



Florim Ceramiche S.p.A. SB



## ENVIRONMENTAL PRODUCT DECLARATION

### Product Name:

Porcelain Stoneware Surfaces (Tiles and slabs) | Florim brands

### Site Plant:

Fiorano Modenese (MO) - ITALY  
Mordano (BO) - ITALY

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

Program Operator	EPDIItaly
Publisher	EPDIItaly

Declaration number	EPDFLORIM01
Registration number	EPDITALY0462

Date of publication (first issue)	12/06/2023
Date of validity	12/06/2028



## 1. GENERAL INFORMATION

<b>EPD OWNER</b>	
<i>Company name</i>	Florim Ceramiche S.p.A. SB
<i>Legal head office</i>	Via Canaletto 24, 41042 Fiorano Modenese
<i>Contacts for information on the EPD</i>	<a href="https://www.florim.com/en/contacts/">https://www.florim.com/en/contacts/</a>
<b>PROGRAM OPERATOR</b>	
EPDITALY ( <a href="http://www.epditaly.it">www.epditaly.it</a> )	via Gaetano De Castillia n° 10 - 20124 Milano, Italia
<b>INFORMATION ON THE EPD</b>	
<i>Product name</i>	Porcelain Stoneware Surfaces (Tiles and slabs)   Florim brands
<i>Plant involved in the declaration</i>	Via Canaletto 24, 41042 Fiorano Modenese (MO) Strada Provinciale 610 Selice 1, 40027 Mordano (BO)
<i>Short product description</i>	This document refers to an average installed ceramic tile and slab product with a weight of 21.97 kg/m <sup>2</sup> and a thickness of 9.63 mm manufactured by FLORIM Ceramiche S.p.A. SB.
<i>Application area</i>	Tiles are used for covering floors and walls of residential buildings and also in public spaces and surfaces subject to high stress and heavy traffic.
<i>CPC Code</i>	37370
<b>VERIFICATION INFORMATION</b>	
<i>Product Category Rules (PCR)</i>	EN 15804:2012+A2:2019 is the framework reference for PCRs. PCR ICMQ-001/15 rev3
<i>EPDItaly regulation</i>	General Programme Instruction document of EPDItaly v.5.2
<i>Project report LCA</i>	Environmental Product Declaration for Ceramic Tiles
<b>INDEPENDENT CHECK</b>	PCR review was conducted by Chiara Maran. Contact via <a href="mailto:info@epditaly.it">info@epditaly.it</a> . Independent verification of the declaration and data, according to EN ISO 14025:2010. Internal <input type="checkbox"/> External <input checked="" type="checkbox"/> Third party verifier: ICMQ SpA, via De Castillia, 10 20124 Milano ( <a href="http://www.icmq.it">www.icmq.it</a> ). Accredited by Accredia.
<b>COMPARABILITY</b>	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.
<b>ACCOUNTABILITY</b>	Florim Ceramiche S.p.A. SB 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.
<b>Additional information</b>	
<b>TECHNICAL SUPPORT</b>	Sphera <a href="https://www.sphera.com">https://www.sphera.com</a> 

## 2. THE COMPANY



### **FLORIM SPA SB**

Florim has been producing porcelain surfaces to meet all the needs of the construction, architecture and interior design sectors for over 60 years. Headed by Claudio Lucchese, son of its founder Giovanni Lucchese, the company has a past firmly rooted in the ceramics district and a present as an international industry trendsetter. The Group employs about 1,500 people worldwide and generates turnover of 584 million Euro with the brands FLORIM, CEDIT, FLORIM stone. With state-of-the-art production plants, distribution companies and partnerships in Europe, America and Asia and a number of flagship stores and single-brand showrooms, the company is well positioned in the world's top design districts (Milan, New York, Moscow, Singapore, Frankfurt, London, Abu Dhabi, Paris, Rome and Los Angeles). Its strategy focused on quality, innovation and sustainability combines with the creative drive and passion of its human resources to transform the value known as “made in Italy” into “made in Florim”.

### ***Management systems, environmental and quality brands:***

#### **UNI EN ISO 9001**

Florim is certified ISO 9001 for the design, manufacture and sale of all categories of ceramic tile. The current ISO 9001 standard defines quality as the ability to satisfy explicit or implicit needs via a product or a service. A Quality System implies constant improvement of company processes in order to produce products that satisfy the customer's needs.

#### **UNI EN ISO 14001**

All Florim plants have received ISO 14001 voluntary certification, which confirms compliance with a series of internationally codified procedures intended to improve the internal environmental management system. The decision to seek this certification springs from the desire to reconcile quality with efficiency and productivity while protecting the environment and community in which the company operates.

**UNI ISO 45001**

Florim was the first Italian ceramics corporation to achieve BS OHSAS 18001 international occupational health and safety certification. Both Italian locations have confirmed their focus on plant safety by obtaining the new UNI ISO 45001 certification.

**UNI CEI EN ISO 50001**

Thanks to a careful energy management policy and with the support of the most recent investments made in production also aimed at improving energy efficiency, Florim S.p.A. SB was the first ceramics company in the world to earn ISO 50001 certification for its Energy Management System.

**B CORP**

In 2020, after being measured against the highest social and environmental performance standards, Florim was awarded B Corp Certification. Companies which succeed in attaining this goal are considered to lead the world in terms of positive impact and represent a global movement that aims to promote a new economic paradigm in which businesses play a central role in social regeneration.

**AEO**

Florim was the first ceramics manufacturer in the Province of Modena to achieve Authorised Economic Operator certification. This guarantees the company's absolute compliance with customs and security requirements in its foreign trade.

### 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	MND	X	MND	MND	MND	MND	MND	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 Fiorano Modenese and Mordano plants located in Italy and sold worldwide. All data refer to the 2021 production and sales.

According to the PCR ICMQ-001/15 rev. 3 the LCA study and the relative EPD, is “cradle to grave”. Modules included are A1, A2, A3, A4, A5, B2, 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 sites. The reference market is Worldwide.

**DATABASE:** Managed LCA Content (GaBi Database) (version 2023.1)

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



## 4. DETAILED PRODUCT DESCRIPTION

### **MANUFACTURING PROCESS DESCRIPTION:**

Porcelain stoneware is a natural and environmentally friendly material made by pressing a selected mixture of clays, kaolins, sands, feldspars and colored pigments, finely ground, pressed with a power of more than 400 kg/sq cm, and then fired at very high temperatures that result in the vitrification process.

### ***Entry, storage and entry into production of raw materials:***

On delivery, incoming raw materials are inspected and stored in covered bays, from which they are collected by a weighing system and transferred to the grinding system. The first stage in the production process is the selection of the raw materials needed to make up the body of the ceramic slab and combined in carefully calculated ratios.

### ***Manufacturing:***

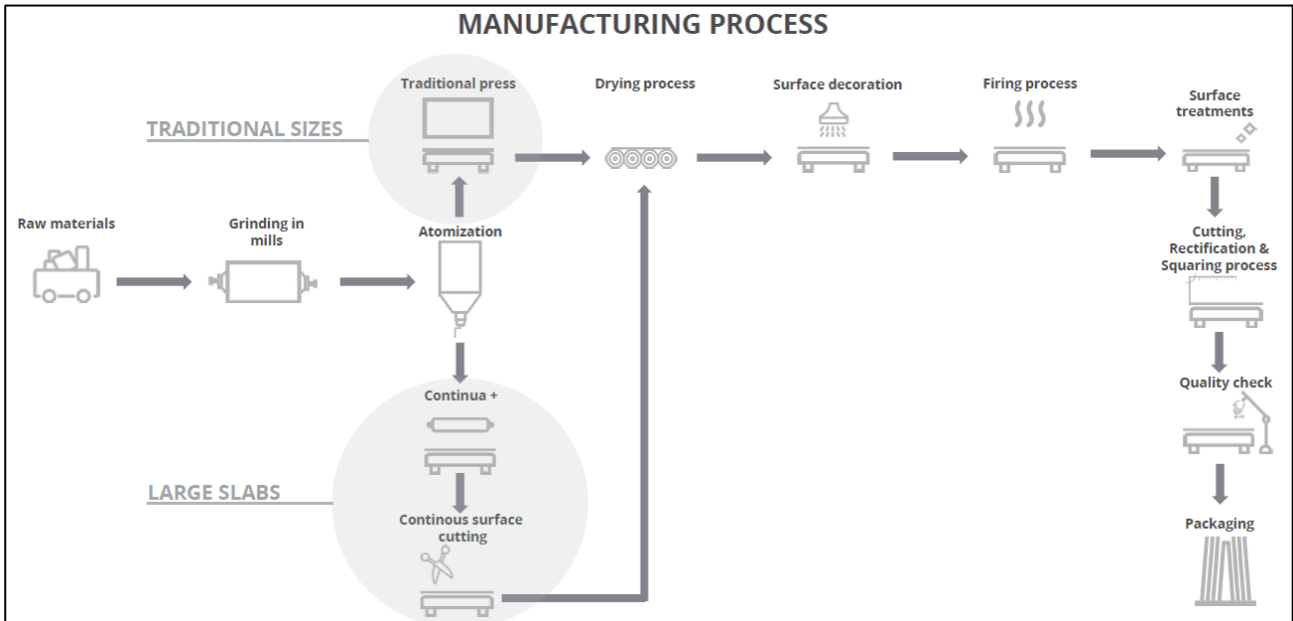
Raw materials are mixed with water in cylindrical mills, resulting in a mud mixture that is then stored in special tanks. To be dried, this ceramic slip is then sprayed against warm air inside the atomizer obtaining spherical granules suitable for forming by a pressing process. Then, the raw tiles are stored in driers waiting to be decorated and to proceed to the firing cycle. At this point the material turns into porcelain stoneware, a vitrified product characterized by specific physical and technical requirements. Then the product is finished using several types of brushes allowing the creation of different kind of surfaces, while the squaring process allows the creation of a single size slabs. At last, during the quality check an automatic checking machine verifies dimensions, flatness and possible flaws of the slab based on predetermined allowances. Slab shade and other possible flaws are also checked by human beings.

### ***Packaging:***

Florim packaging uses 100% recycled paper. Latest-generation packaging machines modulate and cut cardboard packaging to size, eliminating all waste. Thanks to a partnership with the Italian supplier of plastic films (hoods used to cover finished products), the company has introduced a project for recovering the waste plastic, which is separately collected and returned to the producer. The material is then treated and regenerated to make a new product ready to be purchased again.

### ***Shipping warehouse:***

The construction of a fully automated vertical warehouse at the Fiorano Modenese Headquarters was a big investment. Managed by sophisticated software with GPS technology, this warehouse has a storage capacity of over 37,000 pallet spaces and is designed to equip the company with a single shipment point and speed up material delivery times.



**HEALTH AND SAFETY OF WORKERS:**

The Occupational health and safety management system of Florim is certified UNI ISO 45001. In addition to rigorous inspections and maintenance, specific training is provided on the environment and safety, to raise awareness among workers and supervisors.

Workers are informed about physical and chemical risks associated to their job and workplace and the use of specific equipment and machinery. They receive an appropriate training and personal protective equipment.

Courses of first aid, Blsd and firefighting are also ongoing for employees trained in first-aid operations and the use of the many defibrillators available on site.

**ENVIRONMENTAL PROTECTION:**

The Environmental management system of Florim is certified UNI EN ISO 14001 and the Energy management system is certified UNI CEI EN ISO 50001.

The company's commitment to a sustainable footprint comes through ongoing investment and objectives for continual improvement in product, process, and supply chain management.

All raw material suppliers are monitored via a software program which records quarry location, distance from the plant, recycled content declaration, technical and safety datasheets. Verify authorization for the extraction activity, the environmental recovery plan and compliance with UE Directive about habitats and birds and UN convention about biological diversity.

Florim hasn't wastewater emission because the 100% of the wastewater from the production cycle is recovered, treated and reused. The environmental authorization permits to further reduce the input of fresh water in the process by recovering wastewater from other.

In addition, Florim recovers and recycles, within the production process, all tile and slab greenware scraps, dust residues from filters and greenware scarpers from external companies.

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.

Florim controls all its noise sources respecting the regulatory limits, in many case the plant's acoustic emissions are lower than other environmental sources (traffic etc.).

Since 2012, Florim S.p.A. SB has reduced its CO<sub>2</sub> emissions thanks to the energy produced by solar panels, cogeneration plants, which emit less CO<sub>2</sub> than energy purchased from the grid and since 2013 Florim Italy has been offsetting its CO<sub>2</sub> emissions through a reporting and certification process as required by the European Emission Trading System Directive.

In terms of energy savings Florim have state-of the-art plants with low energy impact. With two cogeneration plants and 64,000 m<sup>2</sup> of solar panels operating with a peak power of 12,3 MWp, the company has a unique set-up for energy production. On sunny days, the Florim plants are able to produce

up to 100% of the electricity needed to power the Italian sites. The self-generation of electricity reached about 78% of total consumption. Since 2021, 100 per cent of the electrical energy that Florim purchases from the grid comes from renewable sources with Guarantee of Origin (GO), the electronic certification issued by the GSE certifying the renewable derivation of the energy sources used in compliance with Directive 2009/28/EC.

In December 2021 Florim updated its bylaws to include a commitment to work toward a zero net emissions economy.

#### TECHNICAL DATA:

“Porcelain Tiles and Slabs”. Technical data, technical specifications, requirements and reference standards.

Porcelain tiles and slabs product by FLORIM are made primarily of natural raw materials such as sand, clay, feldspar, and kaolin. To minimize the use of natural resources, a percentage of recycled material both from external suppliers and internal production is added to the mixing recipe.

Porcelain tiles have extremely low water absorption  $\leq 0,1\%$ .

The declared products represent an average porcelain tile applicable to the production of FLORIM plants. The tiles and slabs 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 the EU/EFTA (with exception of Switzerland), the Regulation (EU) No 305/2011 applies. The products need a Declaration of Performance taking into consideration of /EN 14411:2012 Ceramic tiles – Definitions, classification, characteristics, evaluation of conformity and the CEmarking.

For the application and use the respective national provisions apply.

Porcelain tiles and slabs are conform to the following standards and specifications. According to EN 14411 in Europe and ISO 13006 in the rest of the world.

Ceramic tiles with the lowest water absorption level ( $\leq 0.5\%$ ) can be designated as porcelain tiles (impervious tiles).

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	$\leq 0,1$	%
Breaking Strength acc. to ISO 10545-4	thickness <7,5 mm, > 700 thickness >7,5 mm, > 1300	N
Modulus of rupture acc. to ISO 10545-4	> 35	N/mm <sup>2</sup>
Impact resistance acc. to ISO 10545-5	Test method available	-
Resistance to deep abrasion – Unglazed tiles acc. To ISO 10545-6	Average 140	mm <sup>3</sup>
Resistance to surface abrasion – Glazed tiles acc. to ISO 10545-7	1 - 5	Abrasion class
Coefficient of linear thermal expansion acc. to ISO 10545-8	7	10 <sup>-6</sup> /K
Thermal shock resistance acc. to ISO 10545-9	Resistant	-
Moisture expansion acc. to ISO 10545-10	Test method available	-
Crazing resistance acc. to ISO 10545-11, glazed tiles	Resistant	-
Frost resistance acc. to ISO 10545-12	Resistant	-
Resistance to acid and alkals 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 UGL – decl. value	-
Release of lead and cadmium – Glazed tiles acc. to ISO 10545-15	If required	-
Nonslip property acc. to. EN 16165 annex A EN 16165 annex B EN 16165 annex C DM 236/89 ANSI A 137.1	NC - class A - class B - class C NC - R9 - R10 - R11 - R12 NC - PTV 4s >36 wet NC > 0,4 NC > 0,42 wet	
Reaction to fire NO testing (CWT)	A1-A1fl - Bfl s1d0	



## BASE MATERIALS / ANCILLARY MATERIALS:

### Main raw materials for ceramic tile:

- Clay 30-40%
- Kaolin 8-12%
- Feldspar 40-50%
- Sand 4-8%

## PRODUCT PROCESSING/INSTALLATION

Tiles are fixed to the walls and floors surfaces using different materials and amounts: mortars, sealants, dispersion and cementitious adhesives, epoxy or polyurethane adhesives. During the installation, no emissions occur and no health or environmental risks derive from tiles; for the other materials used for installation (adhesives, ...) refer to the supplier data sheets.

## 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.

Ceramic tiles coating 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: Volatile organic compounds (VOCs) and Radon.

## DECLARED UNIT and REFERENCE FLOW

The declared unit is 1 m<sup>2</sup> ceramic tiles for covering walls and floors for 1 year. The mass of the surface considered is 21.97 kg, while the thickness is 9.63mm.

## 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: 0.0455

Environmental Impact indicators for 1m <sup>2</sup> of ceramic tile										
Parameter	Unit	A1-A3	A4	A5	B2	C1	C2	C3	C4	D
GWP total	kg CO <sub>2</sub> -eq.	1.30E+01	7.02E-01	4.93E+00	1.22E-02	1.72E-02	7.96E-02	4.74E-02	1.20E-01	-5.80E-01
GWP fossil	kg CO <sub>2</sub> -eq.	1.42E+01	6.78E-01	2.60E+00	9.11E-03	1.64E-02	7.61E-02	4.75E-02	1.20E-01	-5.74E-01
GWP biogenic	kg CO <sub>2</sub> -eq.	-1.18E+00	2.41E-02	2.33E+00	3.04E-03	7.46E-04	3.45E-03	-4.42E-04	4.15E-04	-6.41E-03
GWP luluc	kg CO <sub>2</sub> -eq.	1.99E-03	3.59E-05	1.10E-03	1.34E-06	1.02E-06	4.80E-06	3.58E-04	3.72E-04	-1.58E-04
ODP	kg CFC-11-eq.	7.53E-11	7.26E-14	8.98E-12	4.19E-14	1.91E-15	9.02E-15	7.95E-14	3.04E-13	-4.11E-12
AP	mole of H <sup>+</sup> -eq.	2.23E-02	5.74E-03	4.68E-03	1.55E-05	8.12E-05	1.13E-04	2.48E-04	8.48E-04	-8.69E-04
EP - freshwater	kg P eq.	1.01E-05	1.62E-07	1.07E-05	3.56E-06	3.91E-09	1.85E-08	1.62E-07	2.41E-07	-1.63E-06
EP - marine	kg N eq.	8.29E-03	1.41E-03	1.62E-03	1.75E-05	3.86E-05	4.51E-05	1.14E-04	2.19E-04	-2.71E-04
EP - terrestrial	mole of N eq.	9.11E-02	1.55E-02	1.81E-02	4.59E-05	4.22E-04	4.97E-04	1.26E-03	2.41E-03	-2.92E-03
POCP	kg NMVOC eq.	2.30E-02	4.00E-03	4.19E-03	1.94E-05	1.09E-04	1.08E-04	3.09E-04	6.61E-04	-1.03E-03
ADPE	kg Sb eq.	4.45E-05	7.91E-09	5.74E-06	4.37E-10	2.00E-10	9.45E-10	5.09E-08	5.51E-09	-3.97E-08
ADPF	MJ	2.14E+02	9.41E+00	2.44E+01	1.98E-01	2.32E-01	1.10E+00	9.36E-01	1.59E+00	-1.41E+01
WDP	m <sup>3</sup> world eq.	9.08E-01	1.52E-03	2.00E-01	1.56E-03	3.89E-05	1.84E-04	9.24E-03	1.31E-02	-3.43E-02

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 <sup>2</sup> of ceramic tile										
Parameter	Unit	A1-A3	A4	A5	B2	C1	C2	C3	C4	D
PERE	[MJ]	2.01E+01	5.70E-02	0.00E+00	2.42E-02	1.50E-03	7.08E-03	8.70E-02	2.60E-01	-2.41E+00
PERM*	[MJ]	1.53E+01	0	-1.43E+01	0	0	0	0	0	0
PERT	[MJ]	3.54E+01	5.70E-02	5.45E+00	2.42E-02	1.50E-03	7.08E-03	8.70E-02	2.60E-01	-2.41E+00
PENRE	[MJ]	2.07E+02	9.44E+00	3.16E+01	1.98E-01	2.33E-01	1.10E+00	9.38E-01	1.59E+00	-1.42E+01
PENRM*	[MJ]	7.75E+00	0	-7.25E+00	0	0	0	0	0	0
PENRT	[MJ]	2.14E+02	9.44E+00	2.44E+01	1.98E-01	2.33E-01	1.10E+00	9.38E-01	1.59E+00	-1.42E+01
SM	[kg]	7.95E-01	0	5.17E-02	0	0	0	0	0	1.81E+01
RSF	[MJ]	0	0	0	0	0	0	0	0	0
NRSF	[MJ]	0	0	0	0	0	0	0	0	0
FW	[kg]	2.78E-02	6.75E-05	6.23E-03	5.62E-05	1.74E-06	8.23E-06	2.67E-04	4.02E-04	-2.58E-03

\* 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 <sup>2</sup> of ceramic tile										
Parameter	Unit	A1-A3	A4	A5	B2	C1	C2	C3	C4	D
HWD	[kg]	1.47E-07	1.97E-11	9.91E-09	1.03E-11	0.00E+00	2.03E-12	-2.43E-12	3.47E-11	-7.20E-10
NHWD	[kg]	5.04E-01	9.26E-04	1.79E+00	6.04E-03	2.32E-05	1.10E-04	2.47E-04	7.97E+00	-7.58E-01
RWD	[kg]	7.85E-03	1.49E-05	7.85E-04	4.49E-06	3.88E-07	1.83E-06	1.26E-05	1.82E-05	-4.57E-04
CRU	[kg]	0	0	0	0	0	0	0	0	0
MFR	[kg]	0	0	1.46E-01	0	0	0	1.86E+01	0	0
MER	[kg]	0	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; ETE = Exported thermal energy
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Biogenic carbon content of product and packaging for 1m <sup>2</sup> of ceramic tile										
Parameter	Unit	A1-A3	A4	A5	B2	C1	C2	C3	C4	D
Biog. C in packaging	[kg]	4.13E-01	0	-4.13E-01	0	0	0	0	0	0
Biog. C in product	[kg]	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
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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 <sup>2</sup>
Grammage	21.97	kg/m <sup>2</sup>
Conversion factor to 1 kg	0.0455	-

### 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.

### PERIOD UNDER REVIEW:

The primary data collected in the study refer to 2021.

### 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.

## 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
Volumetric capacity utilization factor (including idle revolutions)	0,85	–
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, 2019"; 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-5 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 is inert, therefore during the use stage, does not emit any pollutants or substances which are harmful to the environment and health. For this reason and according to PCR, evidence is not required because it is not relevant for this product group.



Although evidence is not required, tests related to the following standards are available  
GREENGUARD/ Indoor Air Quality Certification – ASTM Standards D-5116 and D-6670



DEVL1104875A/ Ministère de l'écologie, du développement durable, des transports et du logement - Arrêté du 19 avril 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;

## REFERENCES

<b>EN 15804+A2</b>	EN 15804:2012+A2:2019: Sustainability of construction works -Environmental Product Declarations - Core rules for the product category of construction products
<b>EN ISO 14025</b>	EN ISO 14025:2011-10 Environmental labels and declarations - Type III environmental declarations - Principles and procedures
<b>EN ISO 14040</b>	EN ISO 14040:2009-11 Environmental management - Life cycle assessment - Principles and framework
<b>EN ISO 14044</b>	EN ISO 14044:2006-10 Environmental management - Life cycle assessment - Requirements and guidelines
<b>LCA for Expert (GaBi)</b>	Life cycle assessment software (version 10), by Sphera Solutions GmbH, Leinfelden-Echterdingen, 2023 <a href="https://sphera.com/life-cycle-assessment-lca-software/">https://sphera.com/life-cycle-assessment-lca-software/</a>
<b>Managed LCA Content (GaBi database)</b>	Life cycle assessment database, by Sphera Solutions GmbH, Leinfelden-Echterdingen, 2023 <a href="https://sphera.com/life-cycle-assessment-lca-database/">https://sphera.com/life-cycle-assessment-lca-database/</a>
<b>PCR ICMQ REV3</b>	ICMQ-001/15, 2017- rev.3: Prodotti da costruzione e servizi per costruzioni, EPD Italy. Data di emissione: 02/12/2019, validità fino al: 01/12/2024.
<b>REGOLAMENTO EPD ITALY REV. 5.2</b>	Regolamento del Programma EPD Italy. Data di emissione: 16/02/2022
<b>BNB 2011</b>	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 <a href="http://www.nachhaltigesbauen.de/baustoffundgebaeuedaten/useful_lives-of-bauteilen.html">http://www.nachhaltigesbauen.de/baustoffundgebaeuedaten/useful_lives-of-bauteilen.html</a> ; stand 12/2015
<b>US GBC</b>	US Green Building Council, Leed v3, 2009, Whole building life cycle assessment. LEED BD&C v4 (LEED Building Design & Construction).
<b>PD CEN/TR 15941:2010</b>	Sustainability of construction works – Environmental Product Declarations – Methodology for selection and use of generic data
<b>EUROSTAT</b>	EUROSTAT Data browser: Packaging waste by waste management operations <a href="https://ec.europa.eu/eurostat/databrowser/view/ENV_WASPAC_custom_344983/default/table?lang=en">https://ec.europa.eu/eurostat/databrowser/view/ENV_WASPAC_custom_344983/default/table?lang=en</a>
<b>IBU PCR Part B</b>	Part B: Requirements on the EPD for Ceramic tiles and panel 06/04/2023. <a href="http://www.ibu-epd.com">www.ibu-epd.com</a>
<b>Background Report</b>	Environmental Product Declaration (EPD) Background Report On behalf of Florim Ceramiche S.p.A. SB. v.03, 12/06/2023.