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Ceramic tiles



Owner of the EPD:

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ITB is the verified member of The European Platform for EPD program operators and LCA practitioner www.eco-platform.org

Basic information

This declaration is the Type III Environmental Product Declaration (EPD) based on EN 15804+A2 and verified according to ISO 14025 by an external auditor. It contains the information on the impacts of the declared construction materials on the environment. Their aspects were verified by the independent body according to ISO 14025. Basically, a comparison or evaluation of EPD data is possible only if all the compared data were created according to EN 15804+A2.

Life cycle analysis (LCA): A1-A5, C1-C4 and D modules in accordance with EN 15804 (Cradle-to-Gate with options)

The year of preparing the EPD: 2022

Product standard: EN 14411

Service Life: 30 years

PCR: ITB-PCR A (PCR based on EN 15804)

Declared unit: 1 kg

Reasons for performing LCA: B2B

Representativeness: Polish, European

MANUFACTURER

Ceramika Paradyż is a Polish, family-owned company, specialized in manufacturing of ceramic tiles. It has been driving design for 33 years, creating and delivering to customers in almost 50 countries innovative products with unique design and highest quality.

Ceramika Paradyż employs almost 1400 people. The products are manufactured in five manufacturing plants located in Wielka Wola near Paradyż, in Opoczno and in three plants in Tomaszów Mazowiecki. The company also owns high bay warehouses with a picking and shipping system for finished products, centralizing all warehouse processes.

Ceramika Paradyż has three own brands: Paradyż as an umbrella brand with a wide range of collections in various styles and formats, as well as two sub-brands - Paradyż My Way, dedicated to customers looking for individual and innovative design solutions, and Paradyż Classica (formerly Kwadro Ceramika), directed to people who value classic elegance at an affordable price. The product collections of Ceramika Paradyż are complementary, offering the customers many formats of wall and floor tiles, clinker, glass decorations and decorative elements.

The company has won awards in the field of design and economy - including Red Dot Design Award 2016 (Trakt), iF Design 2017 (Elanda/Elando), Dobry Wzór 2018 (Esagon) and Bronze A'Design Award 2020 for the Modernizm collection, as well as the Economic Award of the President of the Republic of Poland and the Annual Award of the Minister of Culture and National Heritage.



Fig. 1. Ceramika Paradyż Sp. z o.o. manufacturing plant located in Tomaszów Mazowiecki (Poland).

PRODUCTS DESCRIPTION AND APPLICATION

Ceramic tiles are manufactured using the following materials: clay, dolomite, kaolin, grit, syenite, feldspar, sand, colorants and other additives. The manufacturing process is carried out according to the requirements of standard PN-EN 14411. Ceramika Paradyż manufactures ceramic tiles and decorations with water absorption:

$E_b \leq 0.5\%$, Grupa BI_a,

$0.5\% < E_b \leq 3\%$, Grupa BI_b

$E_b \geq 10\%$, Grupa BIII

Ceramic tiles manufactured by Ceramika Paradyż Sp. z o.o. are intended for internal and external use as floor, wall, facade and stair coverings in residential, commercial, institutional and industrial buildings. The functional properties of the ceramic tiles are presented in Table 1.

Table 1. Declared performance of ceramic tiles manufactured by Ceramika Paradyż Sp. z o. o.

Essential characteristics	Reference document	Levels and/or classes of selected products							
		Wall tile (monoporosa)	Floor tile (monocottura)	Technical porcelain stoneware	Glazed stoneware	Unglazed stoneware	Clinker tile	Ceramic wall decorations	Ceramic floor decorations
Fire response	EN14411:2012	A1	A1/A1 _{FL}	A1/A1 _{FL}	A1/A1 _{FL}	A1/A1 _{FL}	A1/A1 _{FL}	A1	A1 _{FL}
Release of hazardous substances - glazed tiles:	-	-	-	-	-	-	-	-	-
- Lead [mg/dm ²]	EN14411:2012	≤ 0,8	≤ 0,8	not applicable	≤ 0,8	not applicable	≤ 0,8	≤ 0,8	≤ 0,8
- Cadmium [mg/dm ²]	EN14411:2012	≤ 0,07	≤ 0,07	not applicable	≤ 0,07	not applicable	≤ 0,07	≤ 0,07	≤ 0,07
Bonding force / adhesion [N/mm ²]:	-	-	-	-	-	-	-	-	-
- cement adhesives	EN14411:2012	≥ 0,5	≥ 0,5	≥ 0,5	≥ 0,5	≥ 0,5	≥ 0,5	≥ 0,5	≥ 0,5
- dispersion adhesives	EN14411:2012	≥ 1	≥ 1	≥ 1	≥ 1	≥ 1	≥ 1	≥ 1	≥ 1
- reactive resin glues	EN14411:2012	≥ 2	≥ 2	≥ 2	≥ 2	≥ 2	≥ 2	≥ 2	≥ 2
Breaking force	EN14411:2012	-	minimum 1100	minimum 1300	minimum 1300	minimum 1300	minimum 1100	-	minimum 1300
Thermal shock resistance	EN14411:2012	minimum 600	meets	meets	meets	meets	meets	minimum 600	meets
Durability for:	-	-	-	-	-	-	-	-	-
- indoor applications	EN14411:2012	meets	meets	meets	meets	meets	meets	meets	meets
- outdoor applications: freeze-thaw resistance	EN14411:2012	not applicable	meets	meets	meets	meets	meets	not applicable	meets

More information available on the website of Ceramika Paradyż Sp. z o.o. www.paradyz.com

LIFE CYCLE ASSESSMENT (LCA) – general rules applied

Allocation

The allocation rules used for this EPD are based on general ITB PCR A. Production of the ceramic tiles is a line process conducted in five factories of Ceramika Paradyż Sp. z o.o. located in Wielka Wola, Opoczno and Tomaszów Mazowiecki (Poland). Allocation was done on product mass basis. All impacts associated with the extraction and processing of raw materials used for the production of ceramic tiles are allocated in module A1 of the LCA. Impacts from the global line production of Ceramika Paradyż Sp. z o.o. were inventoried and 100% were allocated to the ceramic tiles production. Water and energy consumption, associated emissions and generated wastes are allocated to module A3. Packaging materials were taken into consideration.

System limits

The life cycle analysis (LCA) of the declared products covers: product stage – modules A1-A3, transport to a construction site – module A4, installation process – module A5, end of life – modules C1-C4 and benefits and loads beyond the system boundary – module D (cradle-to-gate with options) in accordance with EN 15804+A2 and ITB PCR A. Energy and water consumption, emissions as well as information on generated wastes were inventoried and were included in the calculations. It can be assumed that the total sum of omitted processes does not exceed 5% of all impact categories. In accordance with EN 15804+A2, machines and facilities (capital goods) required for the production as well as transportation of employees were not included in LCA.

Modules A1 and A2: Raw materials supply and transport

Clay, dolomite, kaolin, grit, syenite, feldspar, sand, dyes, additives, auxiliary materials and packaging materials are sourced from domestic and foreign suppliers. Means of transport include railway, ships and trucks. Polish and European standards for average combustion were used for calculations.

Module A3: Production

The production of ceramic tiles is carried out in five Polish factories of Ceramika Paradyż Sp. z o.o.:

- Tomaszów 1 Plant: 23 Ujezdzka St., 97-200 Tomaszów Mazowiecki;
- Tomaszów 2 Plant: 21 Milenijna St., 97-200 Tomaszów Mazowiecki;
- Paradyż Plant: 27/35 Milenijna St., 97-200 Tomaszów Mazowiecki;
- Wielka Wola Plant: 14 Wielka Wola St., 26-333 Paradyż;
- Opoczno Plant: 5 Ogrodowa St., 26-300 Opoczno.

A scheme of the ceramic tiles production process by Ceramika Paradyż Sp. z o.o. is presented in Fig. 2.

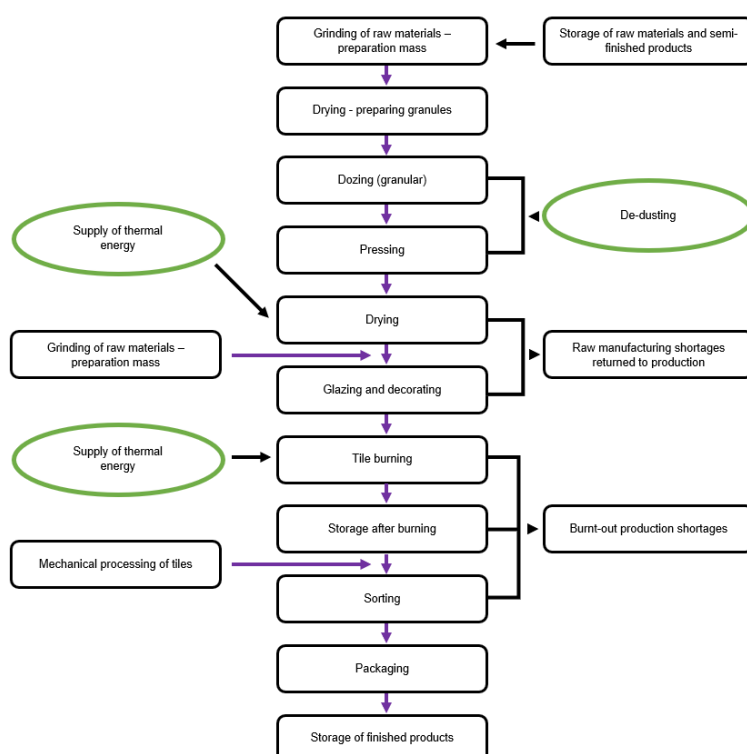


Fig. 2. The scheme of the ceramic tiles production process by Ceramika Paradyż Sp. z o.o.

Module A4: Transport to a construction site

The ceramic tiles produced are delivered to Polish as well as foreign customers. In the adapted scenario an average distance of 250 km from the factory gate to a recipient is assumed. Means of transport include 16-32t lorry (EURO 5) with fuel consumption of 35 l per 100 km.

Module A5: Installation process

In the adapted scenario the installation process requires adhesive mortar, water and other ancillary materials recommended by the Ceramika Paradyż Sp. z o.o. Only consumable materials have been included in the calculation.

Modules C1, C2, C3, C4 and D: End-of-life (EoL)

In the adapted scenario, dismantling of ceramic tiles (C1) is performed as part of building renovation or demolition processes, where environmental impacts from declared products can be considered minor (<1%). There are no specific deconstruction methods, applied in Poland, in regards with the ceramic tiles. During the demolition process the major amount of the products contribute to the construction and demolition wastes which can be processed on site or in a waste processing plant. It is assumed that 100% of ceramic tiles are recovered at the EoL cycle.

Recovered material is transported to either to landfill or construction site distant by 70 km, on 16-32t lorry (EURO 5) with fuel consumption of 35 l per 100 km. In the adapted scenario 50% of the ceramic tiles is recycled and further used as aggregate for road foundation or ballast (credits presented in module D) while remaining 50% is forwarded to landfill in the form of mixed construction and demolition wastes. Environmental burdens declared in module C4 are associated with waste-specific emissions to air, soil and groundwater.

Data quality

The values determined to calculate the LCA originate from verified Ceramika Paradyż Sp. z o.o. inventory data.

Data collection period

The data for manufacture of the declared products refer to period between 01.01.2020 – 31.12.2020 (1 year). The life cycle assessments were prepared for Poland.

Assumptions and estimates

Environmental impacts associated with ceramic tile production were aggregated using weighted averages.

Calculation rules

LCA was done in accordance with ITB PCR A document.

Databases

The data for the processes come from the following databases: Ecoinvent v.3.8, specific EPDs, ITB-Database.

LIFE CYCLE ASSESSMENT (LCA) – Results

Declared unit

The declaration refers to declared unit (DU) – 1 kg of the ceramic tiles produced by Ceramika Paradyż Sp. z o.o.

Table 3. System boundaries for the environmental characteristic of ceramic tiles

Environmental assessment information (MD – Module Declared, MND – Module Not Declared, INA – Indicator Not Assessed)																
Product stage			Construction process		Use stage							End of life				Benefits and loads beyond the system boundary
Raw material supply	Transport	Manufacturing	Transport to construction site	Construction-installation process	Use	Maintenance	Repair	Replacement	Refurbishment	Operational energy use	Operational water use	Deconstruction 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
MD	MD	MD	MD	MD	MND	MND	MND	MND	MND	MND	MND	MD	MD	MD	MD	MD

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Table 4. Life cycle assessment (LCA) results of the ceramic tiles manufactured by Ceramika Paradyż Sp. z o.o. - environmental impacts (DU: 1 kg)

Indicator	Unit	A1	A2	A3	A1-A3	A4	A5	C1	C2	C3	C4	D
Global Warming Potential	eq. kg CO ₂	1.63E-01	9.47E-03	3.55E-01	5.28E-01	4.17E-02	9.99E-02	0.00E+00	1.17E-02	4.52E-01	5.32E-03	-1.53E-02
Greenhouse gas potential - fossil	eq. kg CO ₂	2.39E-01	9.44E-03	3.51E-01	5.99E-01	4.15E-02	9.80E-02	0.00E+00	1.16E-02	4.51E-01	5.26E-03	-1.52E-02
Greenhouse gas potential - biogenic	eq. kg CO ₂	-7.62E-02	2.50E-05	3.63E-03	-7.25E-02	1.10E-04	1.88E-03	0.00E+00	3.08E-05	3.88E-04	5.31E-05	-3.95E-05
Global warming potential - land use and land use change	eq. kg CO ₂	6.81E-04	3.71E-06	5.31E-05	7.38E-04	1.63E-05	1.00E-04	0.00E+00	4.57E-06	4.47E-05	5.33E-06	-1.61E-05
Stratospheric ozone depletion potential	eq. kg CFC 11	1.72E-08	2.18E-09	1.90E-08	3.84E-08	9.62E-09	9.39E-09	0.00E+00	2.69E-09	9.57E-08	1.60E-09	-2.11E-09
Soil and water acidification potential	eq. mol H ⁺	1.41E-03	3.83E-05	2.13E-03	3.57E-03	1.69E-04	6.38E-04	0.00E+00	4.72E-05	2.43E-03	4.44E-05	-8.06E-05
Eutrophication potential - freshwater	eq. kg P	1.46E-04	6.08E-07	3.38E-04	4.85E-04	2.68E-06	3.21E-05	0.00E+00	7.49E-07	1.39E-05	1.53E-06	-2.13E-06
Eutrophication potential - seawater	eq. kg N	2.92E-04	1.16E-05	3.09E-04	6.12E-04	5.09E-05	1.05E-04	0.00E+00	1.42E-05	9.70E-04	1.53E-05	-2.45E-05
Eutrophication potential - terrestrial	eq. mol N	2.68E-03	1.26E-04	2.72E-03	5.53E-03	5.55E-04	1.06E-03	0.00E+00	1.55E-04	1.06E-02	1.67E-04	-2.71E-04
Potential for photochemical ozone synthesis	eq. kg NMVOC	7.56E-04	3.86E-05	8.25E-04	1.62E-03	1.70E-04	3.59E-04	0.00E+00	4.76E-05	2.92E-03	4.82E-05	-7.72E-05
Potential for depletion of abiotic resources - non-fossil resources	eq. kg Sb	6.38E-06	3.36E-08	3.77E-07	6.79E-06	1.48E-07	1.85E-06	0.00E+00	4.14E-08	2.34E-07	1.78E-08	-5.79E-08
Abiotic depletion potential - fossil fuels	MJ	4.00E+00	1.40E-01	5.16E+00	9.30E+00	6.17E-01	1.40E+00	0.00E+00	1.73E-01	6.03E+00	1.22E-01	-2.18E-01
Water deprivation potential	eq. m ³	1.39E-01	6.43E-04	6.27E-02	2.03E-01	2.83E-03	5.56E-02	0.00E+00	7.92E-04	1.62E-02	7.06E-04	-2.77E-03

Table 5. Life cycle assessment (LCA) results of the ceramic tiles manufactured by Ceramika Paradyż Sp. z o.o. - environmental information describing waste categories (DU: 1 kg)

Indicator	Unit	A1	A2	A3	A1-A3	A4	A5	C1	C2	C3	C4	D
Hazardous waste neutralized	kg	6.20E-06	3.73E-07	1.21E-04	1.28E-04	1.64E-06	1.66E-06	0.00E+00	4.59E-07	1.68E-05	1.91E-07	-6.46E-07
Non-hazardous waste neutralised	kg	7.11E-02	7.34E-03	2.92E-02	1.08E-01	3.23E-02	2.80E-02	0.00E+00	9.05E-03	8.20E-03	5.01E-01	-7.05E-02
Radioactive waste	kg	1.76E-05	9.65E-07	3.17E-06	2.17E-05	4.25E-06	3.24E-06	0.00E+00	1.19E-06	4.24E-05	7.39E-07	-7.55E-07
Components for re-use	kg	0.00E+00	0.00E+00	6.70E-02	6.70E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Materials for recycling	kg	0.00E+00	0.00E+00	2.13E-03	2.13E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Materials for energy recovery	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

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Table 6. Life cycle assessment (LCA) results of the ceramic tiles manufactured by Ceramika Paradyż Sp. z o.o. - environmental aspects related to resource use (DU: 1 kg)

Indicator	Unit	A1	A2	A3	A1-A3	A4	A5	C1	C2	C3	C4	D
Consumption of renewable primary energy - excluding renewable primary energy sources used as raw materials	MJ	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA
Consumption of renewable primary energy resources used as raw materials	MJ	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA
Total consumption of renewable primary energy resources	MJ	1.80E+00	2.02E-03	2.24E-01	2.02E+00	8.88E-03	9.09E-02	0.00E+00	2.49E-03	3.46E-02	2.14E-03	-6.28E-03
Consumption of non-renewable primary energy - excluding renewable primary energy sources used as raw materials	MJ	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA
Consumption of non-renewable primary energy resources used as raw materials	MJ	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA
Total consumption of non-renewable primary energy resources	MJ	3.72E+00	1.52E-01	5.57E+00	9.44E+00	6.67E-01	1.51E+00	0.00E+00	1.87E-01	6.53E+00	1.31E-01	-2.38E-01
Consumption of secondary materials	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
Consumption of renewable secondary fuels	MJ	0.00E+00	7.58E-03	0.00E+00	7.58E-03	3.33E-02	0.00E+00	0.00E+00	9.34E-03	0.00E+00	0.00E+00	0.00E+00
Consumption of non-renewable secondary fuels	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
Net consumption of freshwater resources	m³	3.22E-03	6.97E-06	1.78E-03	5.00E-03	3.07E-05	9.31E-04	0.00E+00	8.59E-06	1.08E-04	1.90E-05	-1.42E-03

Table 7. Life cycle assessment (LCA) results of the ceramic tiles manufactured by Ceramika Paradyż Sp. z o.o. – additional impacts indicators (DU: 1 kg)

Indicator	Unit	A1	A2	A3	A1-A3	A4	A5	C1	C2	C3	C4	D
Particulate matter	disease incidence	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA
Potential human exposure efficiency relative to U235	eg. kBq U235	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA
Potential comparative toxic unit for ecosystems	CTUe	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA
Potential comparative toxic unit for humans (cancer effects)	CTUh	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA
Potential comparative toxic unit for humans (non-cancer effects)	CTUh	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA
Potential soil quality index	dimensionless	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA

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Verification

The process of verification of this EPD is in accordance with ISO 14025 and ISO 21930. After verification, this EPD is valid for a 5-year-period. EPD does not have to be recalculated after 5 years, if the underlying data have not changed significantly.

The basis for LCA analysis was EN 15804+A2:2020-03 and ITB PCR A	
Independent verification corresponding to ISO 14025 (subclause 8.1.3.)	
☒ external	☐ internal
External verification of EPD: Halina Prejzner, PhD Eng	
LCA, LCI audit and input data verification: Justyna Tomaszewska, PhD Eng j.tomaszewska@itb.pl	
Verification of LCA: Michał Piasecki, PhD DSc Eng, m.piasecki@itb.pl	

Normative references

- ITB PCR A General Product Category Rules for Construction Products
- ISO 14025:2006, Environmental labels and declarations – Type III environmental declarations – Principles and procedures
- ISO 21930:2017 Sustainability in buildings and civil engineering works – Core rules for environmental product declarations of construction products and services
- ISO 14044:2006 Environmental management – Life cycle assessment – Requirements and guidelines
- ISO 15686-1:2011 Buildings and constructed assets – Service life planning – Part 1: General principles and framework
- ISO 15686-8:2008 Buildings and constructed assets – Service life planning – Part 8: Reference service life and service-life estimation
- EN 15804:2012+A2:2019 Sustainability of construction works - Environmental product declarations - Core rules for the product category of construction products
- PN-EN 15942:2012 Sustainability of construction works – Environmental product declarations – Communication format business-to-business
- EN 14411:2012 Płytki ceramiczne -- Definicje, klasyfikacja, właściwości, ocena zgodności i znakowanie
- KOBiZE Wskaźniki emisyjności CO₂, SO₂, NO_x, CO i pyłu całkowitego dla energii elektrycznej, grudzień 2021

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CERTIFICATE No 299/2022
of TYPE III ENVIRONMENTAL DECLARATION

Product:

Ceramic tiles

Manufacturer:

Ceramika Paradyż Sp. z o.o.

Piotrkowska 61, 26-300 Opoczno, Poland

confirms the correctness of the data included in the development of
Type III Environmental Declaration and accordance with the requirements of the standard

EN 15804:2012+A2:2019

Sustainability of construction works.

Environmental product declarations.

Core rules for the product category of construction products.

This certificate, issued for the first time on 17th March 2022 is valid for 5 years
or until amendment of mentioned Environmental Declaration

Head of the Thermal Physic, Acoustics
and Environment Department

Agnieszka Winkler-Skalna
Agnieszka Winkler-Skalna, PhD



Deputy Director
for Research and Innovation

Krzysztof Kuczyński
Krzysztof Kuczyński, PhD

Warsaw, March 2022