



EPD

CERTIFICATION

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ZENTECH COLLECTION



ENVIRONMENTAL PRODUCT DECLARATION

Product Name: "PORCELAIN STONEWARE"

Site Plant: "FINALE EMILIA (MO) - ITALY"

in compliance with ISO 14025 and EN 15804

Program Operator	EPDItaly
Publisher	EPDItaly
Declaration Number	EPD 001 PGR ver.1
EPDItaly Registration Number	EPDItaly0050
ECO-EPD Registration Number	00000800
Issue Date	25/11/2018
Valid to	24/11/2023





ZENTECH COLLECTION

TECHNICAL DATA:

Technical feature	Average value	Unit of measure
Water absorption according to ISO 10545-3	0,05	%
Breaking strength according to ISO 10545-4	≥ 1300	N
Modulus of rupture according to ISO 10545-4	50	N/mm ²
Resistance to wear abrasion (glazed ceramic tile) according to ISO 10545-7	Depending on product	Class
Linear thermal expansion according to ISO 10545-8	7 x 10 ⁻⁴	1/K
Thermal shock resistance according to ISO 10545-9	Resistant	
Crazing resistance according to ISO 10545-11	Resistant	
Frost resistance according to ISO 10545-12	Resistant	
Antislip properties (R9, R10, R11, R12, R13 class) according to DIN 51130	Depending on product	Class
Antislip properties (A, B, C class) according to DIN 51097	Depending on product	Class
Adhesion strength according to EN 12004	Conforms	
Impact resistance according to ISO 10545-5	0.75-0.85	
Fire reaction	A1/Afl	Class
Chemical resistance according to ISO 10545-13	LA (Resistant)	Class
Resistance to the household chemicals and swimming pool salts according to ISO 10545-13	A (Resistant)	Class
Stain resistance according to ISO 10545-14	Conforms	Class
Lead and Cadmium given off (glazed ceramic tile) according to ISO 10545-15	None (Resistant)	
Moisture expansion according to ISO 10545-10	0,0	mm/m
Resistance to deep abrasion (unglazed ceramic tile) according to ISO 10545-6	145	mm ³



ZENTECH COLLECTION

SECTION 5 - RESULTS OF THE LCA

The following tables illustrate the results of the LCA (Life Cycle Assessment) study. Basic information on all declared modules can be found in chapter 3. It is possible to convert the results referring to kg using the following conversion factor 0.0328.

RESULTS OF THE LCA - ENVIRONMENTAL IMPACTS of 1 m ² of porcelain tile (30.5 kg / m ²)																
Parameter	Unit	A1-3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
GWP	[kg CO ₂ -eq.]	1,25E+01	8,10E-01	2,84E+00	0,00E+00	4,04E-02	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	6,29E-02	6,09E-02	1,65E-01	-3,18E-01
ODP	[kg CFC11-eq.]	6,45E-11	2,96E-14	7,64E-12	0,00E+00	7,63E-12	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	2,22E-15	2,74E-14	3,73E-14	-1,03E-12
AP	[kg SO ₂ -eq.]	2,66E-02	6,68E-03	4,25E-03	0,00E+00	5,85E-05	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	2,76E-04	4,35E-04	9,74E-04	-7,81E-04
EP	[kg PO ₄ ³⁻ -eq.]	3,80E-03	7,44E-04	8,66E-04	0,00E+00	4,47E-05	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	7,00E-05	1,05E-04	1,35E-04	-1,28E-04
POCP	[kg ethene-eq.]	1,92E-03	3,43E-04	3,40E-04	0,00E+00	6,56E-06	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	-1,09E-04	4,75E-05	7,57E-05	-8,33E-05
ADPE	[kg Sb-eq.]	4,28E-05	5,89E-08	6,88E-06	0,00E+00	1,33E-08	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	6,68E-09	8,05E-08	6,32E-08	-1,31E-07
ADPF	[MJ]	2,03E+02	1,07E+01	2,17E+01	0,00E+00	3,46E-01	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	1,11E+00	1,19E+00	2,13E+00	-5,70E+00
Caption	GWP = Global warming potential; ODP = Ozone depletion potential; AP = Acidification potential; EP = Eutrophication potential; POCP = Photochemical ozone creation potential; ADPE = Abiotic depletion potential for non fossil resources; ADPF = Abiotic depletion potential for fossil resources															



ZENTECH COLLECTION

RESULTS OF THE LCA - RESOURCE USE of 1 m ² of porcelain tile (30.5 kg / m ²)																
Parameter	Unit	A1-3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
PERE	[MJ]	4,89E+01	4,39E+01	1,00E+01	0,00E+00	1,87E+02	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	6,19E+02	0,00E+02	2,79E+01	-2,46E+00
PERM	[MJ]	1,00E+01	0,00E+00	-1,12E+01	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
PERT	[MJ]	3,89E+01	4,39E+01	9,02E+00	0,00E+00	1,87E+02	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	6,19E+02	0,00E+02	2,79E+01	-2,46E+00
PENRE	[MJ]	2,19E+02	1,00E+01	2,49E+01	0,00E+00	3,67E+01	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	1,11E+00	1,23E+00	2,21E+00	-4,69E+00
PENRM	[MJ]	1,00E+00	0,00E+00	-2,00E+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	0,00E+00
PENRT	[MJ]	2,12E+02	1,00E+01	2,31E+01	0,00E+00	3,67E+01	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	1,11E+00	1,23E+00	2,21E+00	-4,69E+00
SM	[kg]	3,39E+00	0,00E+00	2,16E+01	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	2,02E+01
RSF	[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	0,00E+00	0,00E+00	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	0,00E+00	0,00E+00	0,00E+00
FW	[m ³]	6,14E+02	0,10E+04	0,00E+03	0,00E+00	2,81E+04	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	1,13E+04	3,74E+04	4,22E+04	-1,44E+03
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															



ZENTECH COLLECTION

RESULTS OF THE LCA - OUTPUT FLOWS AND WASTE CATEGORIES of 1 m ² of porcelain tile (30.5 kg / m ²)																
Parameter	Unit	A1-3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
HWD	[kg]	4,79E-04	4,36E-07	3,73E-08	0,00E+00	2,54E-03	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	4,42E-08	3,90E-08	3,00E-08	-3,48E-08
NHWD	[kg]	4,60E-01	4,79E-04	2,26E+00	0,00E+00	5,73E-03	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	9,31E-06	2,61E-04	1,04E+01	-9,79E-01
RWD	[kg]	3,88E-03	2,08E-06	3,38E-04	0,00E+00	4,31E-06	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	1,32E-06	1,00E-06	3,19E-03	-3,06E-04
CRU	[kg]	0,00E+00	0,00E+00	2,32E-01	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	-
MFR	[kg]	0,00E+00	0,00E+00	2,67E-01	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	2,41E-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	0,00E+00	0,00E+00	-
EEE	[MJ]	0,00E+00	0,00E+00	0,20E+01	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	-
EET	[MJ]	0,00E+00	0,00E+00	1,22E+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	-
Caption	HWD - Hazardous waste disposed; NHWD - Non hazardous waste disposed; RWD - Radioactive waste disposed; CRU - Components for re-use; MFR - Materials for recycling; MER - Materials for energy recovery; EEE - Exported electrical energy; EET - Exported thermal energy															



ZENTECH COLLECTION

TRACI INDICATORS:

According to UL, USA program operator.

TRACI indicators (version 2.1), from EPA's Tool for the Reduction and Assessment of Chemical and Other Environmental Impacts <http://www.epa.gov/nmmrl/std/traci/traci.html>, are listed below:

TRACI INDICATORS: ENVIRONMENTAL IMPACTS of 1 m ² of porcelain tiles (30.5 kg / m ²)									
Parameter	Unit	A1-A3	A4	A5	B2	C2	C3	C4	D
Global Warming Air	[kg CO ₂ -eq.]	1,25E+01	8,10E-01	2,84E+00	4,04E-02	6,29E-02	6,09E-02	1,65E-01	-3,18E-01
Ozone Depletion Air	[kg CFC11-eq.]	6,49E-11	2,96E-14	7,67E-12	8,12E-12	2,22E-15	2,74E-14	3,73E-14	-1,03E-12
Acidificatio Air	[kg SO ₂ -eq.]	3,00E-02	7,08E-03	4,87E-03	8,71E-05	3,70E-04	5,83E-04	1,07E-03	-8,80E-04
Eutrophication	[kg N -eq.]	2,16E-03	3,12E-04	7,30E-04	8,87E-05	3,27E-05	4,23E-05	8,99E-05	-9,45E-05
Smog Air	[kg O ₃ -eq.]	5,93E-01	1,30E-01	9,27E-02	1,31E-03	8,09E-03	1,93E-02	2,10E-02	-1,87E-02



ZENTECH COLLECTION

SECTION 6 - CALCULATION RULES

FUNCTIONAL UNIT:

Name	Value	Unit of measure
Unit of measurement declared	1	m ²
Weight	30,5	kg/m ²
Conversion factor to 1 kg	0,0328	-

ASSUMPTIONS:

The modules from A5 to C4 are scenarios based on average data, included in the PCR created by the European Federation of ceramic tile manufacturers /CET PCR 2014/ and subsequently implemented in the PCRs of the IBU program operator "Ceramic tiles and panels v1.6".

EXCLUSION CRITERIA:

All flows in known inputs and outputs were considered.

DATA QUALITY:

The validity period of the background data from the Thinkstep database is between 2013 and 2017. Most of the information (energy and water consumption, emissions of pollutants, atomized powders 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 checked for each plant involved in this study. Carbon dioxide emissions (related to carbonate oxidation) are collected through the ETS (Emissions Trading Scheme) declaration.

Detailed data was obtained not only for mixtures of raw materials (collected with primary data from the company) but also for dyes, frits and other raw materials for glaze production.

The overall quality of the data can be considered optimal.

EXAMINATION PERIOD:

Primary data collected in the context of this study refer to 2017.

ALLOCATION:

The consumption of energy and materials has been allocated to the product in question based on the mass of ceramic tiles produced annually. No further allocations were applied in the modules subsequent to the production phase. Some ceramic waste is recycled internally. Credits for energy recovery of packaging materials and end of life of the product have been taken into consideration.



ZENTECH COLLECTION

SECTION 7 - SCENARIOS

The following technical information concerning the declared modules and related scenarios are based on average data, in accordance with the "European Federation of Ceramic Tile Manufacturers" and subsequently implemented by the PCRb of the IBU program operator "Ceramic tiles and panels v1.6".

TRANSPORTATION (A4):

For transportation of distances of less than 300 km, the return journeys of the vehicles used are considered to be empty. Return journeys travelled by vehicles, over 300 km, are considered at full load. This assumption is applied for any type of transport present in the analyzed system.

INSTALLATION INTO THE BUILDING (A5):

For the installation stage 3 options are defined, where different materials can be used. For option 1, adhesives, mortar and water, for option 2 mortar dispersion adhesives and polysulfides, for option 3 also cementitious adhesives (different quantities for different tile formats). These considerations are based on average data from different manufacturers of ceramic tiles in Europe. In this EPD it is assumed that the tiles are installed using cementitious adhesive (option 3). For the treatment of packaging waste, a European average scenario is used and shown, taken from "Eurostat, 2013"; therefore the end of life is recycling, energy recovery and landfill, for plastic and paper, instead reuse, energy recovery and landfill for wood. The ceramic material loss considered is 6,5%.

Option 3 (large size tiles)	Value	Unit of measure
Cementitious adhesive	6	kg

USE (B1):

Ceramic tiles are robust and have a hard, abrasion-resistant surface. There are no impacts on the environment during the use stage.

MAINTENANCE (B2):

Ceramic covering products shall be cleaned regularly, to a greater or lesser degree, depending on the type of building: residential, commercial, healthcare. Thus, the consumption of water and disinfectant has been considered. The values declared in this stage refer to a time period of 1 year. Scenario for maintaining ceramic floor and wall tiles. Residential use: 0,2 ml of detergent and 0,1 l of water are used to wash 1 m² of ceramic tiles once a week. This stage scenario is based on average data from different manufacturers of ceramic tiles in Europe.

Name	Value	Unit of measure
Water consumption	0,1	l
Detergent	0,2	ml
Floor tile maintenance cycle	2400	Number/LS
Wall tile maintenance cycle	200	Number/LS



ZENTECH COLLECTION

REPAIR, REPLACEMENT AND REFURBISHMENT (B3, B4, B5):

In general the service life of ceramic tiles is the same as the building life time. Repair, replacement and refurbishment is not required for ceramic tiles.

OPERATIONAL ENERGY AND WATER USE (B6, B7):

These modules are not relevant for ceramic tiles.

END OF LIFE (C1-C4):

C1: This module, according to the PCR developed by the European Ceramic Tile Manufacturers' Federation, is not relevant for ceramic tiles.

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 end-of-life scenario is described in the following table:

Name	Value	Unit of measure
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 tiles and packaging, energy credits from thermal recovery of the packaging.



ZENTECH COLLECTION

SECTION 8 - ENVIRONMENT AND HEALTH DURING USE

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

SECTION 9 - OTHER ADDITIONAL ENVIRONMENTAL INFORMATION

The Minimum Environmental Criteria (CAM) are the environmental requirements defined by Italian Legislation for the various phases of the public administration purchase process, aimed at identifying the best project solution, product or service from an environmental point of view along the life cycle, taking into account market availability.

CAMs are regulated by art. 18 of Law 221/2015 and, subsequently, by art. 34 on "Energy and environmental sustainability criteria" of Legislative Decree no. 50/2016 "Procurement Code" (as amended by Legislative Decree 11 October 2017), which made it mandatory for all contracting authorities to apply.

The Pananiagroup Products manufactured at Finale Emilia comply with the requirements of the CAM, see table below.

The criteria for the ceramic tiles uses the following parameters among those adopted at the European level for the allocation of the Ecolabel ecological mark to the "hard covering" category (Decision 2009/607/EC).

Requirement	Parameter	Declared value	Exclusion limit	Unit of measure	Testing method
Consumption and use of water	Water consumption and use (Cmp-a)	0,6	> 1	l/kg	-
	Rate of waste water recycling in production	104,6	< 90	%	-
Emissions into the air	Particulate matter (firing stage)	96	> 200	mg/m ²	EN 13284-1
	HF (firing stage)	50	> 200	mg/m ²	ISO 15713
Emissions into the water	Suspended solid emission into water	0	> 40	mg/l	ISO 5667-17
	Cd emission into water	0	> 0.015	mg/l	ISO 8288
	Cr(VI) emission into water	0	> 0.15	mg/l	ISO 11083
	Pb emission into water	0	> 0.15	mg/l	ISO 8288
Waste recovery	Waste management - % of waste recovered ¹⁾	99,9	< 85	% (by weight)	-

Note 1): assessed according to the general terms and definitions contained in Council Directive 75/442/EEC. Process waste does not include maintenance waste, organic waste and municipal waste generated by ancillary and administrative activities.