Type III Environmental Product Declaration No. 724/2024

Issuance date: 13.12.2024
Validation: 18.03.2025
Validity date: 13.12.2029

Porotherm ceramic blocks

Owner of the EPD:

Wienerberger Ceramika Budowlana Sp. z o.o.
Address: Plac Konesera 8
03-736 Warsaw, Poland
Tel.: +48 664 139 036
Website: www.wienerberger.pl
Contact: biuro@wienerberger.com

EPD Program Operator:

Instytut Techniki Budowlanej (ITB)
Address: Filtrowa 1,
00-611 Warsaw, Poland
Website: www.itb.pl
Contact: Michał Piasecki
energia@itb.pl

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 and their aspects verified by the independent body according to ISO 14025. Basically, 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-A3, A4-A5, C1-C4 and D modules in accordance with EN 15804+A2 (Cradle-to-Gate with options)

The year of preparing the EPD: 2024

Product standard: PN EN 771-1+A1:2015-10

Service Life: 150 years

PCR: ITB-PCR A

Declared unit: 1 ton

Reasons for performing LCA: B2B

Representativeness: Poland, Europe, 2022

MANUFACTURER

Wienerberger Ceramika Budowlana Sp. z o.o. is part of Wienerberger AG - a leading international supplier of building materials and infrastructure solutions. From energy-efficient homes to safe sewage systems and the aesthetics of public spaces, company expertise is evident in all areas of life. As a global supplier of building materials and infrastructure solutions, we produce high-quality ceramic structural bricks, ceramic façade solutions, ceramic roof tiles, ceramic and concrete slabs and pavers, as well as ceramic and plastic pipe systems.

Figure 1 The view of Wienerberger Ceramika Budowlana Sp. z o.o. manufacturing plant

For 200 years, we have been accompanying builders by providing comprehensive home construction solutions to achieve the highest standards of investment. Wienerberger is number 1 in the global brick market and are leaders in many of company other business areas.

With company sustainable and innovative products, company create the best solutions for company customers. Together with company customers: architects and designers, contractors, roofers or installers, we develop intelligent solutions for the construction and infrastructure of tomorrow. Company actions are guided by a clear goal - to create value for the future and improve the quality of people's lives.

The offices of Wienerberger and Semmelrock are located in Warsaw, in a revitalized part of Prague. In Poland, the company has plants at 13 locations where it develops and manufactures top-quality products. At 7 locations, the company manufactures Porotherm brand ceramic wall solutions, in Kunice near Legnica the company has 3 plants producing Koramic brand roof tiles and ceramic accessories, and at the remaining 5 locations Semmelrock brand concrete pavers and slabs are manufactured. At each of the plants, the company has a customer service department so that the process of receiving materials is carried out efficiently.

PRODUCTS DESCRIPTION

Porotherm is a solution for the design and construction of building walls, lintels and ceilings. It includes ceramic blocks for exterior and interior load-bearing walls, partition walls, mortars for joining them, ceramic lintels, and ceiling beams and blocks. Application of Porotherm system:

- Compatibility and modularity of Porotherm system components is a convenience for architects and designers of single-family houses. A set of building materials that match each other in terms of, among other things, technical, dimensional and aesthetic qualities, facilitates the design of durable structures with high aesthetic qualities.
- Ready-made product lists for the construction of a building element help investors in the selection and purchase of materials. They also give confidence in the uniformity of the completed elements, which allows savings during the operation of the house. Matching materials and construction chemicals allow contractors to reduce the likelihood of execution errors, simplify work and reduce construction time.
- The offer includes various models of blocks - in addition to the basic ones, it includes half blocks, corner blocks, as well as those equipped with pockets, which are used, for example, when masonry window and door openings.

Table 1 Technical parameters of the products

Characterization		Unit	Value Range/Performance		Standard
			From	To	
Dimensions	length	mm	124	498	EN 771-1
	broad		80	440	
	height		238	249	
tolerances	tolerance	classes	T1, T2, Tm		
	span	classes	R1, R2, Rm		
brick group		group	2 -3		EN 1996-1
flatness		mm	NPD/0,3		EN 772-16
plane parallelism		mm	NPD/0,6		EN 772-16
compressive strength	category	Nr.	category I		EN 771-1
					EN 772-1
	normalized value	N/mm²	10	20	
	load direction	N/mm²	Vertical		
Usual moisture expansion		mm/m	NPD		EN 772-19
bond strength (shear strength)		N/mm²	0,05	0,30	EN 1052-3
Active soluble salts		class	S0		EN 772-5
reaction to fire		Euro-class	A1		EN 771-1
Fire resistance	Bearing bricks	–	REI 30	REI 240	EN 13501-2
	non-bearing bricks		EI 30	EI 240	
water absorption		%	NPD		EN 772-21
Water vapor diffusion resistance factor μ		–	5/10		EN 1745
Sound insulation, gross dry density		kg/m³	600	1100	EN 772-13
thermal conductivity λ10 tr		W/mK	0,13	0,28	EN 1745
net dry density		kg/m³	1590	1700	EN 772-13
ρg,dry density average		kg/m³	750		
Durability (frost resistance)		class	F0	F1	PN-B-12012
Dangerous substances		Radio-activity	I ≤ 1,0		wg Rozp. R. M. z 17.12.2020, Dz.U. 2021, poz. 33.

All additional technical information about the product is available on the https://www.wienerberger.pl/ and catalogues.

LIFE CYCLE ASSESSMENT (LCA) – general rules applied

Unit

Declared unit is 1 ton of ceramic products manufactured in Oleśnica (Poland). The reference period is the year 2022.

System boundary

The life cycle analysis of the declared products covers “Product Stage” A1-A3, A4-A5, C1-C4+D modules in accordance with EN 15804 and ITB PCR A (cradle to gate with options). Energy and water consumption, emissions as well as information on generated wastes were inventoried and were included in the calculation. It can be assumed that the total sum of omitted processes does not exceed 2% 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.

Allocation

The allocation rules used for this EPD are based on general ITB PCR A. Production of ceramic blocks is a line process executed by of Wienerberger Ceramika Budowlana Sp. z o.o. in plant located in Oleśnica (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 Wienerberger Ceramika Budowlana Sp. z o.o. Water and energy consumption, associated emissions and generated wastes are allocated to module A3. Packaging materials were taken into consideration.

System limits

100% materials and 100% energy consumption were inventoried in a factory and were included in calculation. In the assessment, all significant parameters from gathered production data are considered, utilized energy, and electric power consumption, direct production waste, and available emission measurements. The total of neglected input flows per module A1-A3 does not exceed the permitted maximum of 1 % of energy usage and product mass. Tires consumption for transport was not taken into account. It is assumed that the total sum of omitted processes does not exceed 2% of all impact categories. In accordance with EN 15804+A2 machines and facilities (capital goods) required for and during production are excluded, as is transportation of employees.

Modules A1 and A2: *Raw materials supply and transport*

The modules A1 and A2 represent the extraction and processing of raw materials/elements (mainly metal and curtain elements) and transport to the production site. For A2 module (transport) European averages for fuel data are applied. All input material transport’s distances from supplier were considered and included into calculation.

Module A3: *Production*

The production of ceramic blocks begins with the extraction of clay as the main production raw material. Clay is extracted from a heap located near the production plant. First, the extracted clay is crushed and mixed with specific additives (including sawdust). The next stage is forming the blocks and drying them. After drying the blocks, they are fired. In the production process, constant quality checks are carried out at all stages, and the company has its own research laboratory. Ready blocks

that have passed quality control are packed and sent to customers . The diagram of the production process is shown in Fig. 2

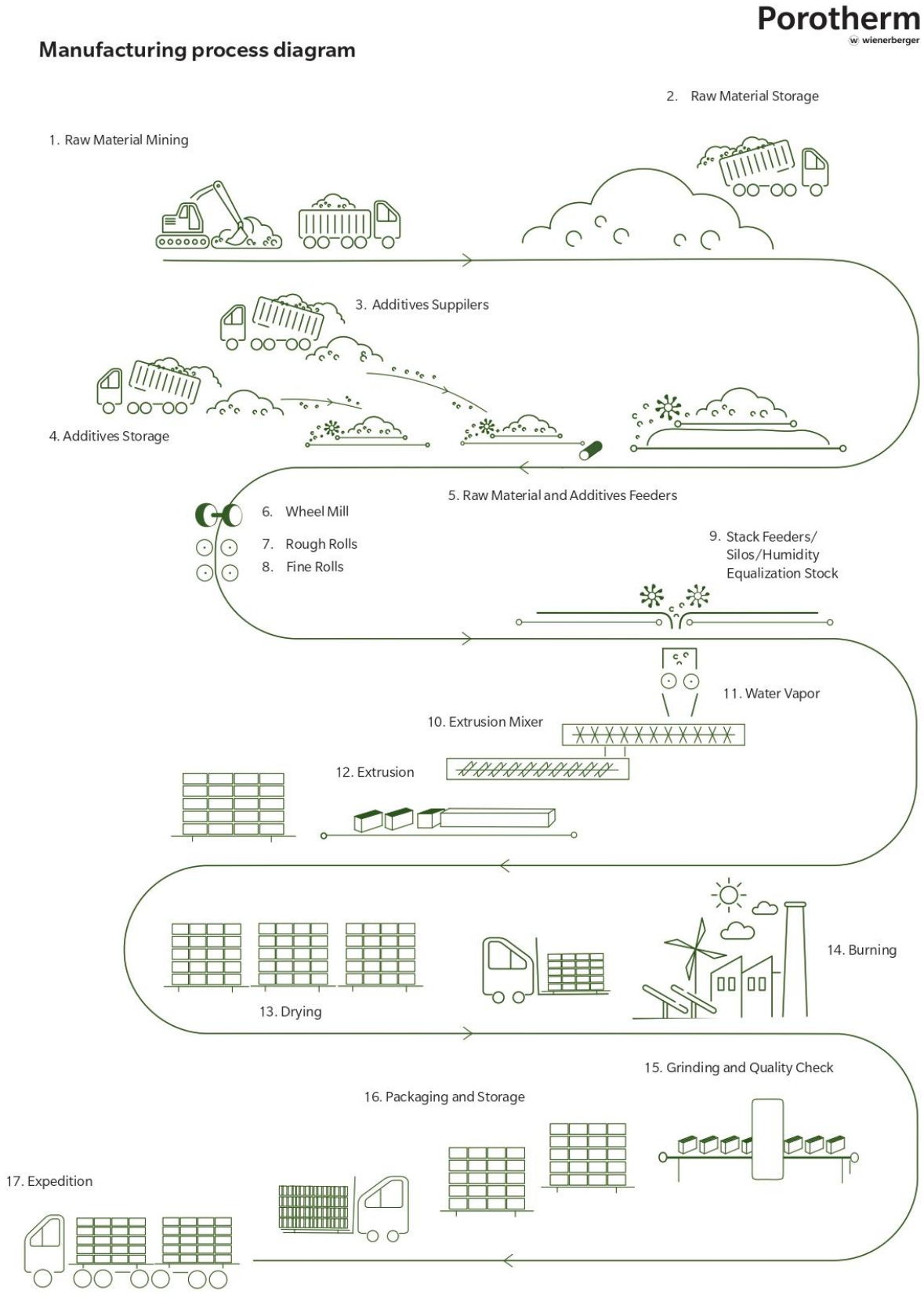

Figure 2 Manufacturing process scheme (A3)

Module A4: transport to consumer

Vehicle transport at distance 100 km is considered (emission standard: Euro 5) with 100% load capacity.

Modules *C and D: End-of-life (EOL)*

In the adapted scenario, dismantling of clay bricks and elements (C1) is performed as part of building renovation or demolition processes, where environmental impacts from declared products can be considered as minor (<1%). There are no specific deconstruction methods, applied in Poland, in regards with the clay bricks and elements so the electric tools impact was assumed. 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 clay bricks and elements are recovered at the EoL cycle. Recovered material is transported to either to landfill or construction site distant by 100 km, on 16 32t lorry (EURO 5) with fuel consumption of 35 l per 100 km. In the adapted scenario 90% of the clay bricks and elements is recycled and further used as aggregate for road foundation or ballast (credits presented in module D) while remaining 10% 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. Regarding the recycling material of metals, the metal parts in the EoL are declared a send of waste status. Electricity at end of life (module D) has been modelled using an average EU27 electricity mix as the location where the product reaches end of life is unknown.

Table 2 End-of-life scenario for the Porotherm ceramic blocks

Material	Material recovery	Recycling	Landfilling
Ceramic waste	100%	90%	10%

Electricity at end-of-life (module C) has been modelled using an average Polish electricity mix as the location where the product reaches end-of-life is unknown.

Data collection period

The data for manufacture of the declared products refer to period between 01.01.2022 – 31.12.2022 (1 year). The life cycle assessments were prepared for Poland and Europe as reference area.

Data quality

The data selected for LCA originate from ITB-LCI questionnaires completed by Wienerberger Ceramika Budowlana Sp. z o.o. and verified during LCI data audit. No data collected is older than five years and no generic datasets used are older than ten years. The representativeness, completeness, reliability, and consistency is judged as good. The background data for the processes come from the following resources database Ecoinvent v.3.10. Specific (LCI) data quality analysis was a part of the input data verification. Where no background data is available, data gaps were complemented by manufacturer information and literature research.

Assumptions and estimates

The impacts of the representative products were aggregated using weighted average.

Calculation rules

LCA was performed using ITB-LCA tool developed in accordance with EN15804+A2. Emission of greenhouse gases was calculated using the IPCC 2013 GWP method with a 100-year horizon. Emission of acidifying substances, Emission of substances to water contributing to oxygen depletion, Emission of gases that contribute to the creation of ground-level ozone, Abiotic depletion, and ozone depletion emissions where all calculated with the CML-IA baseline method

Additional information

Polish electricity (Ecoinvent ver. 3.10 supplemented by actual national KOBiZE data) emission factor used is 0.685 kg CO_2/kWh. As a general rule, no particular environmental or health protection measures other than those specified by law are necessary.

LIFE CYCLE ASSESSMENT (LCA) – Results

Declared unit

The declaration refers to declared unit (DU) – 1 ton of Porotherm ceramic blocks following life cycle modules (Table 3) were included in the analysis. The following tables 4-7 show the environmental impacts of the life cycle of selected modules (A1-A5+C1-C4+D).

Table 3 System boundaries for the environmental characteristic of the product.

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**

Table 4 Life cycle assessment (LCA) results for specific product – environmental impacts (DU: 1 ton)

Indicator	Unit	A1	A2	A3	A1-A3	A4	A5	C1	C2	C3	C4	D
Global Warming Potential	eq. kg CO_2	-5.70E+01	3.30E+00	1.37E+02	8.32E+01	1.67E+01	4.63E+00	6.98E+00	1.67E+01	1.50E+01	1.06E+00	-9.00E+00
Greenhouse potential - fossil	eq. kg CO_2	2.96E+01	3.30E+00	1.36E+02	1.69E+02	1.66E+01	4.54E+00	0.00E+00	1.66E+01	1.50E+01	1.05E+00	-9.00E+00
Greenhouse potential - biogenic	eq. kg CO_2	-8.63E+01	2.15E-03	4.28E-01	-8.59E+01	5.68E-02	9.31E-02	0.00E+00	5.68E-02	5.11E-02	1.06E-02	-5.40E-04
Global warming potential - land use and land use change	eq. kg CO_2	7.64E-02	1.08E-03	5.13E-03	8.26E-02	6.52E-03	3.05E-03	0.00E+00	6.52E-03	5.87E-03	1.07E-03	-4.13E-02
Stratospheric ozone depletion potential	eq. kg CFC 11	6.14E-07	6.55E-08	2.02E-06	2.70E-06	3.85E-06	1.25E-07	0.00E+00	3.85E-06	3.46E-06	3.20E-07	-1.69E-06
Soil and water acidification potential	eq. mol H+	2.97E-01	1.03E-02	2.84E-01	5.92E-01	6.75E-02	3.62E-02	5.30E-02	6.75E-02	6.07E-02	8.88E-03	-3.78E-01
Eutrophication potential - freshwater	eq. kg P	1.93E-02	2.20E-04	4.29E-02	6.24E-02	1.12E-03	3.11E-03	0.00E+00	1.12E-03	1.01E-03	3.06E-04	-1.37E-02
Eutrophication potential - seawater	eq. kg N	7.79E-02	3.48E-03	7.07E-02	1.52E-01	2.04E-02	1.36E-02	0.00E+00	2.04E-02	1.83E-02	3.06E-03	-3.36E-02
Eutrophication potential - terrestrial	eq. mol N	8.77E-01	3.78E-02	3.72E-01	1.29E+00	2.22E-01	5.88E-02	0.00E+00	2.22E-01	2.00E-01	3.33E-02	-4.51E-01
Potential for photochemical ozone synthesis	eq. kg NMVOC	2.80E-01	1.62E-02	1.13E-01	4.09E-01	6.80E-02	2.42E-02	0.00E+00	6.80E-02	6.12E-02	9.64E-03	-1.08E-01
Potential for depletion of abiotic resources - non-fossil resources	eq. kg Sb	4.32E-04	1.08E-05	3.38E-05	4.77E-04	5.89E-05	1.22E-05	1.77E-07	5.89E-05	5.30E-05	3.56E-06	-2.68E-03
Abiotic depletion potential - fossil fuels	MJ	5.88E+02	4.63E+01	6.49E+02	1.28E+03	2.47E+02	5.12E+01	0.00E+00	2.47E+02	2.22E+02	2.43E+01	-3.16E+02
Water deprivation potential	eq. m^3	9.39E+00	2.24E-01	1.43E+01	2.39E+01	1.14E+00	2.53E+00	0.00E+00	1.14E+00	1.03E+00	1.41E-01	-2.34E+01

Table 5 Life cycle assessment (LCA) results for specific product – additional impacts indicators (DU: 1 ton)

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

Table 6 Life cycle assessment (LCA) results for specific product - the resource use (DU: 1 ton)

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	1.03E+03	7.85E-01	3.76E+01	1.06E+03	3.54E+00	7.59E+00	0.00E+00	3.54E+00	3.19E+00	4.27E-01	-3.63E+01
Consumption of renewable primary energy resources used as raw materials	MJ	5.05E+02	0.00E+00	0.00E+00	5.05E+02	0.00E+00	6.38E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Total consumption of renewable primary energy resources	MJ	5.21E+02	7.85E-01	3.76E+01	5.59E+02	3.54E+00	7.66E+00	1.52E-07	3.54E+00	3.19E+00	4.27E-01	-3.63E+01
Consumption of non-renewable primary energy - excluding renewable primary energy sources used as raw materials	MJ	5.51E+02	4.63E+01	6.77E+02	1.27E+03	2.47E+02	5.26E+01	0.00E+00	2.47E+02	2.22E+02	2.63E+01	-3.16E+02
Consumption of non-renewable primary energy resources used as raw materials	MJ	3.70E+01	0.00E+00	0.00E+00	3.70E+01	0.00E+00	3.37E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Total consumption of non-renewable primary energy resources	MJ	5.88E+02	4.63E+01	6.77E+02	1.31E+03	2.47E+02	5.28E+01	0.00E+00	2.47E+02	2.22E+02	2.63E+01	-3.16E+02
Consumption of secondary materials	kg	1.78E+02	2.12E-02	6.39E-02	1.78E+02	8.27E-02	1.17E-01	0.00E+00	8.27E-02	7.44E-02	0.00E+00	-1.91E-01
Consumption of renew. secondary fuels	MJ	8.01E+00	2.68E-04	2.41E-04	8.01E+00	9.11E-04	1.36E-03	9.00E-13	9.11E-04	8.20E-04	0.00E+00	-1.16E-02
Consumption of non-renewable secondary fuels	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	8.24E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Net consumption of freshwater	m^3	4.48E-01	6.15E-03	2.73E+00	3.19E+00	3.10E-02	4.14E-01	0.00E+00	3.10E-02	2.79E-02	3.79E-03	-5.73E-01

Table 7 Life cycle assessment (LCA) results for specific product – waste categories (DU: 1 ton)

Indicator	Unit	A1	A2	A3	A1-A3	A4	A5	C1	C2	C3	C4	D
Hazardous waste	kg	1.63E+00	6.66E-02	4.45E+00	6.14E+00	2.77E-01	5.50E-01	0.00E+00	2.77E-01	2.49E-01	3.83E-05	2.21E+00
Non-hazardous waste	kg	7.99E+01	1.41E+00	2.03E+02	2.85E+02	4.92E+00	1.11E+01	0.00E+00	4.92E+00	4.42E+00	1.00E+02	6.15E+01
Radioactive waste	kg	4.87E-04	1.48E-05	1.18E-04	6.20E-04	1.84E-05	2.15E-05	7.83E-18	1.84E-05	1.66E-05	1.48E-04	8.34E-04
Components for re-use	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
Materials for recycling	kg	9.57E-03	3.47E-04	3.00E+00	3.01E+00	7.64E-04	4.20E+00	0.00E+00	7.64E-04	6.87E-04	0.00E+00	4.28E-03
Materials for energy recovery	kg	1.60E-04	2.94E-06	5.35E-06	1.68E-04	6.18E-06	2.79E-06	0.00E+00	6.18E-06	5.56E-06	0.00E+00	3.98E-04
Exported Energy	MJ	5.23E-01	1.93E-02	6.33E-01	1.18E+00	0.00E+00	1.42E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	8.59E-01

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 (sub clause 8.1.3.) ☒ external ☐ internal
External verification of EPD: Halina Prejzner, PhD. Eng. LCI audit and verification: Michał Chwedaczuk, M.Sc. Eng. LCA, LCI audit and input data verification: Michał Piasecki, PhD., D.Sc., eng.

Note 1: The declaration owner has the sole ownership, liability, and responsibility for the for the information provided and contained in EPD. Declarations of construction products may not be comparable if they do not comply with EN 15804+A2. For further information about comparability, see EN 15804+A2 and ISO 14025.

Note 2: ITB is a public Research Organization and Notified Body (EC Reg. no 1488) to the European Commission and to other Member States of the European Union designated for the tasks concerning the assessment of building products' performance. ITB acts as the independent, third-party verification organization (see ISO 17025/17065/17029). ITB-EPD program is recognized and registered member of The European Platform - Association of EPD program operators and ITB-EPD declarations are registered and stored in the international ECO-PORTAL.

Normative references

- ITB PCR A, V1.6 General Product Category Rules for Construction Products (2023)
- 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 771-1:2011+A1:2015 Specification for masonry units Clay masonry units
- KOBiZE Wskaźniki emisyjności CO_2, SO_2, NO_x, CO i pyłu całkowitego dla energii elektrycznej, grudzień 2023
- https://ecoinvent.org/

LCA, LCI, data verification
dr hab., eng. Michał Piasecki,
Qualified electronic signature

Head of the Department of Thermal Physics, Acoustics and the Environment
dr eng. Agnieszka Winkler-Skalna
Qualified electronic signature

Instytut Techniki Budowlanej

Instytut Techniki Budowlanej
00-611 Warsaw, Filtrowa 1

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

CERTIFICATE № 724/2024
of TYPE III ENVIRONMENTAL DECLARATION

Products:

Porotherm ceramic blocks

Manufacturer:

Wienerberger Ceramika Budowlana Sp. z o.o.
Plac Konesera 8, 03-736 Warsaw, 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+A2

Sustainability of construction works.
Environmental product declarations.
Core rules for the product category of construction products.

This certificate, issued on 13th December 2024 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

INSTYTUT TECHNIKI BUDOWLANEJ

Deputy Director for Research and Innovation
Krzysztof Kuczyński, PhD

Warsaw, December 2024