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Ceramic tiles

with water absorption $\leq 0.5\%$



Owner of the EPD:

CERRAD Sp. z o.o.
Address: Radomska 49B
27-200 Starachowice, Poland
Tel.: +48 41 275 54 33
Website: www.cerrad.com
Contact: cerrad@cerrad.com

EPD Program Operator:

Institut Techniki Budowlanej (ITB)
Address: Filtrowa 1, 00-611 Warsaw, Poland
Website: www.itb.pl
Contact: Justyna Tomaszewska
j.tomaszewska@itb.pl
energia@itb.pl



ITB is the verified member of The European Platform for EPD program operators and LCA practitioner

Basic information

This declaration is the Type III Environmental Product Declaration (EPD) based on EN 15804 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 (see point 5.3 of the standard).

Life cycle analysis (LCA): A1-A3, C3, C4 and D modules in accordance with EN 15804

(Cradle-to-Gate with options)

The year of preparing the EPD: 2021

Product standard: PN-EN 14411

Service Life: 60 years for standard product

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

Declared unit: 1 kg

Reasons for performing LCA: B2B

Representativeness: Polish, European, Global

Type III Environmental Product Declaration No. 261/2021

MANUFACTURER

Cerrad Sp. z o.o. is a Polish manufacturer of stoneware and clinker tiles, present on the market from 80 years as a heir of Radom Factory of Ceramic Tiles and Sanitary Products. The clinker plant in Starachowice was built in area of SSE Starachowice in 2001-2002, and the production was launched in April 2002. The production of stoneware started in 2015. In 2020, Cerrad Sp. z o.o. purchased production plants in Końskie and Kopaniny. Portfolio of Cerrad Sp. z o.o. is regularly enriched by new collections of tiles inspired by wood textures, the minimalistic concrete surface, natural stones and the marble.

PRODUCTS DESCRIPTION AND APPLICATION

The ceramic tiles are composed of clay, sand, feldspar, pigments and other additives, manufactured according to the requirements of PN-EN 14411 standard. The products are intended for internal as well as external applications as coverings of floors and walls of various type of buildings, including residential, commercial and institutional.

Table 1. Properties of the ceramic tiles with glazed surface (GL) produced by Cerrad Sp. z o.o.

Essential characteristics	Performance	
Reaction-to-fire	A1fl/ A1	
Release of dangerous substances		
- Lead	$\leq 0.8 \text{ mg/dm}^2$	
- Cadmium	$\leq 0.07 \text{ mg/dm}^2$	
	Thickness $\geq 7.5 \text{ mm}$	Thickness $< 7.5 \text{ mm}$
Breaking force	$\geq 1300 \text{ N}$	$\geq 700 \text{ N}$
Bond / adhesion strength for		
— cement adhesives	$\geq 0.5 \text{ N/mm}^2$	
— dispersion adhesives	$\geq 1 \text{ N/mm}^2$	
— reactive resin adhesives	$\geq 2 \text{ N/mm}^2$	
— mortar	NPD – no performance determined	
Slip resistance acc.to CEN/TS 16165:2016, Annex B	R9, R10, R11, R13	
Thermal shock resistance	pass	
Durability for:		
— indoor use	pass	
— outdoor use, freeze thaw resistance	pass	

Table 2. Properties of the ceramic tiles with unglazed surface (UGL) produced by Cerrad Sp. z o.o.

Essential characteristics	Performance	
Reaction-to-fire	A1fl/ A1	
Breaking force	$\geq 1300 \text{ N}$	
Bond / adhesion strength for		
— cement adhesives	$\geq 0.5 \text{ N/mm}^2$	
— dispersion adhesives	$\geq 1 \text{ N/mm}^2$	
— reactive resin adhesives	$\geq 2 \text{ N/mm}^2$	
— mortar	NPD – no performance determined	
Slip resistance acc.to CEN/TS 16165:2016, Annex B	NPD, R9,R10,R11	
Thermal shock resistance	pass	
Durability, for:		
— indoor use:	pass	
— outdoor use, freeze thaw resistance	pass	
Touch sensation	NPD – no performance determined	

Type III Environmental Product Declaration No. 261/2021

Table 3. Specification of the ceramic tiles with water absorption < 0.5% produced by Cerrad Sp. z o.o.

Product	Size	Thickness, mm	Factory
Ceramic tiles with glazed surface (GL)	2797x1197	6	Starachowice
	2397x193	6	
	597x597	8;8,5;10;18;20	
	597x284	8	
	597x297	8;8,5	
	597x193	9;10	
	588x167	8	
	590x590	8,5	
	600x300	7	
	600x175	8	
	900x175	8	
	797x365	8	
	797x380	8;9	
	797x198	20	
	797x797	8;8,5;9;18;20	
	797x397	8;9;18;20	
	795x795	20	
	897x170	8	
	888x167	8	
	1202x193	6;8;9;10;18	
	1202x297	8;20	
	1202x290	18	
	1202x397	18	
	1202x320/5	8	
	1197x597	8;8,5;10	
	1197x230	8	
	1190x190	8	
	1197x1197	8	
	1197x297	8	
	1397x320/50	8	
1597x797	8		
1597x193	6		
1597x257	6		
1597x197	8		
Ceramic tiles with glazed surface (GL)	330x330	7,5	Kopaniny
	400x400	7,5	
	450x450	10	
	175x600	8,0	
	200x600	8,5	
	300x600	7,0 ;8,0 8,5	
Ceramic tiles with glazed surface (GL)	600x600	8,0; 8,5;	Kofskie
	1200x600	8,5	
	1200x200	8,5	
	600x600	8,5	
	300x600	8,5	
Ceramic tiles with unglazed surface (GL) (UGL)	300x300	8,0	Kofskie
	1200x600	10,0	
	1200x300	10,0	
	600x600	8,5	
	600x600	20,0	
	300x600	8,5	
	400x400	8,2	
	300x300	7,5	
	300x300	8,0	
300x300	12,0		

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 with water absorption <0.5% is a line process conducted in three factories of Cerrad Sp. z o.o. located in Kopaniny, Starachowice and Końskie (Poland). Allocation was done on product mass basis. All impacts from raw materials extraction and processing are allocated in module A1 of the LCA. Impacts from the global line production of Cerrad Sp. z o.o. were inventoried and 100% were allocated to the production of the ceramic tiles with water absorption <0.5%. 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, end of life – modules C3, C4 and benefits and loads beyond the system boundary – module D (cradle-to-gate with options) in accordance with EN 15804+A1 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+A1, 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, feldspar, sand, grits, pigments, additives, ancillary materials and packaging materials come from both local and foreign suppliers. Means of transport include ships, railway and lorries. For calculation purposes Polish and European fuel averages were applied.

Module A3: Production

The production of the ceramic tiles with water absorption <0.5% is carried out in three Polish factories of Cerrad Sp. z o.o., located in Starachowice, Kopaniny and Końskie. A scheme of production process of the ceramic tiles with water absorption <0.5% by Cerrad Sp. z o.o is presented in Fig. 1.

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

Deconstruction of the ceramic tiles with water absorption <0.5% can be performed as a part of the refurbishment or demolition process of a building. Therefore, the environmental impact of C1 module is considered to be minor (<1%) and is neglected. 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. At the EoL 100% of the product is recovered. In the adapted scenario 50% of the ceramic tiles with water absorption <0.5% is recycled using a mobile crusher station equipped system (estimated efficiency 150 t/h) 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.

Table 4. End-of-life scenario for the ceramic tiles with water absorption <0.5% produced by Cerrad Sp. z o.o.

Material	Material recovery	Recycling	Landfilling
ceramic tiles	100%	50%	50%

Type III Environmental Product Declaration No. 261/2021

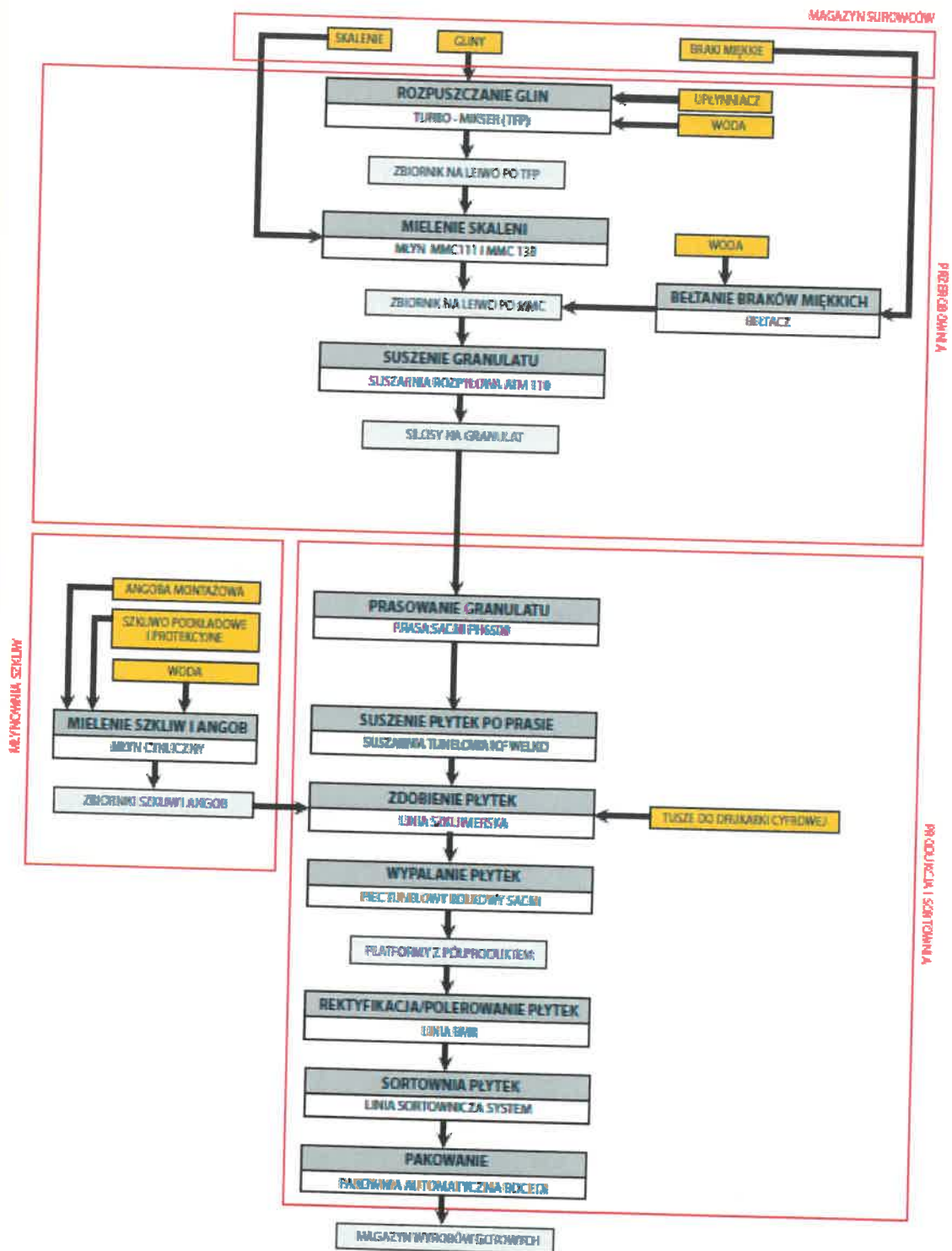


Fig. 1. The scheme of the production of the ceramic tiles with water absorption <math>< 0.5\%</math> by Cerrad Sp. z o.o.

Type III Environmental Product Declaration No. 261/2021

Data quality

The values determined to calculate the LCA originate from verified Cerrad 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 and Europe as reference area.

Assumptions and estimates

The impacts of the representative of the ceramic tiles with water absorption <0.5% were aggregated using weighted average. Impacts were inventoried and calculated for all products of the ceramic tiles with water absorption <0.5%.

Calculation rules

LCA was done in accordance with ITB PCR A document.

Databases

The data for the processes come from the following databases: Ecoinvent, specific EPDs, ITB-Database. Specific data quality analysis was a part of external ISO 14001 audit.

LIFE CYCLE ASSESSMENT (LCA) – Results

Declared unit

The declaration refers to declared unit (DU) – 1 kg of the ceramic tiles with water absorption <0.5% produced by Cerrad Sp. z o.o.

Table 5. System boundaries for the environmental characteristic of the ceramic tiles with water absorption <0.5%

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	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MD	MD	MD

Type III Environmental Product Declaration No. 261/2021

Table 6. Life cycle assessment (LCA) results of the ceramic tiles with water absorption <0.5% produced by Cerrad Sp. z o.o.

Environmental impacts: (DU) 1 kg								
Indicator	Unit	A1	A2	A3	A1-A3	C3	C4	D
Global warming potential	kg CO ₂ eq.	1.64E-01	8.01E-02	7.11E-01	9.56E-01	4.91E-04	1.33E-03	4.07E-03
Depletion potential of the stratospheric ozone layer	kg CFC 11 eq.	1.69E-08	0.00E+00	1.28E-08	2.97E-08	8.37E-11	2.12E-10	3.26E-10
Acidification potential of soil and water	kg SO ₂ eq.	1.34E-03	8.79E-04	1.97E-04	2.41E-03	1.57E-06	9.63E-06	2.07E-05
Formation potential of tropospheric ozone	kg Ethene eq.	7.16E-05	3.40E-05	0.00E+00	1.06E-04	6.30E-08	3.88E-07	1.39E-06
Eutrophication potential	kg (PO ₄) ³⁻ eq.	3.18E-04	1.53E-04	1.84E-05	4.89E-04	3.40E-07	2.23E-06	9.41E-06
Abiotic depletion potential (ADP-elements) for non-fossil resources	kg Sb eq.	1.54E-05	0.00E+00	2.63E-06	1.80E-05	1.95E-10	6.88E-10	3.92E-08
Abiotic depletion potential (ADP-fossil fuels) for fossil resources	MJ	2.91E+00	1.93E+00	6.06E+00	1.09E+01	6.70E-03	1.73E-02	4.69E-02
Environmental aspects on resource use: (DU) 1 kg								
Indicator	Unit	A1	A2	A3	A1-A3	C3	C4	D
Use of renewable primary energy excluding renewable primary energy resources used as raw materials	MJ	INA	INA	INA	INA	INA	INA	INA
Use of renewable primary energy resources used as raw materials	MJ	INA	INA	INA	INA	INA	INA	INA
Total use of renewable primary energy resources (primary energy and primary energy resources used as raw materials)	MJ	2.39E+00	1.35E-01	3.58E-01	2.89E+00	3.49E-05	1.47E-04	5.75E-03
Use of non-renewable primary energy excluding non-renewable primary energy resources used as raw materials	MJ	INA	INA	INA	INA	INA	INA	INA
Use of non-renewable primary energy resources used as raw materials	MJ	INA	INA	INA	INA	INA	INA	INA
Total use of non-renewable primary energy resources (primary energy and primary energy resources used as raw materials)	MJ	2.90E+00	2.02E+00	6.36E+00	1.13E+01	6.70E-03	1.89E-02	6.49E-02
Use of secondary material	kg	2.42E-07	0.00E+00	0.00E+00	2.42E-07	0.00E+00	0.00E+00	0.00E+00
Use of renewable secondary fuels	MJ	3.37E-09	1.01E-01	0.00E+00	1.01E-01	0.00E+00	0.00E+00	0.00E+00
Use of non-renewable secondary fuels	MJ	3.56E-11	0.00E+00	0.00E+00	3.56E-11	0.00E+00	0.00E+00	0.00E+00
Net use of fresh water	m ³	INA	INA	INA	INA	INA	INA	INA
Other environmental information describing waste categories: (DU) 1 kg								
Indicator	Unit	A1	A2	A3	A1-A3	C3	C4	D
Hazardous waste disposed	kg	6.41E-06	3.94E-05	4.07E-05	8.65E-05	1.82E-08	4.70E-08	1.26E-07
Non-hazardous waste disposed	kg	1.83E-01	1.76E-02	9.66E-04	2.02E-01	8.13E-06	5.00E-01	1.00E-03
Radioactive waste disposed	kg	1.64E-05	1.02E-04	0.00E+00	1.18E-04	4.69E-08	1.19E-07	3.12E-07
Components for re-use	kg	0.00E+00	0.00E+00	4.05E-02	4.05E-02	0.00E+00	0.00E+00	0.00E+00
Materials for recycling	kg	2.56E-08	0.00E+00	6.38E-04	6.38E-04	0.00E+00	0.00E+00	0.00E+00
Materials for energy recover	kg	0.00E+00	0.00E+00	2.92E-05	2.92E-05	0.00E+00	0.00E+00	0.00E+00
Exported energy	MJ per energy carrier	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00

Type III Environmental Product Declaration No. 261/2021

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 and ITB PCR A
Independent verification corresponding to ISO 14025 (subclause 8.1.3.) <input checked="" type="checkbox"/> external <input type="checkbox"/> internal
External verification of EPD: PhD. Eng. Halina Prejzner LCA, LCI audit and input data verification: PhD. Eng. Justyna Tomaszewska, j.tomaszewska@itb.pl Verification of LCA: M.Sc. Eng. Dominik Bekierski, d.bekierski@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+A1:2013 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
- PN-EN 14411:2013 Płytki ceramiczne -- Definicje, klasyfikacja, właściwości, ocena zgodności i znakowanie
- PN-EN 14411:2016-09 Płytki ceramiczne -- Definicja, klasyfikacja, właściwości, ocena i weryfikacja stałości właściwości użytkowych i znakowanie
- Department for Business, Energy & Industrial Strategy. Calorific values and density of fuels, 2021. <https://www.gov.uk/>
- KOBiZE Wskaźniki emisyjności CO₂, SO₂, NO_x, CO i pyłu całkowitego dla energii elektrycznej. Grudzień 2020

Podpis jest prawidłowy

Dokument podpisany przez: Agnieszka Winkler-Skalna, ITB
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dr inż. Agnieszka Winkler-Skalna
Kierownik Zakładu Fizyki Ciepłej,
Akustyki i Środowiska



Instytut Techniki Budowlanej

00-611 Warsaw, Filtrowa 1

Thermal Physics, Acoustics and Environment Department
02-656 Warsaw, Ksawerów 21

CERTIFICATE No 261/2021
of TYPE III ENVIRONMENTAL DECLARATION

Products:

Ceramic tiles with water absorption <0.5%

Manufacturer:

CERRAD Sp. z o.o

ul. Radomska 49B, 27-200 Starachowice, Poland

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

PN-EN 15804+A1

Sustainability of construction works.

Environmental product declarations.

Core rules for the product category of construction products.

This certificate, issued for the first time on 26th November 2021 is valid for 5 years
or until amendment of mentioned Environmental Declaration

Head of the Thermal Physic, Acoustics
and Environment Department


Agnieszka Winkler-Skalna, PhD



Deputy Director
for Research and Innovation


Krzysztof Kuczyński, PhD

Warsaw, November 2021

