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Clinker brick slips



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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, C1, C4 and D modules in accordance with EN 15804

(Cradle-to-Gate with options)

The year of preparing the EPD: 2022

Product standard: PN-EN 14411:2016

Service Life: 100 years for standard product

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

Declared unit: 1 m² of brick slips

Reasons for performing LCA: B2B

Representativeness: Polish, European

MANUFACTURER

The origins of the **KING KLINKER** (Klinkier Przysucha S.A.) date back to 1972. Since then, the company has specialized in the production of the ceramics, based on the traditional method of clinker production. In December 2013, the company launched a new production plant, producing extruded brick slips. The new plant not only increased production capacity to above 70 000 000 brick slips per year, but also provided completely new possibilities in terms of colours, structures and formats. Advanced technology gives access to unlimited possibilities of product development, while maintaining expected technical parameters.

PRODUCT DESCRIPTION AND APPLICATION

KING KLINKER brick slips produced by Klinkier Przysucha S.A. characterize durability and the long service life exceeding 100 years without changes of physicochemical properties of the products. Brick slips are intended for finishing external wall surfaces of building objects, protecting against unfavorable weather conditions and damage, ensuring the proper heat flow between the interior and exterior environments, simultaneously providing desirable aesthetic values.

Brick slips **KING KLINKER** produced by Klinkier Przysucha S.A. are ceramic products made of white, yellow or red clay, clinker scrap, sand and additives. Brick slips are available in different colors, sizes and have various structures.

More details can be found on the website www.kingklinker.com

LIFE CYCLE ASSESSMENT (LCA) – general rules applied

Allocation

The allocation rules used for this LCA are based on general ITB PCR A and product mass basis. Production of the brick slips based on white, yellow and red clay is a line process performed in Klinkier Przysucha S.A. (**KING KLINKER**) manufacturing plant located in Skrzyńsko (Poland). All impacts from raw materials extraction and processing are allocated in module A1 of the LCA. Total impacts from the line production of Klinkier Przysucha S.A. (**KING KLINKER**) were inventoried and allocated to the clinker brick slips production. Water and energy consumption, associated emissions and generated wastes are allocated to module A3. Utilization of packaging material was taken into consideration. Module A2 includes transport of raw materials from their suppliers to Klinkier Przysucha S.A. (**KING KLINKER**) in Skrzyńsko.

System limits

The life cycle analysis (LCA) of the declared products covers: product stage – modules A1-A3, 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+A1 and ITB PCR A. The details of systems limits are provided in the background report. 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, clinker scrap, sand, feldspar-quartz meal, dyes, enamel, engobe, basalt aggregate, additives, ancillary materials and packaging materials (wood, paper, foil) are used for the production of the clinker brick slips. Raw materials, additives, ancillary materials and packaging materials come from both local and foreign suppliers. Module A2 is based on information on deliveries inventoried by Klinkier Przysucha S.A. (**KING KLINKER**). Means of transport include lorries with load: <10t, 10 – 16t and >16t.

For calculation purposes Polish and European fuel averages are applied.

Module A3: Production

Stages of the production process of the clinker tiles are presented in Fig. 1.

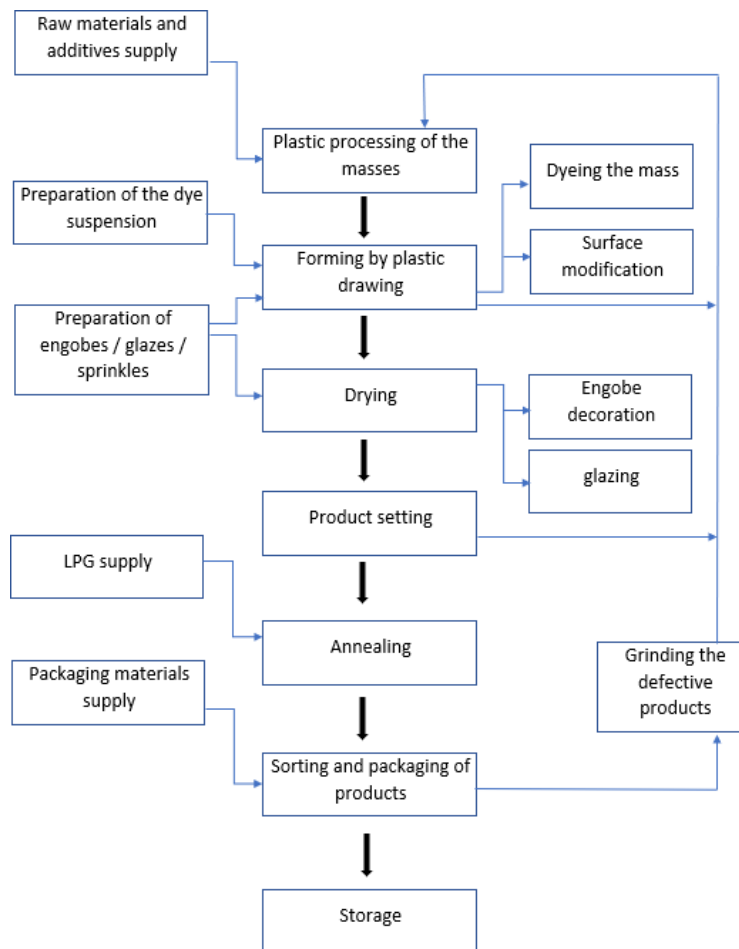


Fig. 1. A scheme of the clinker tiles production process performed by Klinkier Przysucha S. A. at manufacturing plant located in Skrzyńsko (Poland).

Modules C1, C4 and D: End-of-life (EoL) and loads and benefits beyond the system boundary

Deconstruction of the clinker brick slips 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 clinker brick slips. In the adapted scenario, 100% of the product is recovered at the EoL of which 50% is recycled using a mobile crushing station (estimated efficiency 150 t/h) and further used as an aggregate for roads foundation (credits presented in module D) while remaining 50% is forwarded to landfill in the form of mixed construction and demolition wastes.

Data quality

The specific data used for LCA were provided by Klinkier Przysucha S.A. (**KING KLINKER**) and acquired from ITB databases. The generic data were adopted from Ecoinvent databases v.3.8. No specific data selected is older than five years and no generic datasets used are older than ten years. The representativeness, completeness, reliability, and consistency are judged as good.

Data collection period

The specific data provided by Klinkier Przysucha S.A. (**KING KLINKER**) covers a period of 01.01.2020 – 31.12.2020 (1 year). The life cycle assessments were prepared for Poland as reference area.

Assumptions and estimates

The impacts of the clinker brick slips representative were aggregated using weighted average. Impacts were inventoried and calculated for all clinker tiles

Calculation rules

LCA was done in accordance with ITB PCR A document.

Databases

The data for the processes comes from the following databases: Ecoinvent v.3.8 (raw materials, additives, ancillary materials), specific EPDs (packaging materials).

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LIFE CYCLE ASSESSMENT (LCA) – Results

Declared unit

The declaration refers to declared unit (DU) – 1 m² of the clinker brick slips produced by Klinkier Przysucha S.A. (**KING KLINKER**)

Table 1. System boundaries for the environmental characteristic of the clinker brick slips.

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	MD	MD	MD	MD	MD

List of abbreviations applicable to Table 3:

GWP – Global warming potential; **ODP** – Depletion potential of the stratospheric ozone layer; **AP** – Acidification potential of land and water; **EP** – Eutrophication potential; **POCP** – Formation potential of tropospheric ozone photochemical oxidants; **ADPE** – Abiotic depletion potential for non-fossil resources; **ADPF** – Abiotic depletion potential for fossil resources; **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; **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; **EE** – Exported energy.

Table 2. Life cycle assessment (LCA) results of the clinker brick slips produced by Klinkier Przysucha S.A. (**KING KLINKER**)

Environmental impacts: (DU) 1 m ² (average weight of 27.6 kg)								
Indicator	Unit	A1	A2	A3	A1-A3	C1	C4	D
GWP	kg CO ₂ eq.	2.73E+00	1.99E-01	1.51E+01	1.81E+01	8.18E-04	3.68E-02	-2.87E-02
ODP	kg CFC 11 eq.	9.09E-08	0.00E+00	2.73E-09	9.36E-08	1.39E-10	5.85E-09	-3.97E-09
AP	kg SO ₂ eq.	1.33E-02	1.47E-03	2.14E-02	3.62E-02	3.95E-06	2.66E-04	-1.95E-04
POCP	kg Ethene eq.	1.07E-03	1.05E-04	7.85E-05	1.26E-03	2.14E-07	1.07E-05	-6.90E-06
EP	kg (PO ₄) ³⁻ eq.	4.68E-03	2.60E-04	3.16E-03	8.10E-03	9.20E-07	6.17E-05	-3.85E-05
ADPE	kg Sb eq.	2.08E-05	0.00E+00	5.61E-05	7.69E-05	4.22E-10	1.90E-08	-4.56E-07
ADPF	MJ	3.84E+01	1.53E+00	1.73E+02	2.13E+02	1.10E-02	4.79E-01	-3.58E-01
Environmental aspects on resource use: (DU) 1 m ² (average weight of 27.6 kg)								
Indicator	Unit	A1	A2	A3	A1-A3	C1	C4	D
PERE	MJ	INA	INA	INA	INA	INA	INA	INA
PERM	MJ	INA	INA	INA	INA	INA	INA	INA
PERT	MJ	1.93E+01	1.07E-01	8.33E+00	2.77E+01	6.35E-05	4.05E-03	-1.43E-01
PENRE	MJ	INA	INA	INA	INA	INA	INA	INA
PENRM	MJ	INA	INA	INA	INA	INA	INA	INA
PENRT	MJ	5.00E+01	1.61E+00	1.82E+02	2.34E+02	1.19E-02	5.22E-01	-3.87E-01
SM	kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
RSF	MJ	0.00E+00	8.03E-02	0.00E+00	8.03E-02	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
FW	m ³	1.88E-02	7.11E-07	8.56E-03	2.74E-02	1.98E-07	1.35E-03	-2.41E-04
Other environmental information describing waste categories: (DU) 1 m ² (average weight of 27.6 kg)								
Indicator	Unit	A1	A2	A3	A1-A3	C1	C4	D
HWD	kg	2.40E-04	1.27E-05	2.42E-03	2.67E-03	3.08E-08	1.30E-06	-1.39E-06
NHWD	kg	3.17E-01	4.92E-01	1.19E-01	9.27E-01	1.50E-05	1.38E+01	-4.15E-03
RWD	kg	8.20E-05	3.56E-05	0.00E+00	1.18E-04	7.77E-08	3.28E-06	-3.85E-06
CRU	kg	0.00E+00	0.00E+00	1.24E+01	1.24E+01	0.00E+00	0.00E+00	0.00E+00
MFR	kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.38E+01	0.00E+00	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
EE	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

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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 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: Halina Prejzner, <i>Ph.D. Eng</i> LCA, LCI audit and input data verification: Justyna Tomaszewska, <i>Ph.D. Eng</i> , j.tomaszewska@itb.pl Verification of LCA: Michał Piasecki, <i>Ph.D. D.Sc. Eng</i> .

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
- EN 15942:2011 Sustainability of construction works – Environmental product declarations – Communication format business-to-business
- PN-EN 14411:2016 Płytki ceramiczne -- Definicja, klasyfikacja, właściwości, ocena i weryfikacja stałości właściwości użytkowych i znakowanie
- KOBIZE 2021, Wskaźniki emisyjności CO₂, SO₂, NO_x, CO i pyłu całkowitego dla energii elektrycznej
- Department for Business, Energy & Industrial Strategy. Calorific values and density of fuels, 2021. <https://www.gov.uk/>

KIEROWNIK
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dr inż. Agnieszka Winkler-Skalna



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CERTIFICATE No 296/2022
of TYPE III ENVIRONMENTAL DECLARATION

Product:

Clinker brick slips

Manufacturer:

Klinkier Przysucha S.A.

Przemysłowa 56, 26-400 Przysucha, 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 25th February 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, PhD



Deputy Director
for Research and Innovation


Krzysztof Kuczyński, PhD

Warsaw, February 2022