



Ceramic roof tile

Röben Polska



ISSUANCE DATE

VALIDITY DATE

17/06/2024

17/06/2029

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Basic information

This declaration is a Type III Environmental Product Declaration (EPD) based on the EN 15804 standard and verified according to ISO 14025 by an independent auditor.

It contains information about the environmental impact of the declared construction materials. These aspects have been verified by an independent body in accordance with ISO 14025. In principle, a comparison or evaluation of EPD data is only possible if all data to be compared have been created in accordance with EN 15804 (see section 5.3 of the standard).

EPD OWNER	RÖBEN POLSKA SP. Z O.O. I WSPÓLNICY SP. K. ul. Ceramiczna 2, 55-300 Środa Śląska www.roben.pl
PROGRAMME OWNER	Instytut Techniki Budowlanej (ITB) ul. Filtrowa 1, 00 - 611 Warszawa, Polska e-mail: energia@itb.pl, www.itb.pl
LCA ANALYSIS	A1 - A3, A4, C1 - C4 and D according to EN 15804 (cradle to gate with options)
YEAR OF EPD DEVELOPMENT	2024
DECLARED SERVICE LIFE	150 YEARS
PCR	ITB-PCR A document (based on PN-EN 15804)
DECLARED UNIT	1 ton of product
REASON FOR IMPLEMENTATION	B2B
REPRESENTATIVENESS	Polish products, 2022-2023

ITB cooperates with other operators of EPD programmes through the ECO-PLATFORM, (<http://www.eco-platform.org/>) in order to coordinate efforts to support industrial sectors while reducing verification efforts in different countries.

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Manufacturer

Röben Polska is part of a family-owned concern that has been producing ceramic building materials for over 160 years. The plant in Środa Śląska is Röben's largest and most modern roofing factory in Europe.

The company produces bricks, clinker tiles, roof tiles and roof accessories.



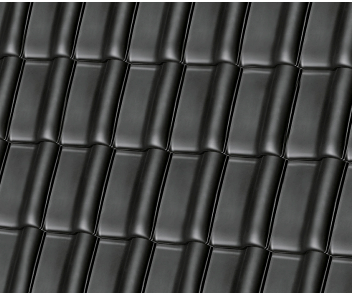
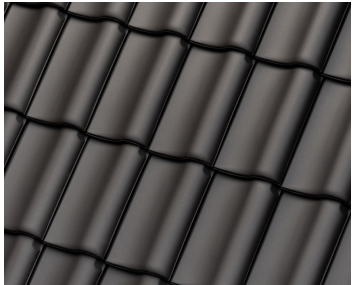


Fig. 1 Röben Polska factory in Środa Śląska

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Products description and application

This declaration covers clay roof tiles. Product range:

Name	Image	Selected technical data
BERGAMO		Weight of 1 piece: approx. 3.95 kg Total length: approx. 43.6 cm Total width: approx. 28.5 cm Amount/m ² : approx. 11.8-12.8 pcs. Weight/m ² : approx. 48.5 kg
PIEMONTE		Weight of 1 piece: approx. 3.95 kg Total length: approx. 47.2 cm Total width: approx. 29.0 cm Amount/m ² : approx. 10.1-11.2 pcs. Weight/m ² : approx. 40.1-44.5 kg
MONZA		Weight of 1 piece: approx. 3,95 kg Total length: approx. 46.4 cm Total width: approx. 30.4 cm Amount/m ² : approx. 9.4-9.9 pcs. Weight/m ² : approx. 38.3-40.3 kg
MILANO		Weight of 1 piece: approx. 3.95 kg Total length: approx. 46.6 cm Total width: approx. 30.6 cm Amount/m ² : approx. 10.3-11.5 pcs. Weight/m ² : approx. 40.2-44.9 kg

Composition of ceramic roof tiles

Component	Content
Clay	54.8%
Basalt	15%
Production rubble	8%
Devonian	10%
Sand	12%
Additives	0.2%

04**Life cycle assessment (LCA) -
general principles****Declared unit**

The declared unit of product is 1 ton of Röben Polska ceramic roof tiles.

Allocation

The allocation in this study was made in accordance with the ITB PCR A guidelines. The production and storage of the products covered in this declaration takes place at the production site of Röben Polska at 2 Ceramiczna Street in Środa Śląska. Input data and emissions were collected for the production facility. All inputs from raw material extraction are allocated in module A1. The production of products is based on raw materials and rubble, which is post-production waste. 100% of the receipts from the production lines have been inventoried and allocated to the production of products. Module A2 includes the transport of raw materials from Polish and foreign distributors to the factory in Środa Śląska. The utilities for the entire production process were inventoried and included in module A3.

System boundaries

The life cycle analysis of the declared products covers the production stage (modules A1 - A3), A4, C1-C4+D ('cradle to gate with options') according to EN 15804 and ITB PCR A.

System limits

100% of input materials and 100% of utility consumption were inventoried at the Środa Śląska production plant. All relevant parameters from the collected production data are included in the assessment, i.e. all materials used for production and electricity, natural gas, diesel, water, wastewater and emissions consumed.

Modules A1 and A2 Extraction and transport of raw materials

Raw materials for production such as clay, sand, basalt, devonian and paints are mainly transported from Poland, but also from Germany and France. Module A1 shows the production impact of raw materials further used in the production of ceramic roof tiles. Data on the transport of raw materials is recorded by the factory. Means of transport include trucks and vans. Global fuel averages were used for the calculation of module A2.

Module A3 Production

Mass production is based on natural raw materials. The basis is clay. All raw materials are delivered to the company by truck and stored respectively in boxes (loose raw materials) or on heaps (clay). The mixture of raw materials for the mill in the agreed proportions is pre-prepared in a box, from where it is dosed into the feeder. The pre-crushed material is milled in a wheel mill and stored as a finished product in boxes. The non-plastic materials mixture for the mass consists of meal, devonian and sand. After preparation, the mass is stored for about 10 days before being sent to the production plants. The sand is transported by conveyor belts. The pulp is mixed and processed by squeezing it through the screens of a mashing machine. The pulp is then formed into strips, which are cut into gallets. The gallets go to the stamp presses, where the final pressing of the tiles takes place. During pressing, a waste product is produced, which is mixed with fresh mass and sent further into production. The pressed tiles go to a tunnel dryer heated mainly by the heat returned from the furnace. They are then subjected to quality control in a sorting cabin. Tiles that do not pass the inspection are rejected to be mixed again with fresh clay and go into production. After quality control, the tiles are glazed/angobled and then go to the gas tunnel furnace for firing. After firing, another inspection of the tiles takes place. The process consumes electricity, natural gas, diesel and water. In addition, electricity and water are consumed in the plant for domestic purposes. The waste generated during each production process is reintroduced into the mass from which the next batch of tiles is produced.

Module A4 Transport

Transport to the building site takes place from the plant in Środa Śląska. The following are used for packaging and labeling the finished products: spacer paper, PET tape, polypropylene spacer, stretch sleeve and labels. Packed products are placed on Euro pallets, on which they are loaded onto trucks. Transport is carried out using 16-32 tonne trucks meeting EURO 6 emission standards, with an average transport distance of 100 km. The fuel used is diesel.

Module C1 Deconstruction and demolition

The deconstruction of roof tiles was assumed to be done manually. Therefore, no contribution was reported in this category and the module is equal to 0.

Module C2 Transport

It is assumed that the end-of-life product will be transported by truck to the nearest waste treatment facility (truck, diesel) within a 100 km distance.

Module C3 Waste treatment

It was assumed that 100% of the products would be recovered and recycled.

Module C4 Disposal

It was assumed that the products would not go to landfill at the end of their life, so the module is equal to 0.

Module D External impacts beyond system boundaries

To obtain the net result of recycled material from the product system, the contribution of the recycled material building up the product is subtracted from the material to be recycled at the end of life. Module D shows the burdens and benefits of recycling the remaining net recycled material. Benefits are assessed at the point of functional equivalence, i.e. where there is a substitution of virgin raw material.

Data collection period

The input data for the calculation of declared products is for the period from March 2022 to February 2023. The life cycle assessment was prepared for Poland as a reference area.

Data quality

The data for the calculation of modules A1-A4 came from verified LCI inventory data from the plant. In accordance with Annex E of EN 15804 + A2, a data quality assessment was carried out. For technical representativeness, processes with a quality level of "very good" represent 99% of the values for the climate change indicators. For geographical and temporal representativeness, a process evaluation level of "very good" was obtained.

Assumptions and estimates

The impacts of the representative products were aggregated using a weighted average. The results obtained for the representative products can be related proportionally to all Röben Polska ceramic roof tiles.

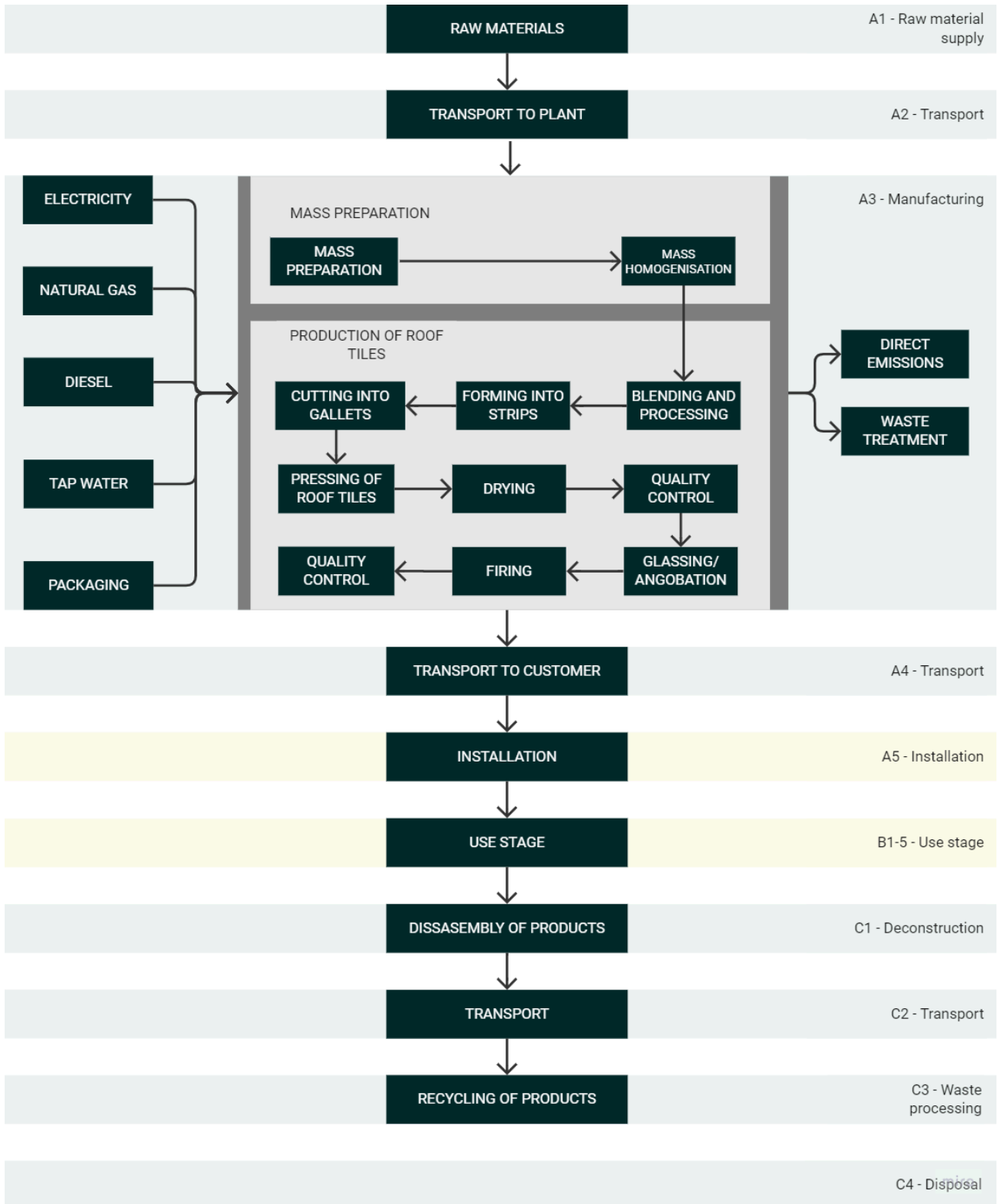
Calculation principles

The LCA was carried out in accordance with EN 15804+A2 and the ITB document PCR A (v1.6, 2023).

Databases

The data for the calculations came from Ecoinvent v. 3.8 and from databases available in Bionova OneClickLCA software. Emission factors for electricity have been supplemented with actual KOBIZE data. The characterisation factors are CML ver. 4.2 based on EN 15804+A2.

Production scheme



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Life cycle assessment (LCA) - Results

The declared unit is 1 ton of ceramic roof tiles manufactured by Röben Polska. The following indicates which LCA assessment modules were included in the assessment (**MA** - module assessed, **MNA** - module not assessed).

Information on system boundaries																
Product stage			Construction stage		Use stage							End of life				Benefits and loads beyond the system boundaries
Raw material supply	Transport	Manufacturing	Transport to construction site	Construction and installation process	Use	Maintenance	Repair	Replacement	Refurbishment	Operational energy use	Operational water use	Deconstruction / demolition	Transport	Waste processing	Disposal	Potential for reuse, recovery or recycling
A1	A2	A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
MA	MA	MA	MA	MNA	MNA	MNA	MNA	MNA	MNA	MNA	MNA	MA	MA	MA	MA	MA

Environmental impacts

Indicator	Unit	A1	A2	A3	A1-A3	A4	C1	C2	C3	C4	D
GLOBAL WARMING POTENTIAL - TOTAL	kg CO2 eq.	2.13E+01	7.43E+00	2.60E+02	2.89E+02	1.62E+01	0.00E+00	9.10E+00	3.30E+00	0.00E+00	-1.72E+02
GLOBAL WARMING POTENTIAL - FOSSIL	kg CO2 eq.	2.12E+01	7.42E+00	2.93E+02	3.21E+02	1.63E+01	0.00E+00	9.09E+00	3.30E+00	0.00E+00	-1.71E+02
GLOBAL WARMING POTENTIAL - BIOGENIC	kg CO2 eq.	7.33E-02	5.39E-03	-3.25E+01	-3.24E+01	8.78E-03	0.00E+00	6.60E-03	6.05E-04	0.00E+00	-8.43E-01
GLOBAL WARMING POTENTIAL - LULAC	kg CO2 eq.	4.68E-02	2.23E-03	4.92E-02	9.81E-02	5.90E-03	0.00E+00	2.74E-03	3.29E-04	0.00E+00	-4.44E-02
DEPLETION POTENTIAL OF THE STRATOSPHERIC OZONE LAYER	kg CFC 11 eq.	4.37E-06	1.74E-06	2.61E-05	3.22E-05	3.72E-06	0.00E+00	2.14E-06	7.05E-07	0.00E+00	-1.78E-05
ACIDIFICATION POTENTIAL	mol H+ eq.	1.84E-01	3.12E-02	1.28E+00	1.50E+00	4.69E-02	0.00E+00	3.82E-02	3.43E-02	0.00E+00	-7.97E-01
EUTROPHICATION AQUATIC FRESHWATER	kg Pe	8.24E-04	6.04E-05	1.45E-02	1.54E-02	1.39E-04	0.00E+00	7.39E-05	1.09E-05	0.00E+00	1.09E-05
EUTROPHICATION AQUATIC MARINE	kg N eq.	4.45E-02	9.39E-03	2.39E-01	2.93E-01	9.32E-03	0.00E+00	1.15E-02	1.52E-02	0.00E+00	-1.39E-01
EUTROPHICATION AQUATIC TERRESTRIAL	kg N eq.	5.21E-01	1.04E-01	2.39E+00	3.02E+00	1.04E-01	0.00E+00	1.27E-01	1.66E-01	0.00E+00	-1.60E+00
FORMULATION POTENTIAL OF TROPOSPHERIC OZONE	kg NMVOC eq.	1.40E-01	3.34E-02	7.27E-01	9.00E-01	3.98E-02	0.00E+00	4.08E-02	4.58E-02	0.00E+00	-4.63E-01
ABIOTIC DEPLETION POTENTIAL FOR NON-FOSSIL RESOURCES	kg Sb eq.	1.39E-03	1.27E-04	1.82E-04	1.70E-03	4.51E-04	0.00E+00	1.55E-04	1.65E-06	0.00E+00	-3.67E-02
ABIOTIC DEPLETION POTENTIAL FOR FOSSIL RESOURCES	MJ	2.74E+02	1.15E+02	4.07E+03	4.46E+03	2.47E+02	0.00E+00	1.41E+02	4.44E+01	0.00E+00	-2.39E+03
WATER USE	m ³	1.05E+01	4.29E-01	1.85E+01	2.94E+01	8.08E-01	0.00E+00	5.26E-01	1.19E-01	0.00E+00	-4.19E+01

Environmental aspects related to resource use

Indicator	Unit	A1	A2	A3	A1-A3	A4	C1	C2	C3	C4	D
RENEWABLE PRIMARY ENERGY AS AN ENERGY CARRIER	MJ	1.79E+01	1.45E+00	3.86E+02	4.06E+02	3.54E+00	0.00E+00	1.78E+00	2.54E-01	0.00E+00	-9.22E+01
RENEWABLE PRIMARY ENERGY FOR MATERIAL USE	MJ	0.00E+00	0.00E+00	3.33E+02	3.33E+02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
COMPLETELY RENEWABLE PRIMARY ENERGY	MJ	1.79E+01	1.45E+00	7.19E+02	7.38E+02	3.54E+00	0.00E+00	1.78E+00	2.54E-01	0.00E+00	-9.22E+01
NON-RENEWABLE PRIMARY ENERGY AS AN ENERGY SOURCE	MJ	2.75E+02	1.15E+02	1.19E+03	1.58E+03	2.47E+02	0.00E+00	1.41E+02	4.44E+01	0.00E+00	-2.39E+03
NON-RENEWABLE PRIMARY ENERGY AS MATERIA USE	MJ	0.00E+00	0.00E+00	2.88E+03	2.88E+03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
COMPLETELY NON-RENEWABLE PRIMARY ENERGY	MJ	2.75E+02	1.15E+02	4.07E+03	4.46E+03	2.47E+02	0.00E+00	1.41E+02	4.44E+01	0.00E+00	-2.39E+03
USE OF SECONDARY RAW MATERIALS	MJ	1.14E+00	0.00E+00	1.42E+00	2.56E+00	0.00E+00	0.00E+00	0.00E+00	1.74E-02	0.00E+00	-2.56E+00
RENEWABLE SECONDARY FUELS	MJ	3.59E-03	0.00E+00	1.07E+01	1.07E+01	0.00E+00	0.00E+00	0.00E+00	5.68E-05	0.00E+00	5.68E-05
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
USE OF FRESH WATER RESOURCES	MJ	1.06E+00	2.40E-02	8.26E+01	8.37E+01	4.27E-02	0.00E+00	2.94E-02	2.70E-03	0.00E+00	-9.07E-01

Other environmental information describing the waste categories

Indicator	Unit	A1	A2	A3	A1-A3	A4	C1	C2	C3	C4	D
HAZARDOUS WASTE DESTINED FOR LANDFILL	kg	2.00E+00	1.12E-01	4.58E+00	6.69E+00	2.54E-01	0.00E+00	1.37E-01	0.00E+00	0.00E+00	-1.62E+01
NON-HAZARDOUS WASTE DESTINED FOR DISPOSAL	kg	1.70E+02	1.24E+01	6.03E+02	7.86E+02	1.75E+01	0.00E+00	1.52E+01	0.00E+00	0.00E+00	-1.59E+02
RADIOACTIVE WASTE FOR DISPOSAL	kg	1.31E-03	7.92E-04	1.56E-03	3.66E-03	1.69E-03	0.00E+00	9.70E-04	0.00E+00	0.00E+00	-3.65E-03
COMPONENTS TO BE REUSED	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
MATERIALS TO BE RECYCLED	kg	0.00E+00	0.00E+00	1.85E+00	1.85E+00	0.00E+00	0.00E+00	0.00E+00	1.00E+03	0.00E+00	0.00E+00
MATERIALS DESTINED 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
ELECTRICITY EXPORTED	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

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Verification

The verification process for this EPD is in accordance with ISO 14025 and ISO 21930. Once verified, this EPD is valid for a period of 5 years. There is no need to recalculate after 5 years if the inputs have not changed significantly.

**EN 15804 standard serves as the basis for ITB PCR-A
independent verification according to ISO 14025 (subsection 8.1.3.)**

internal external

External verification of EPD: **Michał Piasecki, Professor ITB, m.piasecki@itb.pl**

Input data verification, LCI audyt, LCA: **Agnieszka Pikus, JWA, a.pikus@jw-a.pl**

LCA verification: **Michał Piasecki, Professor ITB, m.piasecki@itb.pl**

Note 1: The declaration owner has the sole ownership, liability, and responsibility 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 (ISO 17025/17065/17029). ITB-EPD program is a 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 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
EN 15804 +A2 Sustainability of construction works – Environmental product declarations – Core rules for the product category of construction products
EN 1304:2005 Clay roofing tiles and fittings – Product definitions and specifications
EN 538 Clay roofing tiles for discontinuous laying – Flexural strength test
EN 539-1 Clay roofing tiles for discontinuous laying – Determination of physical characteristics – Part 1: Impermeability test
EN 539-2 Clay roofing tiles for discontinuous laying – Determination of physical characteristics – Part 2: Test for frost resistance
EN 1024 Clay roofing tiles for discontinuous laying – Determination of geometric characteristics



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CERTIFICATE № 643/2024 of TYPE III ENVIRONMENTAL DECLARATION

Products:

Ceramic roof tile

Manufacturer:

RÖBEN POLSKA SP. Z O.O. i WSPÓLNICY SP. K.

Ceramiczna 2, 55-300 Środa Śląska, 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.

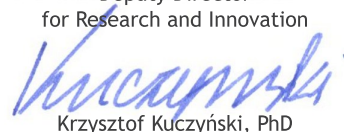
This certificate, issued on 17th June 2024 is valid for 5 years
or until amendment of mentioned Environmental Declaration

Head of the Thermal Physic, Acoustics
and Environment Department


Agnieszka Winkler-Skalna, PhD



Deputy Director
for Research and Innovation


Krzysztof Kuczyński, PhD

Warsaw, June 2024