



ENVIRONMENTAL PRODUCT DECLARATION

Product Name:

Ceramic Tiles

(Thickness 9 mm)

Site Plant:

Bondeno di Gonzaga (MN)

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

Program Operator	EPDItaly
Publisher	EPDItaly

Declaration number	EPD 001 (Rev.1)
Registration number	EPDITALY0835

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1. GENERAL INFORMATION

EPD OWNER	
<i>Company name</i>	Ceramiche La Fenice S.r.l.
<i>Legal head office</i>	Via Statale 467 n° 7, 42013 Casalgrande (RE)
<i>Contacts for information on the EPD</i>	info@lafenicegc.com
PROGRAM OPERATOR	
EPDITALY (www.epditaly.it)	via Gaetano De Castillia n° 10 - 20124 Milano, Italia
INFORMATION ON THE EPD	
<i>Product name</i>	Porcelain Tiles, 9 mm thickness
<i>Plant involved in the declaration</i>	Stab. Keritaly – Strada comunale Albareda 1, 46023 Bondeno di Gonzaga (MN)
<i>Short product description</i>	Avarege EPD for porcelain ceramic tiles with a thickness of 9 mm and a medium weight of 19,54 kg/mq, manufactured by Keritaly S.p.A. for LA FENICE S.r.l.
<i>Application area</i>	Ceramic tile, object of this study, are intended to be applied to both Ceramiche La Fenice relieves EPDItaly from any floor and wall claddings and to be installed both indoors and outdoors for residential, non-residential and commercial use.
<i>CPC Code</i>	37370
VERIFICATION INFORMATION	
<i>Product Category Rules (PCR)</i>	EN 15804:2012+A2:2019 is the framework reference for PCRs. PCR ICMQ-001/15 rev3.1
<i>EPDItaly regulation</i>	General Programme Instruction document of EPDItaly v.6
<i>LCA tool</i>	EPD based on a verified LCA tool: LCA tool creator for Ceramic Tile V6 [(27/11/2023) - DB version 2023.2]
<i>Project LCA Tool Report</i>	Background report for LCA tool for Confindustria Ceramica – 27/11/2023
INDEPENDENT CHECK	Independent verification of the declaration and data, according to EN ISO 14025:2010. Internal ☐ External ☒ Third party verifier: ICMQ SpA, via De Castillia, 10 20124 Milano (www.icmq.it). Accredited by Accredia.
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	Ceramiche La Fenice relieves EPDItaly from any non-compliance with environmental legislation. The holder of the declaration will be responsible for the information and supporting evidence; EPD Italy declines all responsibilities 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



The **La Fenice Group** is made up of Holding **La Fenice Ceramiche**, a commercial company based in Casalgrande, and its three subsidiary companies: **Keritaly**, the group's production unit located in Bondeno di Gonzaga, **Gres Italia**, a commercial company based in Reggio Emilia and **La Fenice Iberia**, a Spanish company.



For 25 years the La Fenice Group has been producing and marketing ceramic surfaces in the heart of the Sassuolo ceramic district, the most important in the world for creativity, technological innovation and product quality. The Group ranks at the top of the most popular Italian commercial realities.

Year after year the Group has grown, acquiring a profound knowledge of ceramic material and the markets, which has allowed it to become a leader in Europe in the large-scale retail trade sector. In 2023, the Group produced 5.7 million square meters of tiles, marketing approximately XX million in more than 100 countries around the world.

The Group's entrepreneurial approach is based on the high technical and aesthetic quality of the products offered, on rigorous and sustainable production processes, and on the search for technological innovations capable of enhancing the excellence of 100% Italian design

Our history

- 1998- La Fenice is founded, a company created to market ceramic products selected by Enrico Guidetti (still CEO) in the Far East. The excellent quality of these surfaces opens the doors of several French, Spanish and Italian showrooms. In just a few years it went from an individual business to the largest ceramics company in the Sassuolo district.
- 2004 – Following a diversification strategy, La Fenice abandons its roots in the East to explore new markets such as Spain and Italy. This period marks an acceleration in the growth of the Group's client portfolio and expansion.
- 2005 - La Fenice moves its headquarters from the modest office in Sassuolo to the more spacious and modern structure in Casalgrande, which boasts over 3,500 m², reflecting the Group's ambition.
- 2013 - La Fenice begins the production of its collections in the Fiorano Modenese (Mo) factory where warehouse is also moved. Because of thorough renovation, there has been an expansion of the Casalgrande offices, the sample department and a new showroom.
- 2018 – The Group acquires and completely renovates the Bondeno (Mn) production site, inaugurating cutting-edge porcelain stoneware production in June 2019. Keritaly S.p.A was born.
- 2020 – Cutting and squaring line has been installed in Keritaly plant since January and, with its 3.5 million m² per year, places La Fenice among the most impressive companies in the ceramic sector. At the same time, the Casalgrande offices and the company showroom undergo a further expansion, demonstrating a constant commitment to excellence and customer satisfaction.
- 2022 – A second cutting and squaring line and a new sorting line were installed in Keritaly plant. The new sorting line has an advanced packaging machine designed to be able to pack ceramic tiles of various sizes using neutral carton sheet and in so doing a significant cardboard savings is guarantee.
- 2023 – La Fenice celebrates 25 years of activity, a historic milestone confirming the success and constant commitment of the people who work in this company.

Management systems, environmental and quality brands:

The organization:

- adopts a Quality Management System to improve the control of its products and services in compliance with current regulations and internal specifications in order to satisfy the needs and expectations of its customers and all stakeholders.
- adopts an Environmental Management System whose application allows a systematic and documented approach to environmental aspects aimed at protecting the environment and pursuing continuous improvement of performance.
- adopts an Occupational Health and Safety Management System to pursue the objectives of continuous improvement of the safety and health of workers, as an integral part of its activity and as a strategic commitment with respect to the more general objectives of the company.

The Keritaly plant in Bondeno di Gonzaga obtained the certification of its company management system in 2023, in compliance with the standards:

- UNI EN ISO 9001: 2015 – Quality management systems
- UNI EN ISO 14001: 2015 – Environmental management systems

and in 2024 in compliance with the standard:

- UNI EN ISO 45001: 2023 - Occupational health and safety management systems

The activities of the La Fenice group indirectly contribute to the sustainable development goals (SDGs) promoted by the UN. In 2023, the organization has presented the group's first **sustainability report**, which describes the performances of the last two years and future commitments in the three declinations of ESG sustainability: environmental, social and governance.

The organization, in order to ensure conditions of correctness and transparency in the business and corporate activities, has decided to implement the management, organization and control model compliant with Italian Legislative Decree 231/2001. Model 231 concerns corporate compliance, i.e. how a company must adapt not only to the mandatory rules, but also to the socio-cultural context that surrounds it, protecting, at the same time, the environment and the health and safety of workers.

The Group also has a **Code of Ethics** which defines the set of rights, duties and responsibilities it has towards all the subjects with whom it enters into relations (customers, suppliers, employees and/or collaborators, partners, institutions, ...). The Group's values and reference principles are indicated in the document, such as integrity, loyalty, honesty, the fight against discrimination, the protection of the individual and transparency.

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), 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 (like adhesives consumption) also 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.

Module **B2** includes the cleaning of the tiles. Provision of water, cleaning agent for the cleaning of the tiles, incl. waste water treatment are considered.

Module **C1** concerns the process of demolition and de-construction of the tiles from the building. It is not considered relevant for the environmental impacts.

Module **C2** considers transportation of the discarded tile to a recycling or disposal process.

Module **C3** considers every process (collection, crushing process etc.) properly for recycling the tiles.

Module **C4** includes all the landfill disposal processes, including pre-treatment and management of the disposal site.

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. Loads from packaging incineration (A5) and resulted energy credits (electricity and thermal energy) are declared within module D.

PRODUCT STAGE			CONSTRUCTION PROCESS STAGE		USE STAGE							END-OF-LIFE STAGE				BENEFITS AND LOADS BEYOND THE SYSTEM BOUNDARIES
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 demolition	Transport	Waste processing	Disposal	Reuse-Recovery-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

MND: MODULE NOT DECLARED

EPD TYPE:

The type of EPD is an average EPD for the product “Porcelain stoneware surfaces - tile and slab” produced in Keritaly located in Bondeno di Gonzaga (MN), Italy. All data refer to the 2023 production and sales.

According to the PCR ICMQ-001/15 rev. 3.1 the LCA study and the relative EPD, is “cradle to grave”. Modules included are A1, A2, A3, A4, A5, B1-B7, C1, C2, C3, C4 and D. All manufacturing activities and packaging/auxiliary's production are in module A3, while energy production and input materials are in A1. Transport to clients (A4) and installation (A5) are included together with end-of-life scenarios (benefits and loads included according to D module).

GEOGRAPHICAL VALIDITY:

Performance was calculated with reference to the company site. The reference market is worldwide.

DATABASE: Managed LCA Content (GaBi Database) (version 2023.2)

SOFTWARE: LCA for Expert (GaBi) (version 10.7)

4. DETAILED PRODUCT DESCRIPTION

MANUFACTURING PROCESS DESCRIPTION:

La Fenice ceramic tiles are manufactured by Keritaly mainly from natural raw material such as clay, feldspar, sand and colored pigments, finely ground, pressed with a power of about 400 kg/sq.cm, glazed and then fired at very high temperature (more than 1200°C). Specifically, porcelain stoneware has a water absorption level of less than 0,5% (Bla GL group – ISO 13006 Annex G).

Entry, storage and entry into production of raw materials:

The manufacturing process of the Keritaly site is a “partial ceramic cycle” which begins with the pressing stage of the spray dried powder received by a single supplier: Ceramiche CCV Castelvetro S.p.a., Strada Statale 569, n.173 - 41014 Solignano di Castelvetro (Mo), Italy. The atomized powders are transferred from Solignano di Castelvetro to Bondeno di Gonzaga by truck.

The data relating to the spray dry production phases are considered in the calculation of impacts.

Manufacturing:

Two ingredients are necessary for the production of tiles: atomized powder and glaze.

The atomized powder is obtained by wet grinding of sands, clays and feldspars. The slip thus produced is then spray dried at 600 °C to then obtain powder. The atomized powder arrives, by truck, outsourced from a single supplier; it is stored in steel silos which guarantee a few days production autonomy. From these silos the powder is sent to the presses via a series of conveyor belts. Before arriving at the press, the powder is deferrized with permanent magnets and then sieved twice.

Keritaly produces ceramic glazes inside. Glazes are suspensions of solids in water and are obtained by grinding in water natural raw materials (such as clays, kaolins, alumina or zirconium), frits (crushed glass coming out of melting furnaces), colored pigments and additives (flocculants, suspending agents, ...). Keritaly uses Alsing mills, steel cylinders lined inside with alumina bricks and half filled with alumina grinding media. The cylinders are equipped with openings for the loading and unloading of the materials. These mills rotate up grinding degrees you wish to active (final residue).

The powder arrives at the presses where it is deposited in the mold cavities. The molds are mounted on hydraulic presses. Porcelain stoneware is pressed at pressures of approximately 400-450 kg/cm². the pressing phase is made up of three phases: a first compaction, a deaeration phase (where the air contained in the powder is let out) and the actual pressing. Atomized powders must have a certain moisture (not less than 5%) to be pressed. This water is then evaporated during the subsequent drying phase. In addition to losing moisture during drying, green tiles increase their toughness.

The pressed and dried tiles then arrive on the glazing lines. In these lines the tiles are glazed and decorated. The glaze has the purpose of giving the surface characteristics (brilliance, roughness,...). Keritaly uses two glazes, a lower one called engobe (which has intermediate characteristics between the support and the final glaze) with the aim of preparing the surface of the tiles for the decoration phase.

The top glaze is what determines the surface characteristics of the tiles. Glazes are generally applied with airless spray systems. The decorations are applied with digital printers. A basic four-color colorimetric system is used (blue, black, brown and beige). Other colors can be added to increase the gamut (for example yellow or red) or materials to create effects (after the engobe: glossy, matt white, sinking, engrave) or before the engobe. Two or more digital printers can be positioned on the same line.

The firing/kiln process determines the final technical and aesthetic characteristics of the tiles. For porcelain stoneware, temperatures reach around 1200 degrees Celsius. During firing the tiles reduce their size by approximately 5-7% and the coloring oxides reach the final color. Ceramic kilns are roller kilns. The rollers are made of silica-alumina materials. The fuel is methane gas. The productivity of a ceramic factory is determined by the productivity of its kilns.

In the next phase the tiles are squared until they reach a precise manufacturing dimension. Squaring can be preceded by a cutting phase. Keritaly machines, all dry, are equipped with cut and crush cutting systems and two squaring heads. At the end of each squaring head there are two spindles for the upper chamfering. The squaring tools can be metallic compounds (the former) or resinoids (the latter).

In the sorting lines each individual tile is inspected to determine the shade (with respect to a primary reference), size, flatness and presence of defects. Thus, different selection classes are generated. Only tiles belonging to the same selection class are packed together and the box marked with the appropriate identification codes. The boxes already packaged are transported to the palletizers and there they are divided on the various pallets according to the articles they contain. At the end of line the pallets are transported to the thermos shrinking machine where polyester or polypropylene straps and polyethylene hoods are positioned over each pallet. The pallet is then picked up and transported to the warehouse.

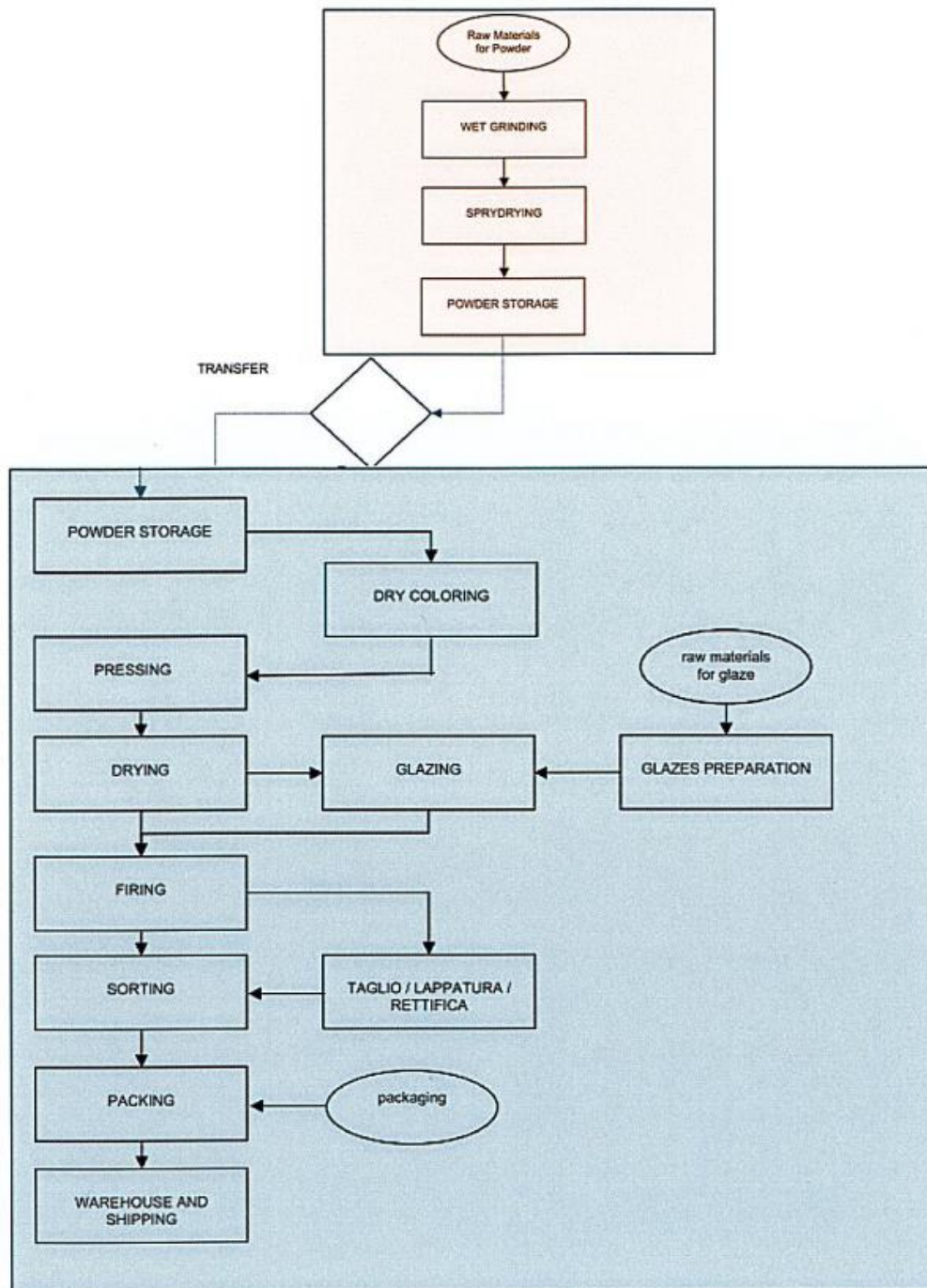
Packaging:

The main materials used for packaging tiles are cardboard (for the boxes), plastic (straps and shrinking hood) and wood (pallet). Keritaly suppliers of cardboard guarantee at least 70% of recycled material in their production. Thanks to a partnership with an Italian supplier of plastic films (shrinking hood) Keritaly has introduced a project for recovering the waste plastic, which is separately collected and returned to the producer. With some customers La Fenice has an agreement for the return of wooden pallets and their reuse in subsequent shipments.

Shipping warehouse:

Forklifts transport finished products from sorting lines to warehouse. The pallets of finished product are then stowed in the indoor or outdoor storage area allocated to that particular item available for the next stages of shipment.

Production chart:



HEALTH AND SAFETY OF WORKERS:

Keritaly has obtained certification for its Occupational health and safety management system according to UNI ISO 450001. Workers are informed about physical and chemical risks associated with their job and workplace. They receive appropriate training and personal protective equipment.

ENVIRONMENTAL PROTECTION:

Keritaly decide to adhere to the international standard ISO 14001, developing and maintaining an Environmental Management System.

Keritaly plant in Bondeno di Gonzaga is a new generation one having been built in 2019 according to ceramic best available techniques and practices. Particular attention to energy consumption and recovery

was adopted.

Keritaly has an environmental authorization according to UE Industrial Emission Directive 2024/1785 and Ceramic Bref (UE Best Available Techniques Reference Document in the Ceramic Manufacturing Industry):

- no wastewater emission is permitted: the 100% of the wastewater from the production cycle is recovered, treated and reused inside or in powder supplier plant.
- all tile greenware scraps and dust residues from filters are recovered and in powder supplier plant;
- more than 95% of the plant waste is sent to recovery;
- the air emissions impacts generated throughout the manufacturing process is reduced with the use of specific filters to capture particulates. To minimize fluorine gas emission from the firing process hydrated lime is used.
- CO₂ emissions are closely monitored through a reporting and certification process as required by European Emission Trading System Directive ;
- noise sources are periodically monitored. In many cases the acoustic emissions coming from the site are lower than the surrounding environmental sources (i.e. traffic, ...);
- the heat recovery from cooling air-flows inside the kilns for the re-use as an energy carrier in the dryers.

Technical data: Technical data, technical specifications, requirements and reference standards.

Porcelain tiles product by Keritaly for La fenice are made primarily of natural raw materials such as sand, clay and feldspar. To minimize the use of natural resources, a percentage of recycled material is added to the mixing recipe.

Porcelain tiles have extremely low water absorption.

The declare products represents an average 9 mm thickness porcelain tile applicable to the production ok Keritaly plant. The tiles under study are intended and applied for both floor and wall coverings, installed both in internal and external environments, for residential, commercial and institutional use.

For the placing on the market in EU/EFTA (with exception of Switzerland) the Regulation EU 305/2011 applies. The ceramic products need a Declaration of Performance (DoP) taking into consideration the EN14411 standard (Ceramic tiles – Definition, classification, characteristics, evaluation of conformity and CE marking). In the rest of the world ISO13006 standard is applied.

Name	Value	Unit
Shaping acc. to EN14411	B: dry pressing	%
Surface quality acc. to ISO 10545-2 § 7	> 95	%
Water absorption acc. to ISO 10545-3	≤ 0,5	%
Breaking Strength acc. to ISO 10545-4	>1300	N
Flexural strength acc. to ISO 10545-4	>35	N/mm ²
Resistance to deep abrasion – Unglazed tiles acc. To ISO 10545-6	< 175	mm ³
Resistance to surface wear– Glazed tiles acc. to ISO 10545-7	2 - 5	Abrasion class
Thermal shock resistance acc. to ISO 10545-9	Resistant	-
Crazing resistance acc. to ISO 10545-11, glazed tiles	Resistant	-
Frost resistance acc. to ISO 10545-12	resistant	-
Nonslip property (class A, B or C; class R9+R12) acc. to. CEN/TS 16165	Test method available	
Bond strength /adhesion acc. to. EN 12004	Test method available	
Reaction to fire NO testing (CWT)	A1-a1fL	-
Resistance to low concentrations of acids and alkalis acc. to ISO 10545-13	A – B	-
Resistance to household chemicals and swimming pool salts acc. to ISO 10545-13	A	-
Resistance to low and high concentrations of acids and alkalis acc. to ISO 10545-13	A – B	-
Resistance to staining acc. to ISO 10545-14	GL – min class 3	-
Release of lead and cadmium – Glazed tiles acc. to ISO 10545-15	If required	-
Moisture expansion acc. to ISO 10545-10	Test method available	-

BASE MATERIALS / ANCILLARY MATERIALS:

Main raw materials for ceramic tile:

- Clay 45÷50 %
- Feldspar 40÷45 %
- Sand 5÷10%
- Recycled scraps 5÷6 %
- Others 1÷3 %

No SVHC (substances of very High Concern) substances are intentionally added to the products during the manufacturing process.

PRODUCT PROCESSING/INSTALLATION

Tiles are fixed to the walls and floors surfaces using different materials and amounts (for example, dispersion and cementitious adhesives and mortars, sealants or liquid applied membranes). During the installation, no emissions occur, and no health or environmental risks derive from ceramic tile installations.

RELEVANT EFFECTS DURING USE

Fire: In accordance with /EN 13501-1:2007+A1:2009/, ceramic tiles can be classified as fire resistance class A1 as they are non-flammable. If the tile is part of a multilayer product, it will be necessary to evaluate the contribution deriving from the other materials.

Coating ceramic tiles in the event of fire has been shown to reduce the heat input on them and thus the risk of collapse.

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

ENVIRONMENT AND HEALTH DURING USE

Ceramic is intrinsically inert, chemically stable and therefore, during the use stage, does not emit any pollutants or substances which are harmful to environment and health such as: VOCs and Radon.

DECLARED UNIT and REFERENCE FLOW

The declared unit is 1 m² ceramic tiles for covering walls and floors for 1 year. The mass of the surface considered is 19,54 kg, while the thickness is 9,0 mm.

Parameter	Minimum value	Maximum value	Average value
Thickness [mm]	8.6	9,4	9.0
Mass [kg]	17,95	20,53	19,54

REFERENCE SERVICE LIFE (RSL)

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. Therefore, 60 years represents an alternative for tiles. The reported results consider the use of tiles for 1 year, multiplying the B2-values by 50 or 60 gives B2-values for 50 or 60 years. No RSL was defined according to ISO 15686.

MECHANICAL DESTRUCTION

Ceramic tiles can be smashed mechanically, but no harmful damage on the environment is expected.

RE-USE PHASE

After the demolition and deconstruction stage, ceramic tiles can be crushed and then used in a range of different applications, like concrete aggregates or road construction.

DISPOSAL

According to the /European Waste Catalogue/ (EWC) ceramic tiles waste belongs to the group 17 "Construction and demolition wastes", tiles and ceramic (code:17 01 03).

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.

You can convert the results per kg using the following conversion factor: Insert conversion factor: 0,0512 (1/tile density)

Environmental Impact indicators for 1m ² of ceramic tile														
Parameter	Unit	A1	A2	A3	A4	A5	B1	B2	B3-B7	C1	C2	C3	C4	D
GWP total	kg CO ₂ -eq.	3.64	1.18	3.34	1.11	3.26	0	0.0118	0	0.0163	0.0757	0.0448	0.114	-0.211
GWP fossil	kg CO ₂ -eq.	3.62	1.14	4.34	1.06	1.96	0	0.0089	0	0.0156	0.0724	0.0449	0.113	-0.21
GWP biogenic	kg CO ₂ -eq.	0.0172	0.0439	-1.01	0.0475	1.31	0	0.00285	0	0.000713	0.0033	-0.000464	0.000318	-0.000852
GWP luluc	kg CO ₂ -eq.	0.000539	6.57E-005	0.00132	6.67E-005	0.00106	0	1.34E-006	0	9.78E-007	4.62E-006	0.000344	0.000358	-0.000123
ODP	kg CFC-11-eq.	2.37E-011	3.22E-013	2.08E-012	1.26E-013	5.55E-012	0	4.19E-014	0	1.84E-015	8.68E-015	7.65E-014	2.93E-013	-1.68E012
AP	mole of H ⁺ -eq.	0.00597	0.00907	0.00456	0.001841	0.00357	0	1.55E-005	0	7.81E-005	0.000109	0.000239	0.000816	-0.000395
EP - freshwater	kg P eq.	4.38E-006	2.92E-007	3.3E-006	2.6E-007	9.11E-006	0	3.56E-006	0	3.76E-009	1.78E-008	1.56E-007	2.32E-007	-5.86E-007
EP - marine	kg N eq.	0.00166	0.00292	0.0022	0.000544	0.00128	0	1.75E-005	0	3.71E-005	4.34E-005	0.00011	0.000211	-0.000129
EP - terrestrial	mole of N eq.	0.0182	0.0321	0.0242	0.00609	0.0143	0	4.59E-005	0	0.000406	0.000478	0.00121	0.00232	-0.0014
POCP	kg NMVOC eq.	0.00532	0.007	0.00608	0.00152	0.00307	0	1.94E-005	0	0.000105	0.000104	0.000297	0.000636	-0.000405
ADPE	kg Sb eq.	3.04E-005	1.45E-008	3.82E-008	1.32E-008	4.82E-006	0	3.96E-010	0	1.93E-010	9.1E-010	4.9E-008	5.32E-009	-1.64E-008
ADPF	MJ	116	16.4	7,49	15.4	17	0	0.198	0	0.223	1.06	0.9	1.53	-4.41
WDP	m ³ world eq.	0.376	0.00428	0.00264	0.00257	0.151	0	0.00156	0	3.74E-005	0.000177	0.00889	0.0126	-0.0148

Caption	GWP = Global warming potential; ODP = Depletion potential of the stratospheric ozone layer; AP = Acidification potential of land and water; EP = Eutrophication potential; POCP = Formation potential of tropospheric ozone photochemical oxidants; ADPE = Abiotic depletion potential for non-fossil resources; ADPF = Abiotic depletion potential for fossil resources; WDP = Water (user) deprivation potential
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Resource use indicators for 1m ² of ceramic tile														
Parameter	Unit	A1	A2	A3	A4	A5	B1	B2	B3-B7	C1	C2	C3	C4	D
PERE	[MJ]	10.7	0.159	8.4	0.0988	0	0	0.0242	0	0.00144	0.00681	0.0837	0.25	-1.03
PERM*	[MJ]	0	0	0.509	0	-0.509	0	0	0	0	0	0	0	0
PERT	[MJ]	10.7	0.159	8.91	0.0988	4.25	0	0.0242	0	0.00144	0.00681	0.837	0.25	-1.03
PENRE	[MJ]	116	16.4	7.42	15.4	17.1	0	0.198	0	0.224	1.06	0.902	1.53	-4.41
PENRM*	[MJ]	0	0	0.806	0	-0.0806	0	0	0	0	0	0	0	0
PENRT	[MJ]	116	16.4	7.5	15.4	17	0	0.198	0	0.224	1.06	0.902	1.53	-4.41
SM	[kg]	0.349	0	0.235	0	0.038	0	0	0	0	0	0	0	17.4
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]	0.0123	0.000216	0.00742	0.000115	0.00474	0	5.62E-005	0	1.68E-006	7.92E-006	0.000257	0.000387	-0.000894

* In order to balance the values of the PENRM and the PERM associated with the use of packaging, the values in module A5 (end-of-life of packaging) are negative.

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
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Wastes input/output flows for 1m ² of ceramic tile														
Parameter	Unit	A1	A2	A3	A4	A5	B1	B2	B3-B7	C1	C2	C3	C4	D
HWD	[kg]	2.02E-007	5.74E-011	2.16E-009	2.88E-011	1.36E-008	0	1.03E-011	0	4.13E-013	1.95E-012	-2.34E-012	3.34E-011	-1.8E-010
NHWD	[kg]	0.179	0.00167	1.16	0.00154	1.51	0	0.00604	0	2.23E-005	0.000105	0.000237	7.67	-0.724
RWD	[kg]	0.0013	9.38E-005	0.000303	2.56E-005	0.000325	0	4.49E-006	0	3.74E-007	1.77E-006	1.21E-005	1.75E-005	-0.000208
CRU	[kg]	0	0	0	0	0	0	0	0	0	0	0	0	0
MFR	[kg]	0	0	0.0279	0	0.0288	0	0	0	0	0	17.9	0	0
MER	[kg]	0	0	0	0	0.198	0	0	0	0	0	0	0	0
EEE	[MJ]	0	0	0	0	0.563	0	0	0	0	0	0	0	0
EET	[MJ]	0	0	0	0	0.86	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; EEE = Exported thermal energy													

Biogenic carbon content of product and packaging		
Indicatori	Unità	Content
Bio. C. Packaging	[kg]	0.0135
Bio. C. Product	[kg]	0

Additional indicators (PM, IR, ETF-fw, HTP-c, HTP-nc and SQP) have been calculated and can only be seen in the /Background Report/.

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

REFERENCE FLOW:

Name	Value	Unit
Declared unit	1	m ²
Grammage	19,54	kg/m ²
Conversion factor to 1 kg	0,0512	-

ASSUMPTIONS:

The modules from A5 to C4 are scenarios based on average data included into the PCR created by the "European Ceramic Tile Manufacturers Federation" /CET PCR 2014/ and subsequently implemented in the PCRb of the IBU program operator "Ceramic tiles and panels".

CUT-OFF CRITERIA:

"All known inputs and outputs were considered".

DATA QUALITY:

The period of validity of background data from Sphera database is between 2019 and 2023. Most of the information (energy and water consumption, pollutant emissions, atomized dust, and ceramic production) are measured or calculated directly at the company level and declared in the Italian IPPC document called AIA, which is specific and is verified for each plant involved in this study. Carbon dioxide emissions (related to carbonate oxidation) are collected through ETS (emissions trading system) reporting.

Detailed data were obtained not only for raw material mixtures (collected with company-specific primary data) but also for dyes, frits and other raw materials used.

The overall quality of the data can be considered satisfactory.

ELECTRICITY EMISSION FACTOR

Emission factory for modules A1-A3: 0,431 kg CO₂eq/kWh

PERIOD UNDER REVIEW:

The primary data collected in the study refer to 2023.

ALLOCATION:

Energy and material supplies have been allocated to the product based on annually produced mass of ceramic tiles. No further allocations have been applied within the subsequent module.

Moreover, some ceramic wastes are internally recycled; credits from energy recovery of packaging materials from the end-of-life of the product are taken into account.

VARIABILITY ANALYSIS:

The average EPD covers the thicknesses of ceramic tiles produced by La Fenice that fall within the 8,6÷9,4 mm range. All products considered in the EPD fall within an impact variation of ±10% for the following indicators:

- Climate Change - total
- Acidification
- Photochemical ozone formation, human health
- Resource use, mineral and metals
- Resource use, fossils
- Total use of renewable primary energy resources (PERT)

- Total use of non-renewable primary energy resources (PENRT)

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 and subsequently implemented in the PCRb of the IBU program operator "Ceramic tiles and panels".

Transport (A4):

The LCA practitioner should justify the transportation scenario used (if different from the default scenario). For transport distances of less than 300 km, trucks shall be assumed to make the return trip empty, whereas for distances exceeding 300 km, they will return full with other goods, so that the return trip is not included in the inventory of the system analysed.

Name	Quantity	Unit
Truck with domestic destination having a capacity of 27 tons (20.5% of tiles sold)	300	km
Truck with European destination having a capacity of 27 tons (48.5% of tiles sold)	1390	km
Transoceanic transport shipment (31% of tiles sold)	6520	km

Installation into the building (A5):

Three options are defined for the installation phase, in which different materials can be used.

- Option 1: adhesives, mortar and water;
- Option 2: mortar and polysulphide dispersion adhesives;
- Option 3: cement adhesives (different quantities for different tile sizes).

These considerations are based on average data provided by different ceramic tile manufacturers in Europe. In this EPD it is assumed that tiles are installed with cementitious adhesive (Option 3).

Option 3 (large format tiles)	Quantity	Unit
Cementitious adhesives	6	kg

For the treatment of packaging waste, an average European scenario is used, taken from "Eurostat, 2020"; thus end-of-life consists of recycling, energy recovery and landfill for plastic and paper, and reuse, energy recovery and landfill for wood.

The loss of ceramic material considered is 6.5%.

Maintenance (B2):

Only stage B2, the maintenance phase, is considered in terms of impact generation. Throughout its lifetime, the ceramic cladding product must be cleaned regularly, 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. In this way, the consumption of water and disinfectant chemicals has been taken into account.

Name	Value	Unit
Water consumption	0.1	l
Detergent	0.2	ml
Floor tile Maintenance cycle	52	Number/LS
Wall tile Maintenance cycle	4	Number/LS

End-of-life (C1-C4):

C1: This module considers the demolition phase considering 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.

C2: The ceramic tile demolition waste is transported from the building site to a container or treatment plant by truck and an average distance of 20 km is considered. The return trip shall be included in the system. It can be considered an average distance of 30 km from the container or treatment plant to final destination.

C3-C4: the table below show the end-of-life stage.

Name	Value	Unit
Recycling percentage (C3)	70	%
Landfill percentage (C4)	30	%

Benefits and loads beyond the product system boundary (D):

Module D includes credits from materials recycling of products and packaging, energy credits from thermal recovery of the packaging.

8. ENVIRONMENT AND HEALTH DURING USE

Ceramics are inherently inert, chemically stable and therefore, during use, do not emit pollutants or substances which are dangerous for the environment and for health, such as VOC and radon.

Furthermore, in compliance with the French legislation referred to “Decret n° 2011-34 du 23 mars 2011 - relatif à l'étiquetage des produits de construction ou de revêtement de mur ou de sol et des peintures et vernis sur leurs émissions de polluants volatils” the primary packaging of “La Fenice” ceramic tiles can bear the brand:



9. OTHER ADDITIONAL ENVIROMENTAL INFORMATION

Common EU GPP (**Green Public Procurement**) criteria are those criteria that can be incorporated into a public procurement procedure for goods, services or works in order to reduce the environmental impact of a purchase. In Italian legislation GPP criteria are defined as “**CAM – Criteri Ambientali Minimi**”. With the decree DM 23/06/2022 Italy has defined GPP criteria for buildings and building materials (point 2.5.10.1 “hard covering”).

La Fenice products comply with the technical specification for ceramic tiles set out in the CAM as they meet following criteria included in the Decision UE/2021/476

Criteria DECISION UE/2021/476

1.1 - *Extraction of industrial and construction minerals:*

Keritaly requires its powder supplier to carry out surveillance activities on its raw material suppliers in order to verify the authorization for the excavation activity, the environmental impact assessment, the environmental restoration plan, the map with geographical coordinates of the site and the compliance with EU Directive named in Decision UE/2021/476

1.2 - *Restricted substances*

The products are manufactured using chemicals or material supplied that do not contain substances of very high concern (SVHC), which are included in the candidate list in accordance with the article 59 of Regulation (EC) n. 1907/2006, in concentration above 0.1% (w/w)

1.3 - *VOC Emission*

Ceramics tiles are deemed inherently inorganic and with no harmful emissions

1.4 - *Suitability for use*

The products are CE marked in accordance with technical standard EN 14411 and with the European regulations for construction products. Keritaly is ISO 9001 certified and adopts procedures for the control of production and finished products and for the complaint handling

1.5 - *Instruction for users*

Information on technical characteristic, installation, use, cleaning and maintenance of the product and on recycling and disposal of the product and packaging are available in the catalogues or, upon request, to the sales offices

4.1 *Fuel consumption for drying and firing:*

Specific fuel energy consumption for drying and firing processes does not exceed the relevant mandatory limits given in Table 1

4.2 *CO2 emission:*

The specific CO2 emissions associated with fuel combustion and process emissions from raw materials decarbonation during drying and firing processes does not exceed the relevant mandatory limits given in Table 1.

4.3 *Process water consumption*

The facility producing ceramic products have either:

- a closed loop wastewater recycling system that guarantees zero liquid discharge;
- a specific freshwater consumption less than 0,5 lt/kg (mandatory limits for spray drying carried out outside)

4.4 *Emissions to air*

The specific dust, HF and NOx emissions to air associated with the production of tiles does not exceed the relevant mandatory limits given in Table 1.

4.5 *Wastewater management:*

All process wastewater is treated on site to remove suspended solids and then returned to the production process.

4.6 *Reuse of process waste*

More than 90% (in weight) of the process waste generated by ceramic product manufacturing are reused in other production process in compliance with the relevant mandatory limits given in Table 1.

4.7 Glazes and inks:

For glaze or decorated tiles, glaze or ink formulation must contain less than 0,1% in weight of lead or cadmium.

Table 1.

Requirements	Parameter	Declared value	U.M.	Mandatory limit	Threshold of environmental excellence
Fuel consumption	Powder Spray Drying	< 1,3	MJ/kg	1,8	1,3
	Drying and firing	< 4,3	MJ/kg	5,5	4,3
CO2 emissions	Spray Drying	<84	kgCO2/t	84	54
	Drying and firing	< 290	kgCO2/t	360	290
Emissions to air	Particulate matter (dust) from spray drying emissions	≤ 90	mg/kg	≤ 90	90
	Particulate matter (dust) from firing stage	≤ 10	mg/kg	≤ 50	10
	Fluorides (as HF) from firing stage	≤ 6	mg/kg	≤ 20	6
	Nox (as NO2) from firing stage	≤ 250	mg/kg	≤ 250	170
Waste recovery	Total process waste	≥ 99	% (by weight)	≥ 90	

REFERENCES

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
EN ISO 14044	EN ISO 14044:2006-10 Environmental management - Life cycle assessment - Requirements and guidelines
LCA for Expert (GaBi)	Life cycle assessment software (version 10), by Sphera Solutions GmbH, Leinfelden-Echterdingen, 2023 https://sphera.com/life-cycle-assessment-lca-software/
Managed LCA Content (GaBi database)	Life cycle assessment database, by Sphera Solutions GmbH, Leinfelden-Echterdingen, 2023 https://sphera.com/life-cycle-assessment-lca-database/
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BNB 2011	BBSR table "useful lives of components for Life Cycle Analysis by BNB ", Federal Institute for Building, Urban Affairs and Spatial Development, Division II Sustainable Building; available online at http://www.nachhaltigesbauen.de/baustoffundgebaeuedaten/useful_lives-of-bauteilen.html ; stand 12/2015
US GBC	US Green Building Council, Leed v3, 2009, Whole building life cycle assessment. LEED BD&C v4 (LEED Building Design & Construction).
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