potential (elements, non-fossil resources);
**ADPF** = Abiotic Depletion Potential (fossil resources);
**WDP** = Water Depletion Potential

## Resource Use Indicators for 1m² of ceramic tiles

| Indicator | Unit | A1 | A2 | A3 | A4 | A5 | B1 | B2 | B3-B7 | C1 | C2 | C3 | C4 | D |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| PERE | [MJ] | 1,61E+01 | 1,20E-01 | 1,00E+01 | 3,62E-02 | 0 | 0 | 2,42E-02 | 0 | 1,42E-03 | 6,69E-03 | 8,23E-02 | 2,45E-01 | -6,54E-01 |

| | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| PERM | [MJ] | 0 | 0 | 2,32E-01 | 0 | -2,32E-01 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| PERT | [MJ] | 1,61E+01 | 1,20E-01 | 1,03E+01 | 3,62E-02 | 4,65E+00 | 0 | 2,42E-02 | 0 | 1,42E-03 | 6,69E-03 | 8,23E-02 | 2,45E-01 | -6,54E-01 |
| PENRE | [MJ] | 1,35E+02 | 9,84E+00 | 3,96E+00 | 5,76E+00 | 1,74E+01 | 0 | 1,98E-01 | 0 | 2,20E-01 | 1,04E+00 | 8,87E-01 | 1,51E+00 | -2,60E+00 |
| PENRM | [MJ] | 0 | 0 | 4,54E-02 | 0 | -4,54E-02 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| PENRT | [MJ] | 1,35E+02 | 9,84E+00 | 4,01E+00 | 5,76E+00 | 1,74E+01 | 0 | 1,98E-01 | 0 | 2,20E-01 | 1,04E+00 | 8,87E-01 | 1,51E+00 | -2,60E+00 |
| SM | [kg] | 4,36E+00 | 0 | 5,95E-02 | 0 | 2,87E-01 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1,71E+01 |
| RSF | [MJ] | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| NRSF | [MJ] | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| FW | [kg] | 1,65E-02 | 1,70E-04 | 2,81E-03 | 4,24E-05 | 4,27E-03 | 0 | 5,62E-05 | 0 | 1,65E-06 | 7,78E-06 | 2,53E-04 | 3,81E-04 | -5,31E-04 |

Caption

**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 input/output flows for 1m2 of ceramic tiles

| Indicator | Unit | A1 | A2 | A3 | A4 | A5 | B1 | B2 | B3-B7 | C1 | C2 | C3 | C4 | D |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| HWD | [kg] | 2,47E-07 | 4,26E-11 | 3,79E-09 | 1,12E-11 | 1,66E-08 | 0 | 1,03E-11 | 0 | 4,06E-13 | 1,92E-12 | -2,30E-12 | 3,28E-11 | -8,08E-11 |
| NHWD | [kg] | 4,15E-01 | 1,03E-03 | 3,75E-01 | 5,71E-04 | 1,40E+00 | 0 | 6,04E-03 | 0 | 2,19E-05 | 1,04E-04 | 2,33E-04 | 7,54E+00 | -7,11E-01 |
| RWD | [kg] | 1,72E-03 | 8,35E-05 | 8,90E-05 | 9,40E-06 | 3,29E-04 | 0 | 4,49E-06 | 0 | 3,67E-07 | 1,73E-06 | 1,19E-05 | 1,72E-05 | -1,21E-04 |
| CRU | [kg] | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| MFR | [kg] | 0 | 0 | 4,62E-02 | 0 | 1,76E-02 | 0 | 0 | 0 | 0 | 0 | 1,76E+01 | 0 | 0 |
| MER | [kg] | 0 | 0 | 0 | 0 | 1,05E-01 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| EEE | [MJ] | 0 | 0 | 0 | 0 | 3,01E-01 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| EET | [MJ] | 0 | 0 | 0 | 0 | 4,59E-01 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |

Caption

**HWD** = Hazardous waste disposed;
**NHWD** = Non-hazardous waste disposed;
**RWD** = Radioactive waste disposed;
**CRU** = Components for re-use;
**MFR** = Materials for recycling;
**MER** = Materials for energy recovery;
**EEE** = Exported electrical energy;
**EET** = Exported thermal energy

## Biogenic carbon content of product and packaging for 1m2 of ceramic tiles

| Indicator | Unit | A1 | A2 | A3 | A4 | A5 | B1 | B2 | B3-B7 | C1 | C2 | C3 | C4 | D |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Biog. C in packaging | [kg | 0 | 0 | 6,25E-03 | 0 | -6,25E-03 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Biog. C in product | [kg] | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |

Caption

**Biog. C in packaging** = Biogenic carbon content in packaging;
**Biog. C in product** = Biogenic carbon content in product

## Additional environmental impact indicators for 1m2 of ceramic tiles

| Indicator | Unit | A1 | A2 | A3 | A4 | A5 | B1 | B2 | B3-B7 | C1 | C2 | C3 | C4 | D |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| PM | [Disease incidences] | 3,78E-07 | 1,56E-08 | 8,16E-08 | 2,42E-08 | 9,78E-08 | 0 | 1,43E-10 | 0 | 8,72E-10 | 1,46E-09 | 4,45E-09 | 9,87E-09 | -1,13E-08 |
| IR | [kBq U235 eq.] | 2,70E-01 | 1,25E-02 | 1,12E-02 | 1,38E-03 | 4,10E-02 | 0 | 6,71E-04 | 0 | 5,42E-05 | 2,56E-04 | 1,91E-03 | 1,99E-03 | -1,82E-02 |
| ETF-fw | [CTUe] | 2,70E+01 | 6,79E+00 | 1,86E+00 | 4,13E+00 | 5,56E+00 | 0 | 2,19E-01 | 0 | 1,58E-01 | 7,47E-01 | 5,89E-01 | 8,15E-01 | -8,76E-01 |
| HTP-c | [CTUh] | 1,10E-09 | 1,26E-10 | 1,11E-09 | 7,59E-11 | 4,04E-10 | 0 | 1,84E-11 | 0 | 2,91E-12 | 1,37E-11 | 1,30E-11 | 1,26E-10 | -7,04E-11 |
| HTP-nc | [CTUh] | 7,29E-08 | 4,07E-09 | 8,64E-08 | 2,44E-09 | 3,81E-08 | 0 | 1,70E-09 | 0 | 9,39E-11 | 4,42E-10 | 4,72E-10 | 1,34E-08 | -5,51E-09 |
| SQP | [Pt] | 1,32E+01 | 1,17E-01 | 5,84E+01 | 3,46E-02 | 1,74E+01 | 0 | 1,74E-02 | 0 | 1,37E-03 | 6,48E-03 | 2,38E-01 | 3,66E-01 | -5,75E-01 |

Caption

**PM** = Particulate matter emissions;
**IR** = Ionising radiation, human health;
**ETF**= Eco-toxicity (freshwater);
**HTP-c** = Human toxicity, cancer effects;
**HTP-nc** = Human toxicity, non-cancer effects;
**SQP** = Soil quality potential/Land use-related impacts

Disclaimer for EN 15804+A2: additional indicators

(1) Potential Human exposure efficiency relative to U235 (IRP): This impact category deals mainly with the eventual impact of low dose ionizing radiation on human health of the nuclear fuel cycle. It does not consider effects due to possible nuclear accidents, occupational exposure nor due to radioactive waste disposal in underground facilities. Potential ionizing radiation from the soil, from radon and from some construction materials is also not measured by this indicator

(2) The results of the environmental impact indicator: ADP, WDP, ETP-fw, HTP-c, HTP-nc, SQP shall be used with care as the uncertainties on these results are high or as there is limited experience with the indicator.

# 6. CALCULATION RULES

The functional unit for this study is 1 $m^2$ of an average installed ceramic tile produced by Ceramica Valsecchia S.p.A., covering walls and floors in accordance with the normative constraints in terms of installation for 50 year (BNB (2011)).

Packaging material for transport to the installation site (plastic, paper-cardboard, wood, and wax) and additional material for the installation (adhesive mortar) have been considered. Material losses of 6,5% during the installation process (A5 phase) have been considered, so 1 $m^2$ of tile surface is the net of material losses.

## REFERENCE FLOW

| Name | Value | Unit |
|---|---|---|
| Declared unit | 1 | $m^2$ |
| Grammage | 18,97 | $kg/m^2$ |
| Conversion factor to 1 kg | 0,053 | - |

## ASSUMPTIONS

Where it is not possible to know the precise composition of materials in the supply chain (due to commercial or industrial confidential suppliers' reasons or due to missing datasets), these are approximated with LCIs of similar materials, estimated by the combination of available datasets or reconstructed with literature data. In most cases, a conservative approach has been adopted, overestimating burdens to prove irrelevance. In other cases, proxy data were selected based on scientific experience, to improve the accuracy of the model.

Some materials, like colorants, glaze compounds, inks, and frits, have been used based on composition (instead, for instance, of the single composition of a single colorant) using primary data in terms of absolute quantity and relative percentage of single chemical compound. For these kinds of materials, belonging to the same family (colorant, serigraphy, etc.) where a technical datasheet is not available, the same composition of the other materials of that family compound has been assumed.

Chemical additives have been modelled using compositions available in technical data sheets (in certain safety data sheets).

Quantities of auxiliary materials and packaging of input materials have been estimated according to waste produced by the company of the working group (e.g., lubricating oil, paper/cardboard, wood, plastic packaging, etc). The exact chemical composition of detergent components used for cleaning ceramic tiles depends on user behaviour and the selected supplier. The following assumptions are applied in the current study concerning the composition of detergents:

- Detergents for ordinary cleaning in a water solution are mixed as reported below according to Müller, F. |. (2003):
    - 5% anionic surfactant component: alcohol ethoxy sulfate,
    - 10% non-ionic surfactant component: fatty acid derivate.

For those processes that take place in Italy, electricity Italian residual grid mix was used, instead for those processes for which the place is unknown electricity RER residual grid mix was used.

Below are the emission factors considered for the energy related to production:

- Electricity = kg GWPeq./kWh
- Natural gas = kg GWPeq./MJ

## CUT-OFF CRITERIA

No cut-offs have been made in the study.

## DATA QUALITY

Geographical and temporal representativeness of primary data:

- **Geographical**: All primary data are collected specifically for the countries/regions studied. Some secondary data represent the German industrial framework or an average European situation. The most important secondary processes for this study, thermal and electrical energy, specifically represent Italian geographical conditions. Processes for which the manufacturing location is unknown (e.g. grinding of some raw materials) use the generic EU28 electricity grid process.
  When country- or region-specific data are not available, surrogate data are used. Geographical representativeness is considered good.
- **Temporal**: All primary data are collected for the reporting period from 01/09/2024 to 31/08/2025. All secondary data come from the LCA for Expert 2023.2 databases and are representative of the years 2018-2022. Temporal representativeness is good.
- **Technological**: All primary and secondary data are modelled to be specific to the technologies or technology mixes studied. When technology-specific data are not available, surrogate data are used. Technological representativeness is considered good.

## PERIOD UNDER REVIEW

The primary data collected in the study refers to the period from 01/09/2024 to 31/08/2025.

## ALLOCATION

For all refinery products, the allocation in terms of mass and net calorific value was applied. Two allocation rules are applied:

1. The raw material consumption (crude oil) of the respective steps, which is required for the production of a product or intermediate, is allocated according to the energy (mass of the product * calorific value of the product);
2. The energy consumption (thermal energy, steam, electricity) of a process, e.g. atmospheric distillation, which is required by a product or intermediate, is allocated to the product according to the share of the step's throughput (mass allocation).

# 7. SCENARIOS

The following technical information about declared modules and related scenarios is based on average data, according to the "European Ceramic Tile Manufacturers Federation" and subsequently implemented in the PCRb of the IBU program operator "Ceramic tiles and panels".

## TRANSPORT (A4)

The environmental costs of transporting the packaged product from the production site to the construction site in Italy and Europe are allocated to Module A4. Having no specific information about the distances of the product's distribution, it was decided to follow what is indicated in **NF EN 15804+A2/CN (2022)**. The transportation settings are:

| Distribution | Dataset | Distance [km] |
|---|---|---|
| National (Italy) – 42,76 % of tiles sold | Truck-trailer, Euro 6 A-C, 34 - 40t gross weight / 27t payload capacity (with a consumption of 2,11E-03 kg diesel/kg) | 300 |
| Intracontinental (Europe) – 44,12 % of tiles sold | | 1390 |
| International – 13,12 % of tiles sold | Bulk commodity carrier, average, deep sea (with a consumption of 1,37E-04 kg HFO/kg) | 6520 |

## INSTALLATION TO THE BUILDING (A5)

The installation stage options were based on average data from different manufacturers of ceramic tiles in Europe to define which kind and the amounts of materials used EN 17160:2019 . For this study, it is assumed that the tiles are installed using 6 kg of cementitious adhesive per $1m^2$ of tile, on a worst-case scenario approach. The three options indicated in the EN 17160:2019 were compared based on the total score using the EF3.0 methodology. What emerged is that option 3 (cementitious adhesive) is 10% more impactful than option 2 (mortar, dispersion adhesive and polysulfide) and 70% more impactful than option 1 (mortar and water).

During the installation, there is an average tile scrap production of 6,5%, which is considered in module A5, as well as all the impacts generated by the production of the scrap.

For the treatment of packaging waste, the most updated European average scenarios (Eurostat 2020) are used:

| Disposal scenarios for packaging materials | | | |
|---|---|---|---|
| **Material** | **Recycling (%)** | **Energy recovery (%)** | **Landfill (%)** |
| Plastic | 37,6 | 38,2 | 24,2 |
| Paper and board | 81,5 | 9,1 | 9,4 |
| Wood | 31,9 | 38,9 | 39,2 |
| Glue-wax* | - | - | 100 |

* Since there are no specific Eurostat statistics for glue or wax packaging, it was decided to consider an end-of-life of 100% landfill, using a conservative approach.

## MAINTENANCE (B2)

Over the use modules (B1-B7), only the maintenance module (B2) is considered to generate environmental impacts. During the ceramic tile life cycle, the product has to be regularly cleaned, to a greater or lesser extent, depending on the type of building (residential, commercial, etc.) in which it is installed. If the surface is dirty or greasy, cleaning agents such as detergents or bleach can be added. Thus, the consumption of water and disinfectant chemicals has been taken into account. This scenario is modelled based on EN 17160:2019 . The scenario is made as follows:

| Name | Value | Unit |
|---|---|---|
| Detergent | 0,13 | ml/m$^2$ |
| Water | 0,2 | l/m$^2$ |
| Cleaning times in 1 year according to periodicity | 26 | Done once every two weeks |
| RSL | 50 | years |
| Electricity | - | kWh |

### END-OF-LIFE

The EoL phase starts with the demolition process used for representing the C1 module, where the building deconstruction takes place. This process considers an excavator (100kW) with a consumption of diesel of 1.72E-4 per kg of product and all the emissions connected with the fuel-burning process. After the demolition stage, ceramic tiles can be crushed and then used in several applications different from ceramic tiles production:

- Road construction in filled embankment;
- Concrete aggregates;
- Aggregates that can be integrated as partial substitutes for natural aggregate in hot mix asphalt;
- Aggregates which can be used in the construction of landfills;

After the demolition, ceramic tile is transported to the end-of-life processing; this is the C2 module and it is considered an average distance of 30 km.

The product's end-of-life scenario includes:

- 70% of the product sent for recycling;
- 30% of the product sent to landfill.

The worst-case scenario (landfilling) is modelled by the landfill process where admixtures end their life cycle and no credit allocated to module D is considered. The dataset used for the landfill considers 100 years of deposit.

### BENEFITS AND LOADS BEYOND THE PRODUCT SYSTEM BOUNDARY

Module D comprises credits from the recycling of packaging and energy credits from the thermal recovery of packaging. For the treatment of packaging waste, the most updated European average scenarios are used (Eurostat 2020):

| Material | Recycle (%) | Incineration with energy recovery (%) | Landfill |
|---|---|---|---|
| Plastic | 37,6 | 38,2 | 24,2 |
| Paper and cardboard | 81,5 | 9,1 | 9,4 |
| Wood | 31,9 | 38,9 | 39,2 |
| Wax | - | - | 100 |

# 8. ENVIRONMENT AND HEALTH DURING USE

Ceramic tiles, being an **inert and stable material**, do not undergo degradation and do not emit volatile chemical substances (VOCs) or other pollutants during their in-use phase.

This characteristic ensures that the product does not represent a source of **indoor pollution** or a risk to the environment and user health. Consequently:

- **Harmful Emissions:** During use, the product does not release hazardous substances, nor acoustic or electromagnetic contaminants, into the surrounding environment.

- **PCR Compliance:** In line with the Product Category Rules (PCR) for ceramic products, the Life Cycle Assessment (LCA) acknowledges that the absence of significant emissions and impacts during the use phase makes further evidence or measurements for this specific impact category unnecessary.

The inertia of the ceramic tile therefore actively contributes to maintaining a high quality of indoor air and the overall healthiness of living and working environments.

# 9. OTHER ADDITIONAL ENVIRONMENTAL INFORMATION

## ADDITIONAL ENVIRONMENTAL PARAMETERS RELATING TO THE MINIMUM ENVIRONMENTAL CRITERIA (CAM) OF MINISTERIAL DECREE 23 JUNE 2022, PARAGRAPH 2.5.10.1 "HARD FLOORINGS".

All articles produced by **Ceramica Valsecchia SpA** meet the characteristics and requirements established by the **Minimum Environmental Criteria (CAM)**, developed as part of the national "green procurement" strategy known as **GPP (Green Public Procurement)**.

These criteria represent the tool adopted by the Italian Public Administration to manage contracts relating to the design and construction of new buildings and the renovation of existing ones. CAM are regulated by **Article 34** ("Energy and Environmental Sustainability Criteria") of **Legislative Decree 50/2016 "Public Procurement Code"**, which made their application mandatory for all contracting authorities.

Tiles produced by Ceramica Valsecchia SpA comply with the technical specifications required by CAM, conforming to the criteria set out in **EU Decision 2021/476**, which establishes the criteria for awarding the European Union ecological label (**EU Ecolabel**) to hard covering products.

**COMMON CRITERIA**

**1.1 - Extraction of minerals for industrial and construction uses**

Ceramica Valsecchia SpA requires all raw material suppliers involved in extraction activities to provide activity authorization, an environmental restoration plan, an environmental impact assessment, and a map with the geographical coordinates of the site.

**1.2 - Restricted substances**

Ceramica Valsecchia SpA manufactures articles using chemicals or supplied materials that do not contain **Substances of Very High Concern (SVHC)** included in the Candidate List pursuant to Article 59 of Regulation (EC) No. 1907/2006, in concentrations exceeding 0.10% (weight/weight).

**1.3 - VOC Emissions – Volatile Organic Compounds**

Ceramic tiles are recognized as inert materials that do not produce harmful emissions.

**1.4 - Fitness for use**

Articles produced by Ceramica Valsecchia SpA are **CE marked** in accordance with technical standard **EN 14411**. Declarations of Performance (DoP) are drawn up according to Regulation (EU) No. 305/2011.

**1.5 - User information**

Information regarding the technical characteristics of Ceramica Valsecchia SpA products, as well as their installation, cleaning, and maintenance, is available on the company website.

**SPECIFIC CRITERIA FOR CERAMIC PRODUCTS**

**4.1 - Fuel consumption for drying and firing**

The specific energy consumption from fuel, calculated for the spray-drying processes (production of spray-dried powder), drying (reduction of moisture in the raw pressed body), and firing of the finished product, does not exceed the mandatory reference limits. See the table below:

| Requirement | Mandatory Limit | Excellence Threshold | Compliant Limit Value | Ceramica Valsecchia SpA |
|---|---|---|---|---|
| **Fuel Consumption** | **Spray-drying** | 1.8 MJ/kg | 1.3 MJ/kg | < 1.8 MJ/kg |
| | **Drying and Firing** | 5.5 MJ/kg | 4.3 MJ/kg | < 4.3 MJ/kg |

*(Limit values declared for product families)*

### 4.2 – CO2 Emissions

CO2 emissions associated with fuel use and process emissions resulting from the decarbonation of raw materials during the drying and firing processes do not exceed the mandatory limits. See the table below:

| Requirement | Mandatory Limit | Excellence Threshold | Compliant Limit Value | Ceramica Valsecchia SpA |
|---|---|---|---|---|
| **CO2 Emissions** | **Spray-drying** | 84 KgCO2/t | 54 KgCO2/t | < 84 KgCO2/t |
| | **Drying and Firing** | 360 KgCO2/t | 290 KgCO2/t | < 290 KgCO2/t |

*(Limit values declared for product families)*

### 4.3 - Process water consumption Compliance:

The Ceramica Valsecchia SpA production plant is equipped with a closed-loop recycling system for wastewater treatment.

### 4.4 - Atmospheric pollutant emissions: Particulate matter, HF, NOx, and SOx. Compliance:

Specific atmospheric emissions of particulate matter (dust), HF, and NOx associated with the production of Ceramica Valsecchia SpA ceramic products do not exceed the mandatory limits set by current regulations. See the table below:

| Requirement | Mandatory Limit | Excellence Threshold | Compliant Limit Value | Ceramica Valsecchia SpA |
|---|---|---|---|---|
| **Air Emissions** | **Dust (spray-dryer)** | 90 mg/kg | - | < 90 mg/kg |
| | **Dust (kiln)** | 50 mg/kg | 10 mg/kg | < 10 mg/kg |
| | **HF (kiln)** | 20 mg/kg | 6 mg/kg | < 6 mg/kg |
| | **NOx (kiln)** | 250 mg/kg | 170 mg/kg | < 250 mg/kg |
| | **SOx (kiln)** | 1300 mg/kg | 750 mg/kg | < 750 mg/kg |

### 4.5 - Wastewater management Compliance:

At the Ceramica Valsecchia SpA production plant, process wastewater is treated on-site to remove suspended solids and subsequently reintroduced into the production cycle as part of a **zero liquid discharge** system.

### 4.6 - Reuse of process waste Compliance:

More than 90% by mass of the process waste generated by the production of ceramic products is reintegrated into the internal production process, used in ceramic product manufacturing processes outside the plant, or reused in other production processes.

### 4.7 - Glazes and inks Compliance:

The formulation of glazes and inks involves weight concentrations of less than 0.1% for both Lead (Pb) and Cadmium (Cd).

# REFERENCES


| | |
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| **EN 17160:2019** | Product category rules for ceramic tiles 2019 |
| **EN 15804+A2** | EN 15804:2012+A2:2019: Sustainability of construction works -Environmental Product Declarations - Core rules for the product category of construction products |
| **EN ISO 14025** | EN ISO 14025:2011-10 Environmental labels and declarations - Type III environmental declarations - Principles and procedures |
| **EN ISO 14040** | EN ISO 14040:2009-11 Environmental management - Life cycle assessment - Principles and framework |
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