# COOPERATIVA CERAMICA D' IMOLA

# ENVIRONMENTAL PRODUCT DECLARATION

**PRODUCT NAME:**
Porcelain stoneware tiles and slabs for floors and walls, indoor and outdoor

**PRODUCTION SITE:**
Imola; Faenza; Borgo Tossignano

**in compliance with ISO 14025:2006 and EN 15804+A2:2019/AC 2021**

| | |
|---|---|
| Program operator | EPDItaly |
| Publisher | EPDItaly |

| | |
|---|---|
| Declaration number | CCI – EPD1 |
| Registration number | EPDITALY0490 |

| | |
|---|---|
| Issue date | 11/10/2023 |
| Valid to | 11/10/2028 |

# 1. GENERAL INFORMATION

| | |
|---|---|
| **EPD owner** | Cooperativa Ceramica d'Imola s.c.<br>Via Vittorio Veneto, 13 – 40026 Imola (BO) |
| **Reference production site** | Site 2 – Via Correcchio, 32 – 40026 Imola (BO)<br>Site 3 – Via Ripalimosani, 1 – 40021 Borgo Tossignano (BO)<br>Site 5 – Via Pana, 10 – 48018 Faenza (RA) |
| **Scope of application** | This is an average EPD referring to ceramic tiles manufactured in 3 different production plants owned by Cooperativa Ceramica Imola: Borgo Tossignano (BO), Faenza (RA) and Imola (BO). The 3 tiles are manufactured following the same production path and delivered and installed worldwide. |
| **Programme operator** | EPDItaly – info@epditaly.it<br>Via Gaetano De Castillia, 10, 20124 Milano (MI) |
| **Independent verification** | This declaration has been developed in accordance with the regulations of EPDItaly; further information and the same regulations are available at: www.epditaly.it<br>Independent verification of the declaration and data carried out in accordance with ISO 14025: 2006<br>☐ Internal ☑ External<br>Third party verification done by: ICMQ S.p.A. (www.icmq.it), Via Gaetano De Castillia, 10, 20124 Milano (MI) – Italia. Accredited by ACCREDIA, Accreditation number 002H REV. 19 |
| **CPC code** | 37370 - Ceramic flags and paving, hearth or wall tiles; ceramic mosaic cubes and the like |
| **Company contact** | Roberto D'Agostino<br>e-mail: roberto.dagostino@ccimola.it |
| **Technical support** | Enel X Advisory Services<br>e-mail: nader.tayser@enel.com |
| **PCR – Product Category Rules** | Core-PCR ICMQ-001/15 rev 3 – MAIN PCR<br>IBU PCR Part B: Requirements on the EPD for Ceramic tiles and panels v.1 – SUPPORTING PCR |

| | |
|---|---|
| **Reference documents** | EN ISO 14025:2006, Environmental labels and declarations – Type III environmental declarations – Principles and procedures<br>EN 15804+A2:2019/AC 2021 - Sustainability of construction works - Environmental product declarations - Core rules for the product category of construction products<br>Regulations of the EPDItaly Programme. Revision 5.2. Issue date 16/02/2022 |
| **Comparability** | EPDs published within the same product category though originating from different programs may not be comparable. Full conformance with a PCR allows EPD comparability only when all stages of a life cycle have been considered. However, variations and deviations are possible. |
| **Liability** | The EPD owner relieves EPDItaly from any non-compliance with the environmental legislations. The holder of the declaration will be liable for the supporting information and evidence. EPDItaly disclaims any liability regarding the manufacturer's information, data, and results of the life cycle assessment. |

## 2. THE COMPANY

Cooperativa Ceramica d'Imola is one of the oldest, longest-standing production and work cooperatives in Italy. With its headquarters and plant in Imola, Cooperativa Ceramica d'Imola is a company manufacturing ceramic and porcelain stoneware flooring and cladding for public and private use. It currently has three production plants, as well as its headquarters.

The Cooperativa Ceramica d'Imola was established following the transfer of the tableware and majolica factory owned by Giuseppe Bucci and his brother Angelo to its workers on 22 June 1874. A transfer that was driven by a desire to contribute to the "progress of industry and the economic improvement of the workers". A belief that is approved and declared by all the historical members in the Brotherhood Agreement and numerous statutes.

At the end of the 1800s, the Cooperativa Ceramica d'Imola inaugurated the Artistic Section, an artisan laboratory for artistic research and the production of majolica. The main stages of its production are still carried out in this workshop today.

The decades that span from the mid-1800s to the end of the century are dominated by a constant growth and continuous increase in production capacity. The Cooperativa Ceramica d'Imola entered the twenty-first century by expanding its production range and with state-of-the-art technological solutions to meet the needs of foreign markets in rapid expansion as well as satisfying the request to safeguard the environment which customers and the local area were expecting.

Continual improvement for customer satisfaction, focusing on people, on working conditions, pay, quality, the environment and workers' safety have always been at the heart of decisions made to reach new goals. Products covered by this EPD are intended both for B2B and for B2C market groups.

# 3. THE PRODUCT

Porcelain stoneware is made of high-grade clay, quartz and feldspar materials combined to create a product that is almost completely vitrified and which offers both a light colour, almost zero water absorption and a product that is highly bend and scratch resistant. It can be decorated on the surface with glaze and ink applications. The technical porcelain stoneware has a "full-body" technology in which the tile's matrix is coloured.

Ceramic tiles produced by Cooperativa Ceramica d'Imola conform to the following standards and specifications. According to EN 14411 in Europe and ISO 13006 in the rest of the world ceramic tiles are classified into five main types based on shaping methods (A = Extrusion, B: Dry pressing) and water absorption level.

**Table 1**. Technical characteristics of the product

| **PORCELAIN STONEWARE** | average value |
|---|---|
| **Dimensions and appearance (ISO 10545-2)** | compliant |
| **Water absorption (ISO 10545-3)** | <0,1% |
| **Flexural resistance (ISO 10545-4)** | >45 N/mm$^2$ |
| **Modulus of rupture (ISO 10545-4)** referred to 60x60 cm size and 6,5 mm thickness | >1800 N |
| **Modulus of rupture (ISO 10545-4)** referred to 60x60 cm size and 10 mm thickness | >3000 N |
| **Modulus of rupture (ISO 10545-4)** referred to 60x60 cm size and 20 mm thickness | >11000 N |
| **Deep abrasion resistance (ISO 10545-6)** | <140 mm$^3$ |
| **Resistance to surface abrasion (ISO 10545-7)** | Classes 0-5 |
| **Linear expansion thermic coefficient (ISO 10545-8)** | ≤7x10$^{-6}$ °C$^{-1}$ |
| **Resistance to sudden temperature changes (ISO 10545-9)** | Resistant |
| **Frost resistance (ISO 10545-12)** | Resistant |
| **Household chemicals and swimming pool water cleansers (ISO 10545-13)** | min. B |
| **Acids and low concentration alkalis (ISO 10545-13)** | from LA, LB to LC |
| **Acids and high concentration alkalis (ISO 10545-13)** | available on request |
| **Stain resistance unglazed tiles (ISO 10545-14)** | available on request |
| **Stain resistance glazed tiles (ISO 10545-14)** | min. 3 |

## Material composition

The declaration on the content of materials for the product was done by the manufacturer in accordance with product recipe. The unique ID and percentage mass share of all the materials and declarable substances contained in the fully assembled product plus its packaging are reported in **table 2.** Only material flows with mass share higher than 0,5% are reported; results are then re-calibrated to 100% according to this criterion. Calculation is performed on a weighted average considering the 3 involved plants.

**Table 2.** Material composition for the fully assembled product

| Material class name | Average mass share (%) |
|---|---|
| Feldspar | 41.3 |
| Clay | 33.5 |
| Feldspathic sand | 7.3 |
| Internal secondary material[1] | 5.6 |
| External secondary material | 5.0 |
| Silica sand | 3.8 |
| Pallet – PACKAGING | 2.2 |
| Fluidifiers | 0.6 |
| Paper – PACKAGING | 0.5 |

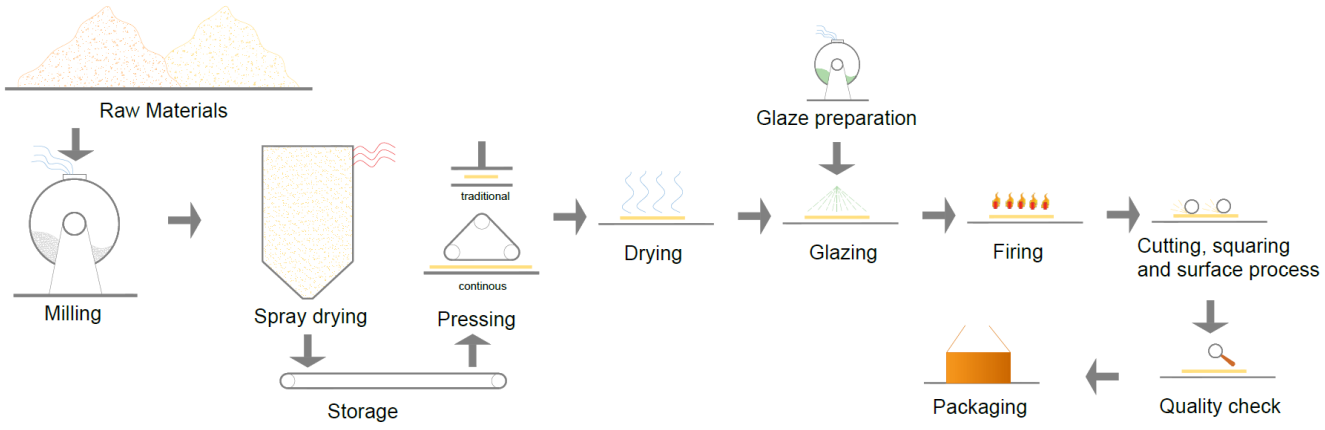
## Byproducts

Tile manufacturing generates some output flows which have an own market and therefore can be considered as byproducts. These flows are reported in table below but they are not included in the LCA; therefore, no allocation among products and byproducts has been performed in this EPD.

**Table 3.** Byproducts production and modelling approach per site

| Plant | Byproduct | Quantity [kg/year] |
|---|---|---|
| Imola | **Dust** | 1.694.180 |
| Imola | **Tile byproduct** | 1.716.268 |
| Borgo Tossignano | **Tile byproduct** | 6.654.360 |
| Faenza | **Tile byproduct** | 8.143.240 |
| Faenza | **Tile byproduct - raw** | 2.561.080 |

## Manufacturing process




[1] This flow does not contribute to recycled content according to ISO 14021

## Reference service life

The reference service life (RSL) of the product was 50 years as stipulated in reference PCR and supporting standards.

# 4. SCOPE AND TYPE OF EPD

This is an average product and plant EPD for the general product defined as "ceramic tile" manufactured in 3 different production sites owned by Cooperativa Ceramica d'Imola. The spatio-temporal scope for the data considered in this study are summarized in **table 3.** The results of the LCA study were generated by a background LCA activity which results and detailed hypotheses are documented in project deliverable *Report LCA Coop. Ceramica Imola_v2.*

**Table 4.** The spatio-temporal scope considered in the LCA study at the current global level of technology

| Representativeness | Scope |
|---|---|
| Spatial | Italian territory (manufacturing); worldwide scope for life cycle phases from gate factory up to the end of life |
| Temporal | January 1st to December 31st, 2021 |

## Declared unit

The declared unit (FU) of the studied system is defined as 1 m² of ceramic tile, manufactured in each of the 3 production plants involved in the study, with a weighted average density[2] of 22,4 kg/m², installed onsite with a reference service life of 50 years according to supporting PCR. According to normative framework, a **declared unit** with the same properties as the functional unit is adopted as some life cycle modules are excluded from the system.

## System boundary

The system boundary implemented in this LCA covered the entire lifecycle of the product i.e., from cradle to grave as shown in **table 4** with the life cycle stages for all the major activities involved, grouped into three distinct modules i.e., upstream, core, and downstream with reference to EN 15804. *Modularity* and *Polluter pays* principles are followed along LCA modelling activities in compliance with reference normative framework. The product life cycle and inventory analysis describing all the activities, simplifying assumptions, and modelling scenarios used in the LCA has been exhaustively executed under **section 5** of this document.

[2] According to what specified in chapter 5

**Table 5.** Life cycle stages, geographical scope, and modules declared in the system boundaries:

| **Phase** | Upstream | | Core | Downstream | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Module** | A1 | A2 | A3 | A4 | A5 | B1 | B2 | B3 | B4 | B5 | B6 | B7 | C1 | C2 | C3 | C4 | D |
| **Declared module** | X | X | X | X | X | ND | X | ND | ND | ND | ND | ND | X | X | X | X | X |

**X** = Lifecycle stages and modules declared in the LCA
**ND** = module not declared in the LCA results

## Cut-off criteria

Cut-off criteria are not exceeding thresholds defined by reference PCRs. Any unit process has been accounted for at least 99% of total material and energy flows, thus meaning 1% cut-off can be estimated. During manufacturing stage, packaging of semifinished products and raw materials has been excluded from the study due to the high complexity in retrieving such data which contribution is expected to be negligible.
Decommissioning phase has been assumed to be performed manually, therefore no material nor energy input is considered in associated life cycle modules.

## Allocation rules

No allocation has been performed in this study. Plant-based data have been normalized on total plant production according to the goal of the study, which is the determination of the environmental impact of the average product manufactured in Cooperativa Ceramica d'Imola proprietary plants.

## Data quality

The most recent and verifiable site-specific data collected in 2021 was used in this study, and the International System of Units (SI) was adopted while recording the data. The initial primary data forming the basis for the LCA are industrial accounting systems (for what concerns plant data such as energy invoices), incoming material passports and purchase notes. Waste streams occurring during manufacturing have been modelled starting from waste management systems implemented in the involved plants.

# PRODUCT LIFE CYCLE AND INVENTORY ANALYSIS

The life cycle inventory (LCI) lists and quantifies all the flows entering and leaving all the declared life cycle stages of the product within the system boundary considered in relation to the scope of the study. The

reference flow for the LCI is 1 m² of ceramic tile, lasting 50 years after being installed. Next sections describe relevant assumptions performed in each life cycle stage.

## Manufacturing (modules A1, A2, A3)

No significant assumptions have been performed for manufacturing, as this phase is completely covered by data controlled by the EPD owner.

## Distribution (A4)

From this point forth, all the activities are classified under the downstream module. To ensure continuity with previous LCAs performed by the EPD owner, the set of distribution default parameters provided by supporting IBU PCR has been adopted, considering lack of specific parameters in the main regulatory framework. Table below summarizes the considered scenario:

| Distribution route | Route share | Average distance [km] | Main transport considered |
|---|---|---|---|
| National | 25% | 300 | Transport, freight, lorry >32 metric ton, EURO5 |
| European | 39% | 1.390 | Transport, freight, lorry >32 metric ton, EURO5 |
| International | 36% | 6.520 | Transport, freight, sea, container ship |

## Installation (A5)

Installation has been modelled considering default scenario provided by supporting PCR. Associated material input is reported below:

| Item | Quantity per m² [kg] | Processo Ecoinvent |
|---|---|---|
| Mortar | 0,5 | Adhesive mortar |
| Plaster (water based) | 2,5 | Base plaster<br>Tap water |
| Polysulfide | 0,07 | Polysulfide, sealing compound |

## Use (B2)

Environmental loads of use phase are associated with tile cleaning. This process, due to the lack of primary data, has been modelled considering supporting PCR default parameters. As the tile can be installed both in walls and floors, different quantities of cleaning products and water are required: the considered installation scenario is 60% for floor applications and 40% for wall applications. Resulting scenario, combining the default parameters for the aforementioned application share, is that 1m² of tiles considered in this EPD requires 164 l of water and 328 ml of surfactant for the whole 50 years RSL established.

## End of life

End of life is modelled according to supporting PCR. C1 module is populated considering 0,047 MJ/kg of mechanical demolition energy, parametrized considering average density plus installation auxiliary

materials. Collected demolition waste is delivered to the treatment facility: a default distance of 20 km covered by 16 t truck has been assumed for this transport. An additional 30 km transport has been considered from collection site to final end of life site (both landfill or recycling facility). The reference end of life scenario is 70% recycling and 30% landfill according to supporting PCR. Auxiliary materials for installation are supposed to be entirely landfilled. As tiles are likely to be quite grinded after building demolition, no inputs of material and energy are accounted in module C3.
Once recycled, ceramic tiles are usually adopted as filler for road pavement. While computing D module, avoided impacts have been calculated considering a benchmark dataset for gravel production, which is the most likely alternative product manufactured from virgin sources to deliver the same function as spent ceramic tiles.

## 5. LCA RESULTS

The environmental performance results of the product for the different lifecycle stages per FU accounting for all the mandatory environmental impact indicators **(Table 5),** descriptive parameters for resource use **(Table 6),** and waste production **(Table 7)** calculated according to reference regulatory standards[3].

Results are computed by performing weighted average among the three involved plants according to production shares reported below:

| Averaging parameters | | | |
|---|---|---|---|
| **Manufacturing site** | **Production [m²/year]** | **Share [%]** | **Average tile density [kg/m²]** |
| Imola | 5 625 541 | 31,6 | 24,7 |
| Borgo Tossignano | 5 099 167 | 28,7 | 22,0 |
| Faenza | 7 050 654 | 39,7 | 20,9 |

[3] EN15804+A2:2019 – Annex C - Table C.1 — Core environmental indicators, units and models; EF3.0 Package has been adopted in this EPD

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# LCA RESULTS – AVERAGE TILE

| Environmental impacts | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Indicator** | **U.M.** | **A1** | **A2** | **A3** | **A4** | **A5** | **B1** | **B2** | **B3** | **B4** | **B5** | **B6** | **B7** | **C1** | **C2** | **C3** | **C4** | **Total** | **D** |
| GWP-total | kg $CO_2$ eq | 4,01E+00 | 1,14E+00 | 5,08E+00 | 1,63E+00 | 1,52E+00 | | 1,42E+00 | | | | | | 1,14E-01 | 2,23E-01 | 0,00E+00 | 2,71E-02 | **1,52E+01** | -2,51E-02 |
| GWP-fossil | kg $CO_2$ eq | 4,01E+00 | 1,14E+00 | 4,23E+00 | 1,63E+00 | 1,46E+00 | | 1,06E+00 | | | | | | 1,14E-01 | 2,23E-01 | 0,00E+00 | 2,71E-02 | **1,39E+01** | -2,49E-02 |
| GWP-biogenic | kg $CO_2$ eq | 3,30E-03 | 7,64E-05 | 8,53E-01 | 1,11E-04 | 6,38E-02 | | 3,97E-03 | | | | | | 8,38E-06 | 1,61E-05 | 0,00E+00 | 3,49E-06 | **9,25E-01** | -1,93E-04 |
| GWP-luluc | kg $CO_2$ eq | 1,51E-03 | 2,99E-05 | 1,66E-03 | 3,79E-05 | 9,87E-04 | | 3,59E-01 | | | | | | 1,55E-05 | 4,23E-06 | 0,00E+00 | 1,32E-06 | **3,63E-01** | -6,34E-06 |
| ODP | kg CFC-11 eq | 2,96E-07 | 2,06E-08 | 7,31E-07 | 3,08E-08 | 3,43E-08 | | 9,36E-09 | | | | | | 3,21E-02 | 4,66E-09 | 0,00E+00 | 3,90E-10 | **3,21E-02** | -4,12E-10 |
| AP | moli $H^+$ eq | 1,35E-02 | 1,96E-02 | 4,76E-03 | 1,85E-02 | 6,91E-03 | | 6,20E-03 | | | | | | 3,58E-02 | 5,46E-04 | 0,00E+00 | 2,44E-04 | **1,06E-01** | -1,93E-04 |
| EPf | kg P eq | 5,10E-04 | 7,23E-06 | 3,91E-04 | 1,04E-05 | 3,06E-04 | | 2,78E-04 | | | | | | 3,07E-04 | 1,47E-06 | 0,00E+00 | 9,27E-08 | **1,81E-03** | -1,36E-06 |
| EPm* | kg N eq | 3,13E-03 | 5,28E-03 | 3,94E-03 | 5,00E-03 | 1,52E-03 | | 4,58E-03 | | | | | | 5,38E-04 | 2,12E-04 | 0,00E+00 | 1,11E-04 | **2,43E-02** | -8,66E-05 |
| EPt* | mol N eq | 3,35E-02 | 5,81E-02 | 1,86E-02 | 5,48E-02 | 1,45E-02 | | 1,88E-02 | | | | | | 2,31E-03 | 2,24E-03 | 0,00E+00 | 1,21E-03 | **2,04E-01** | -9,39E-04 |
| POCP | kg NMVOC eq | 2,24E-02 | 1,61E-02 | 6,40E-03 | 1,60E-02 | 4,81E-03 | | 3,88E-03 | | | | | | 2,37E-03 | 8,84E-04 | 0,00E+00 | 3,61E-04 | **7,32E-02** | -2,86E-04 |
| ADPe** | kg Sb eq | 1,19E-04 | 2,55E-08 | 2,55E-07 | 4,25E-08 | 5,46E-06 | | 9,07E-07 | | | | | | 2,19E-03 | 7,42E-09 | 0,00E+00 | 1,04E-09 | **2,32E-03** | -1,02E-08 |
| ADPf** | MJ | 1,56E+02 | 1,41E+01 | 1,01E+01 | 2,01E+01 | 1,78E+01 | | 2,32E+01 | | | | | | 5,74E-01 | 2,82E+00 | 0,00E+00 | 3,38E-01 | **2,45E+02** | -4,75E-01 |
| WDP** | $m^3$ | 1,95E+00 | 1,30E-02 | 8,81E-01 | 1,86E-02 | 5,44E-01 | | 8,00E+00 | | | | | | 4,15E-01 | 2,64E-03 | 0,00E+00 | 4,68E-04 | **1,18E+01** | -7,21E-03 |

**: Optional environmental KPIs which are not mandatory according to reference PCR*

***: Care shall be taken while handling these KPIs due to high uncertainties in the impact assessment method and limited experience on the interpretation of the results expressed by the indicator*

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| Resource consumption | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Indicator** | **U.M.** | **A1** | **A2** | **A3** | **A4** | **A5** | **B1** | **B2** | **B3** | **B4** | **B5** | **B6** | **B7** | **C1** | **C2** | **C3** | **C4** | **Total** | **D** |
| PERE | MJ | 0,00E+00 | 0,00E+00 | 2,15E+01 | 0,00E+00 | 0,00E+00 | | 0,00E+00 | | | | | | 7,98E-04 | 0,00E+00 | 0,00E+00 | 0,00E+00 | **2,15E+01** | 0,00E+00 |
| PERM | MJ | 0,00E+00 | 0,00E+00 | 5,82E-03 | 0,00E+00 | 0,00E+00 | | 0,00E+00 | | | | | | 8,81E-04 | 0,00E+00 | 0,00E+00 | 0,00E+00 | **6,70E-03** | 0,00E+00 |
| PERT | MJ | 1,71E+00 | 3,13E-02 | 2,15E+01 | 4,80E-02 | 1,20E+00 | | 1,27E+01 | | | | | | 1,14E-03 | 7,54E-03 | 0,00E+00 | 1,50E-03 | **3,71E+01** | -2,02E-01 |
| PENRE | MJ | 5,62E+01 | 0,00E+00 | 8,11E+00 | 0,00E+00 | 0,00E+00 | | 0,00E+00 | | | | | | 8,22E-04 | 0,00E+00 | 0,00E+00 | 0,00E+00 | **6,43E+01** | 0,00E+00 |
| PENRM | MJ | 0,00E+00 | 0,00E+00 | 2,22E+00 | 0,00E+00 | 0,00E+00 | | 0,00E+00 | | | | | | 9,07E-04 | 0,00E+00 | 0,00E+00 | 0,00E+00 | **2,22E+00** | 0,00E+00 |
| PENRT | MJ | 1,56E+02 | 1,46E+01 | 1,03E+01 | 2,07E+01 | 1,80E+01 | | 2,36E+01 | | | | | | 5,90E-01 | 2,90E+00 | 0,00E+00 | 3,47E-01 | **2,47E+02** | -4,83E-01 |
| SM | kg | 3,25E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | | 0,00E+00 | | | | | | 4,27E-01 | 0,00E+00 | 0,00E+00 | 0,00E+00 | **3,68E+00** | 0,00E+00 |
| RSF | MJ | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | | 0,00E+00 | | | | | | 4,71E-01 | 0,00E+00 | 0,00E+00 | 0,00E+00 | **4,71E-01** | 0,00E+00 |
| NRSF | MJ | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | | 0,00E+00 | | | | | | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | **0,00E+00** | 0,00E+00 |
| FW | $m^3$ | 4,66E-02 | 5,74E-04 | 1,37E-02 | 8,32E-04 | 1,37E-02 | | 2,23E-01 | | | | | | 2,90E-05 | 1,20E-04 | 0,00E+00 | 1,77E-05 | **2,98E-01** | -4,69E-03 |

| Output flows and waste stream | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Indicator** | **U.M.** | **A1** | **A2** | **A3** | **A4** | **A5** | **B1** | **B2** | **B3** | **B4** | **B5** | **B6** | **B7** | **C1** | **C2** | **C3** | **C4** | **Total** | **D** |
| HWD | kg | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | | 0,00E+00 | | | | | | 2,10E-05 | 0,00E+00 | 0,00E+00 | 0,00E+00 | **2,10E-05** | 0,00E+00 |
| NHWD | kg | 0,00E+00 | 0,00E+00 | 1,26E-05 | 0,00E+00 | 0,00E+00 | | 0,00E+00 | | | | | | 4,22E-02 | 0,00E+00 | 0,00E+00 | 7,62E+00 | **7,66E+00** | 0,00E+00 |
| RWD | kg | 0,00E+00 | 0,00E+00 | 8,72E-07 | 0,00E+00 | 0,00E+00 | | 0,00E+00 | | | | | | 4,65E-02 | 0,00E+00 | 0,00E+00 | 0,00E+00 | **4,65E-02** | 0,00E+00 |
| CRU | kg | 0,00E+00 | 0,00E+00 | 1,05E-03 | 0,00E+00 | 0,00E+00 | | 0,00E+00 | | | | | | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | **1,05E-03** | 0,00E+00 |
| MFR | kg | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | | 0,00E+00 | | | | | | 0,00E+00 | 0,00E+00 | 0,00E+00 | 1,78E+01 | **1,78E+01** | 0,00E+00 |
| MER | kg | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | | 0,00E+00 | | | | | | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | **0,00E+00** | 0,00E+00 |
| EE | MJ | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | | 0,00E+00 | | | | | | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | **0,00E+00** | 0,00E+00 |

# 6. REFERENCES

1. EPDItaly general programme instruction v.5.2 16/02/2022
2. Core-PCR: Product Category Rules PCR ICMQ-001/15 v.3 02/12/2019
3. Supporting PCR: IBU PCR Part B: Requirements on the EPD for Ceramic tiles and panels v.1
4. EN 15804+A2:2019/AC 2021 - Sustainability of construction works - Environmental product declarations - Core rules for the product category of construction products
5. ISO 14025:2006 Environmental labels and declarations – Type III environmental declarations – Principles and procedures
6. UNI EN ISO 14040:2006 Environmental management - Life cycle assessment - Principles and framework
7. UNI EN ISO 14044:2006 Environmental management - Life cycle assessment - Requirements and guidelines
8. Reference LCA report: Report LCA Coop. Ceramica Imola_v5-CCIMOLA.pdf

# 9. ANNEX: IMPACT ASSESSMENT METHODS

| Impact category | Indicator | Unit | Model |
|---|---|---|---|
| Climate change – total | Global Warming Potential total (GWP-total) | kg CO2 eq. | Baseline model of 100 years of the IPCC based on IPCC 2013 |
| Climate change - fossil | Global Warming Potential fossil fuels (GWP-fossil) | kg CO2 eq. | Baseline model of 100 years of the IPCC based on IPCC 2013 |
| Climate change - biogenic | Global Warming Potential biogenic (GWP-biogenic) | kg CO2 eq. | Baseline model of 100 years of the IPCC based on IPCC 2013 |
| Climate change - land use and land use change | Global Warming Potential land use and land use change (GWP-luluc) | kg CO2 eq. | Baseline model of 100 years of the IPCC based on IPCC 2013 |
| Ozone depletion | Depletion potential of the stratospheric ozone layer (ODP) | kg CFC 11 eq. | Steady-state ODPs, WMO 2014 |
| Acidification | Acidification potential, Accumulated Exceedance (AP) | mol H+ eq. | Accumulated Exceedance, Seppälä et al. 2006, Posch et al., 2008 |
| Eutrophication, freshwater | Eutrophication potential, fraction of nutrients reaching freshwater end compartment (EP-freshwater) | kg PO4 eq. | EUTREND model, Struijs et al., 2009b, as implemented in ReCiPe |
| Eutrophication, marine | Eutrophication potential, fraction of nutrients reaching marine end compartment (EP-marine) | kg N eq. | EUTREND model, Struijs et al., 2009b, as implemented in ReCiPe |
| Eutrophication, terrestrial | Eutrophication potential, Accumulated Exceedance (EP-terrestrial) | mol N eq. | Accumulated Exceedance, Seppälä et al. 2006, Posch et al. |
| Photochemical ozone formation | Formation potential of tropospheric ozone (POCP) | kg NMVOC eq. | LOTOS-EUROS ,Van Zelm et al., 2008, as applied in ReCiPe |
| Depletion of abiotic resources - minerals and metals | Abiotic depletion potential for nonfossil resources (ADPminerals&metals) | kg Sb eq. | CML 2002, Guinée et al., 2002, and van Oers et al. 2002. |
| Depletion of abiotic resources - fossil fuels | Abiotic depletion for fossil resources potential (ADP-fossil) | MJ, net calorific value | CML 2002, Guinée et al., 2002, and van Oers et al. 2002. |
| Water use | Water (user) deprivation potential, deprivation-weighted water consumption (WDP) | m3 world eq. deprived | Available WAter REmaining (AWARE) Boulay et al., 2016 |

| | | | |
|---|---|---|---|
| Particulate matter emissions | Potential incidence of disease due to PM emissions (PM) | Disease incidence | SETAC-UNEP, Fantke et al. 2016 |
| Ionising radiation, human health | Potential Human exposure efficiency relative to U235 (IRP) | kBq U235 eq. | Human health effect model as developed by Dreicer et al. 1995 update by Frischknecht et al., 2000 |
| Ecotoxicity (freshwater) | Potential Comparative Toxic Unit for ecosystems (ETP-fw) | CTUe | Usetox version 2 until the modified USEtox model is available from EC-JRC |
| Human toxicity, cancer effects | Potential Comparative Toxic Unit for humans (HTP-c) | CTUh | Usetox version 2 until the modified USEtox model is available from EC-JRC |
| Human toxicity, non- cancer effects | Potential Comparative Toxic Unit for humans (HTP-nc) | CTUh | Usetox version 2 until the modified USEtox model is available from EC-JRC |
| Land use related impacts / soil quality | Potential Soil quality index (SQP) | dimensionless | Soil quality index based on LANCA |
| Waste streams and output flows | All waste categories | kg | EDIP |