RAKO

Environmental Product Declaration

Pursuant to ISO 14 025 and EN 15 804 ● Producer: **LASSELSBERGER, s.r.o.**, Adelova 2549/1, Plzeň 320 00, Czech Republic ● Valid until: 30/11/2022 ● Date of issue: 30/11/2017 ● Number: 7170001 ● Registration: CENIA, Czech Environmental Information Agency ●

Brand of lasselsbergergroup

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1. Declaration of General Information

LASSELSBERGER, s.r.o.

Programme:
"National programme of environmental labelling" – CR

Service provider:
CENIA, Czech Environmental Information Agency,
executive body of the NPEZ Agency
Vršovická 1442/65, Praha 10, 100 10, www.cenia.cz

Declaration ID:
7170001

Regulations for the product category:
EN 15804+A1 as the basic PCR

Date of Issue:
30/11/2017

Valid until:
30/11/2022
pursuant to EN 15804+A1

Ceramic tiles

Producer's name and address:
LASSELSBERGER, s.r.o., Adelova 2549/1
320 00 Plzeň

Declared unit:
1 m^2 area of produced ceramic tiles

Product:
This Environmental Declaration on the type III product (EPD) represents average values from 4 plants of LASSELSBERGER, s.r.o. The values are related to 1 m^2 of ceramic tiles.

By this Environmental Declaration on the type III product (EPD), LASSELSBERGER, s.r.o. declares its attitude to environmental protection, certifying that it possesses all the corresponding information on the environmental impacts of its products.
This EPD provides quantified environmental information on the construction product based on a harmonised and scientifically substantiated foundation. This EPD also gives basic information on the product as regards evaluation of the building's life cycle and identifies products with a lower impact on the environment.
The EPDs for the given construction product must be made in agreement with the EN 15804+A1:2014 standard on *Sustainability of construction works - Environmental product declarations - Core rules for the product category of construction products.* There is also the additional application of PCR (CET PCR Ceramic Tiles 2014) processed by the EUROPEAN CERAMIC TILE MANUFACTURERS' FEDERATION, Rue de la Montagne 17 – B-1000 BRUXELLES (specifying procedures for A4-D modules) – hereinafter referred to as the PCR.

1. Information on the Product

1.1. Product

LASSELSBERGER, s.r.o. produces many types of ceramic tiles in the dimensions: from 10 x 10 cm to 30 x 90 cm.
This Environmental Declaration on the type III product (EPD) represents **average values for ceramic tile elements** produced in 4 LASSELSBERGER, s.r.o. plants, sufficient for **covering an area of 1 m^2**.

All inputs and outputs were given in the SI units, i.e. kg, m, and m^2. With the following exceptions:

- Sources used as energy input (primary energies) including renewable energy sources (water energy, wind energy) are specified in MWh or units of measure (UM)
- Water consumption, which is specified in m^3 (cubic metres) or litres;
- Inputs regarding transport are in km (distance), tkm (transport of material) and kg (consumption of diesel and propane)
- Time, which is specified in practical units depending on the evaluation scale: minutes, hours, days, years.

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1.2.1. Highly sintered unglazed Bla tiles

TAURUS type

Ceramic highly sintered **unglazed** frost-resistant tiles with water absorption lower than 0.5%, produced pursuant to EN 14411 BIa UGL, annex G (produced in the Chlumčany and Borovany plants).

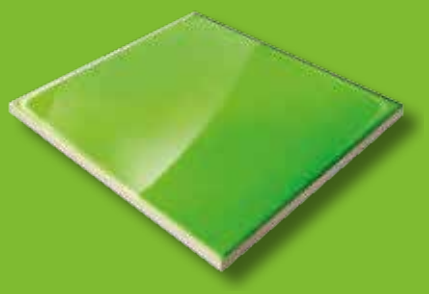
The products are designed for tiling floors and walls subject to extremely demanding conditions in exteriors and interiors, such as climatic influences, high or extremely high mechanical stress, abrasion or dirt. They are thus very suitable for tiling vertical and horizontal surfaces such as outdoor pools, freezers, outdoor tiling in mountain areas, floors in restaurants, industrial halls, car showrooms, balconies, patios, passages, etc. They excel in high firmness, frost and chemical resistance. Polished and satinised non-unglazed tiles are designed for exclusive interiors and façades. These elements are characterised by almost unlimited life, high frost resistance, high resistance against load and high grindability and chemical resistance.

KENTAUR type

Ceramic highly sintered **glazed** frost-resistant tiles with water absorption lower than 0.5%, produced pursuant to **EN 14411 Bla GL**, annex G (produced in the Chlumčany and Borovany plants). The products are of universal use as floor and wall tiles for interiors and exteriors, exposed to climatic effects, high mechanical stress and pollution. They are thus suitable for apartments, blocks of flats and exteriors. For public areas (e.g. restaurants, shops, hotels, offices, car showrooms), highly wear-resistant tiles with declared slip-resistance should be used.

1.2.2. High-density glazed ceramic tiles – Blp type

Glazed tiles with water absorption ranging between 0.5% and 3.0%, made in conformity with **EN 14411 Blb GL, Annex H** (produced in the Pobořany plant). The declared frost-resistant tiles can be used for internal and external floor and wall tiling, including outdoor façades which are exposed to the weather conditions. Their universal application can be used on floors and walls of bathrooms, kitchens, corridors, offices, outdoor façades or swimming pools. It is necessary to choose the appropriate wear-resistance level with regard to the intended application of the glazed tiles.



1.2.3. Porous ceramic tiles – BIII type

Ceramic glazed tiles with water absorption exceeding 10% produced pursuant to **EN 14411 BIII GL, annex L** (produced in the Podbořany and Rakovník plants). They are intended entirely for the tiling of interior walls, which are not exposed to climatic effects, underground water, acid pollutants, their vapours and abrasives. They are thus used for tiling walls of bathrooms, kitchens, laundries or other interiors.

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1.3. Technical information on the product

Table 1

Technical properties	Standard	Declared values of the product groups BIa, BIb and BIII		
Declaration of properties	EU No. 305/2011	BIa	BIb	BIII
Dimensions and the quality of the surface				
Length/width	ISO 10545-2	± 0.4%	± 0.4%	± 0.4%
Thickness		± 5%	± 5%	± 5%
Straightness of edges		± 0.25%	± 0.25%	± 0.25%
Angularity		± 0.3%	± 0.3%	± 0.3%
Planeness		± 0.25%	± 0.25%	± 0.25%
Surface quality		Min. 95%	Min. 95%	Min. 95%
Water absorption	ISO 10545-3	E ⩽ 0.3% Individually max. 0.4%	E ⩽ 2.5% Individually max. 3,0%	E > 10%
Bending strength	ISO 10545-4	Min. 35 N/mm² Individually min. 32 N/mm²	Min. 27 N/mm² Individually min. 32 N/mm²	Min. 12 N/mm² Individually min. 15 N/mm²
Fracture load	ISO 10545-4	Min. 1500 N	⩾ 7.5 mm min. 1100 N < 7.5 mm min. 700 N	⩾ 7.5 mm min. 600 N < 7.5 mm min. 200 N
Frost resistance	ISO 10545-12	Resistant	Resistant	No
Abrasion resistance (glazed)	ISO 10545-7	Declaration in the catalogue	Declaration in the catalogue	
Grindability (unglazed)	ISO 50545-6	Max. 135 mm³		
Thermal expansion coefficient	ISO 10545-8	Max. 8 x 10⁻⁶ /K	Max. 8 x 10⁻⁶ /K	Max. 8 x 10⁻⁶ /K
Resistance against changes of temperature	ISO 10545-9	Resistant	Resistant	Resistant
Hair-crack resistance	ISO 10545-11	Resistant	Resistant	Resistant
Resistance against low concentration acids and lyes	ISO 10545-13	A	B	B
Resistance against high concentration acids and lyes	ISO 10545-13	A	B	B
Resistance against chemicals used in households	ISO 10545-13	A	A	A
Resistance to staining	ISO 10545-14	Min. 3	Min. 3	Min. 3
Slip resistance	DIN 51 130/ DIN 51 097	Declaration in the catalogue	Declaration in the catalogue	Not required
Friction coefficient	CEN/TS 16165:2012	⩾ 0,3	⩾ 0,3	Not required
Surface hardness according to Mohs	ČSN EN 101	Min. 7	Min. 5	Min. 3
Lead and cadmium infusibility	ISO 10545-15	Pb max. 0.8 mg/dm² Cd max. 0.07mg/dm²	Pb max. 0.8 mg/dm² Cd max. 0.07mg/dm²	Pb max. 0.8 mg/dm² Cd max. 0.07mg/dm²

1.4. Instructions for use

The products are produced according to European standard EN 14411:2016 Ceramic tiles. Definition, classification, characteristics, assessment and verification of constancy of performance and marking and evaluated according to Regulation (EU) No. 305/2011 of the European Parliament and of the Council (system of assessment and verification of performance of products 4).

1.5. Method of delivery

LASSELSBERGER, s.r.o. produces all of its products in accordance with the applicable technical regulations. The producer declares the product technical data by the respective CE mark and EU Declaration of Performance (DoP).
The quality of the products is ensured by an efficient Quality Management System in conformity with the technical regulations pursuant to the ČSN EN ISO 9001:2016 standard. The manufacturer applies a system of energy management pursuant to ČSN EN ISO 50001:2012.

Most materials used in the manufacture of ceramic tiles is of a natural origin. This includes clay, kaolin, feldspar, limestone, dolomite and engobes. Ceramic frits and glazing are produced industrially.

Clay – a deposited unconsolidated mineral composed of clay materials and other ingredients (other minerals, fractions of minerals) with the size of individual grains lower than 2 μm (50%). The colour of the mineral differs according to the content of ingredients. The clay is excavated near the surface from selected natural sources.

Kaolin – an unconsolidated whitish mineral of a residual origin; its clay component contains more than 80% of kaolin minerals. Kaolin is characteristic with plasticity when excavated and looseness when dried. It is produced by erosion or kaolinisation of feldspar minerals (granodiorite, orthogneiss and arkose). The mineral was produced in the Tertiary period in a warm and humid climate and acid environment.

Feldspars – minerals characterised by a component of minerals from a group of feldspars or their mixture in the form, amount and quality that allows industrial excavation. Feldspars are a group of monoclinic (orthoclase, sanidine) and triclinic (microcline and plagioclases) potassic and sodium-calcic aluminosilicates. They are used as a fluxing agent in ceramic mixtures because of their low melting point.

Limestone – a deposited mineral whose main component is calcium carbonate ($CaCO_3$). Most of the limestones were created by settling of calcic shells of mainly sea animals and plants in sea sedimentation basins.

Dolomite – a mineral consisting of more than 90% of the mineral dolomite. It often contains ingredients of calcite, less silica or other minerals. It is has a fine-grained or solid structure, usually yellowish, greyish or whitish. Dolomite is a chemically settled mineral. Its thick layers originated by precipitation from sea water.

Engobes – colour finish of the main ceramic body. It is a thin coating from a ceramic mixture of a suitable composition (water-pulped clays, feldspar, frits with a minimum content of dying oxides of iron), which is applied on a dried body, to which another layer of glaze is applied.

Colouring agents – ceramic colouring agents are special inorganic pigments of a crystalline character with a high thermal stability and high chemical resistance to the molten glass. They are used for dying ceramic glazes, materials and enamels and also production of colours for tiles, glass, porcelain or pottery. The dyes have a highly heat-resistant structure into which a certain chromophoric component is incorporated, thus giving the pigment the desired tone.

In elaboration of the study on the product's life cycle (LCA), the total amount of the consumed dyes has been separated according to the proportionate representation of individual components (oxides of iron, oxides of chrome, manganese, zircon silicate and feldspar) with regard to the composition of the dyes.

Frits – used as a semiproduct in production of fritted transparent, white and colour glazes with glossy, semi-matt and matt surface or special effects, for firing temperatures of 940-1200°C.

Glazes – ceramic glazes are inorganic glasses of special composition with the addition of kaolin, ceramic pigments, dying oxides, hardening substances and frits. They refine the surface of ceramic products, ensure their impermeability, increase chemical and mechanical resistance and improve aesthetic properties (colour, gloss, etc.). The thermal expansiveness of the fired glaze should harmonise with the thermal expansivity of the ceramic body to prevent cracks, peeling or destruction of the product. The type of the glaze should also be selected with regard to the desired firing temperature, which depends on the used material.

The other input materials, such as chemicals and mixtures, are purchased from suppliers who provide the corresponding safety/technical sheets with the delivered materials. All these substances or mixtures have been included in an inventory analysis and impact evaluation. Namely substances and mixtures belonging in the groups: aluminium oxide, titanium oxide, zinc oxide, bicarbonate, sodium silicate, ethylene glycol, etc. The Material safety data sheets are available in the purchasing department of LASSELSBERGER, s.r.o.

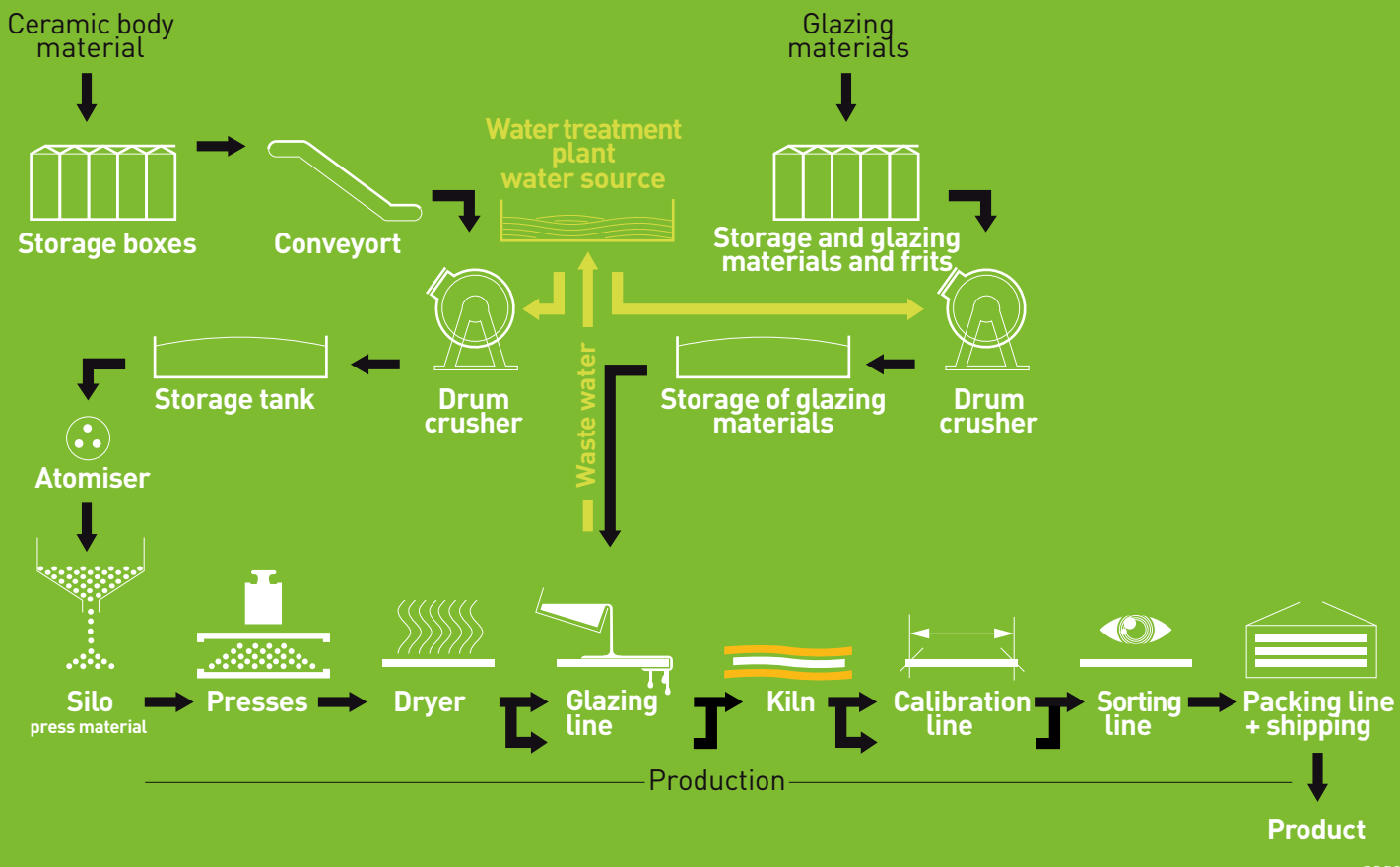
Finished product – a ceramic tile – contains no harmful substances listed in the Candidate List of substances arousing exceptional concerns, in limits subject to authorisation and registration with the European Chemicals Agency.

1.7. Production

Representation of basic material components in the products:

Material input	BIa	BIb	BIII
	Content in %	Content in %	Content in %
Clays, kaolins	31.5–34.5	41.5–44.5	82.5–89.5
Sand, feldspar	60.0–63.0	43.5–46.5	0
Dolomite, limestone	3.7–3.9	3.5–3.7	8.5–9.5
Frits, glazes, sprinkle	0.15–0.30	7.0–7.5	7.3–9.7
Silica, zircon silicates	0.20–0.35	0.30–0.40	0.25–0.40
Dyes	0.30–0.40	0.02–0.04	0.015–0.035

The production process is illustrated in a separate chart.
The first step includes weighing the raw materials according to the given formula, which distinguishes the various weight ratios for individual types of tiles. The weighed mixture is transported to a milling machine. The grinding drums use natural sea pebbles or artificial corundum grinders. The material that leaves the milling drum is a mixture of finely ground materials blended with water, from which a moist granulate is produced in dispersion dryers. The granulate is pressed on hydraulic presses and the resulting product is dried in a dryer before the following process to lose its technological moisture; the products thus acquire the technological firmness necessary for the subsequent processing, engobing, glazing or further decorations.
Preparation of glazes and engobes is strictly separated from the preparation of working mixtures of ceramic materials. They are also based on the principle of wet milling in drum mills. The so-called glazing or engobing suspension leaves the grinding drum after many hours of grinding and homogenisation and is further used in the glazing process.
The engobe and glaze are applied with a suitable technology to the surface of the ceramic product. At the end of the glazing line, the glazed and decorated semiproducts are placed on transport carriages, in which they are dried and transported to the ceramic kiln.
The semiproducts are fired in roller kilns, where the ceramic tiles are transported by ceramic rollers. The firing burns organic substances, releases chemically bonded water, decomposes carbonates, modifies transformation of the silica, transforms clay minerals, forms new phases, melts and transforms feldspars, melts the glazing and sinters. The ceramic tiles are fired at temperatures of 1000°C to 1250°C.
Potential production wastes (raw ceramic bodies) are returned to the production according to the principle of ecological and closed circuit. The same applies for usage of water.
After sorting, the products are packed in cardboard boxes, stacked on EUR pallets, secured with PET straps and wrapped in a film.



1.8. Disposal

According to the applicable legislation of the Czech Republic (Act No. 185/2001 Coll., on wastes and Regulation No. 93/2016 Coll., the waste catalogue (as amended), the waste from production is classified by the waste code 10.12.01 **Waste ceramic materials before heat processing and 10.12.08 Waste ceramic goods, bricks, roof tiles and building materials (after heat processing).** The waste ceramic tiles are deposited in landfill under this code.

2. LCA: Calculation Regulations

2.1. Declared unit

This Environmental Declaration on the type III product (EPD) represents values for **1 m²** of produced ceramic tiles for the reference life (RSL) of **50 years** produced in the plants of LASSELSBERGER, s.r.o. and classified according to the PCR in accordance with the individual types of manufactured products **BIa, BIb and BIII**. The results represent average values for ceramic tiles produced in the following locations:

- **Borovany plant**, Tovární 137, 373 12, Borovany
- **Chlumčany plant**, U Keramičky 448, 334 42, Chlumčany
- **Podbořany plant**, Dělnická 313, 441 01, Podbořany
- **Rakovník plant**, 270 36 Lubná u Rakovníka

The Horní Bříza plant is not included in the assessment because it is primarily engaged in application of specific adorning techniques on already manufactured ceramic tile elements.

3. Product System and System Boundary

The system boundary comprises information modules for the EPD type ***"From the cradle to the gate of opportunities"***. These boundaries include information modules in accordance with PCR: **A1-A3, A4, A5, B2, C2, C3, C4 and D**. The B1, B3, B4, B5, B6, B7 and C1 modules are evaluated as modules, which ***"are irrelevant"*** for the ceramic tile elements.

The reference life (RSL) of the ceramic tiles is defined as **50 years** in PCR.

The phase of the life cycle in the EPD thus covers:

- **Production phase:** corresponds to the manufacture of the ceramic tiles, including all the upstream processes of the product stage (raw materials supply and/or recycled materials, raw materials' transport, energy supply, etc.). Comprising modules A1, A2, and A3 of the EN 15804+A1:2014 standard.
- **Building phase:** transport to the building site and installation in the building work. Comprising modules A4 and A5 of the EN 15804+A1:2014 standard.
- **Usage phase:** Corresponding to the use of ceramic tiles, maintenance, repair, replacement, and refurbishment, including transport (modules B1, B2, B3, B4 and B5, respectively, according to EN 15804+A1:2014), as well as operational energy use and operational water use during the use of the product (modules B6 and B7, respectively according to EN 15804+A1:2014). Only the B2 module is relevant according to the PCR.
- **End-of-life cycle phase:** This stage comprises all the actions and processes relating to de-construction, demolition, transport, reuse and recycling, and disposal. Corresponding to modules C1, C2, C3 and C4 of the EN 15804+A1:2014 standard. Only the C2, C3 and C4 modules are relevant according to the PCR.
- **Yields and costs beyond the system boundary:** Concerning the D module, the reuse potential and/or recycling expressed in clear impacts or benefits.

Table 2

Information on the limits of the product system – information modules (X = included, MND = the module is not relevant)															
Production phase			**Building phase**		**Usage phase**							**End of the life cycle phase**				**Additional information beyond the life cycle**
Delivery of mineral materials	Transport	Production	Transport to the building site	Process of building/ installation	Usage	Maintenance	Repair	Replacement	Reconstruction	Operational energy consumption	Operating water consumption	Demolition/removal	Transport	Waste processing	Removal	Yields and costs beyond the system boundary. Potential re-usage, utilisation, recycling
A1	A2	A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
X	X	X	X	X	MNR	X	MNR	MNR	MNR	MNR	MNR	MNR	X	X	X	X

Calculation of phase A1-A3 (production phase):

Production data from the year 2016 are used with the exception of data detected from the register of wastes where the average values for the period 2014-2016 are used.

Scenario of the A4 phase calculation (the building phase, transport to the site):

Destination	Type of transport	Average distance (km)
Domestic	Truck with the capacity of 24 tons, the use of 100%	300
Domestic	Truck with the capacity of 3.5 tons, use of 100% + 20%	300
Europe	Truck with the capacity of 24 tons, the use of 100%	801
Europe	Truck with the capacity of 3.5 tons, the use of 100% + 20%	801
International (outside Europe)	Ocean-going cargo ship, the use of 100%	6520

The calculation is in "**tkm**". The weight is calculated as the average weight of 1 m^2 according to the type of product and manufacturing site.

Scenario of the A5 phase calculation (the building phase, installation):

Parameter – option 3 according to PCR with specification of the manufacturer's data	Parameter unit expressed in the declared unit (1 m^2)
Cement adhesive – small format tile (15 x 15)	2.5 kg
Cement adhesive – medium tile format (20 x 20, 33 x 33)	3.5 kg
Cement adhesive – large tile format	3.5 kg

A weighed average of the cement adhesive consumption is calculated for the individual types of products according to production of the individual product groups. These values are then used in further calculations.
European average scenarios are used for treatment of the waste packaging. These European average scenarios for the durability of the waste packing are illustrated in the following table:

	Recycling (%)	Energy recovery (%)	Landfill (%)
Plastic	34.3	29.1	36.6
Paper and board	83	8.5	8.5
Wood	37.7	29.9	32.4
Metals	72.3	0.6	27.1
TOTAL	63.6	13.7	22.7

The waste packaging is transported and managed on the disposal site 50 km away from the building site, the return journey is included in the system in the share of 20% of the outbound journey.

Scenario of phase B1, B3, B4, B5, B6 and B7 calculation (the usage phase: usage, repair, replacement, reconstruction, operating power consumption, operating water consumption):
These usage phases are irrelevant for ceramic tiles in the reference life.

Scenario of the B2 phase calculation (the usage phase – maintenance):
During the reference life, the ceramic tiles are cleaned according to the following scenario:
The ceramic floor tile maintenance scenarios (the Bla and Blb types):
- Residential use: 0.3 ml detergent and 0.002 l water to wash 1 m^2 of ceramic floor tiles once a week.

Scenario for the ceramic wall tile maintenance (the BIII type):
- Residential use: 0.3 ml detergent and 0.002 l water to wash 1 m^2 of ceramic wall tiles once every three months.

Scenario of the C1 phase calculation (the end-of-life phase – dismantling, demolition):
The environmental impacts generated during the C1 phase are very low and therefore can be neglected.

Scenario of the C2 phase calculation (the end-of-life phase – transport for waste processing):
The ceramic tile demolition waste is transported from the building site to a container or treatment plant by truck (3.5-7.5 t); the assumed average distance is 20 km. The assumed average distance from the container or treatment plant to final destination is 30 km. The return journey is included in the system in the share of 20% of the outbound journey.

Scenario of the C3 phase calculation (the end-of-life phase – waste processing for reuse, recycling):
For recycling of the demolished material, about 70% of the total amount of waste (crushed backfill material) is calculated.

Scenario of the C4 phase calculation (the end-of-life phase – removal):
An estimated 30% of the total amount of waste is landfilled.

Scenario of the D phase calculation (benefits and costs beyond the system boundary):
In the D module, only replacement of natural materials with recycled demolished waste is considered. This module also includes exported energy (gain outside the limit of the system) from burning the waste wood.

4. Assumptions and Measures Taken

With regard to the composition of the individual colouring agents, the total consumed amount of the agents was in the study divided by weight into the proportionate representation of the individual components of the pigments (iron oxides, chrome oxides, manganese, zircon silicate and feldspar). This division was made separately for the BIII type (all of the components are considered) and separately for other product types Bla and Blb (only iron oxides, chrome oxides, and feldspar are considered). This method of division of the total amount of colouring agents was applied because of the large amount of the used agents, their complicated entry in the SimaPro system and unavailability of specific data. This division was determined on the basis of a chemical composition and quantitative technological calculation.

5. Rules for Separation

All operating data related to the recipes of the products, energy data, diesel and propane consumption were taken for the analysis of the environmental impacts. The transport costs or the differences in the transport distances were acknowledged in all of the inputs and outputs.
As regards the produced wastes, the analysis includes wastes that clearly relate to the production activities.
Processes necessary for installation of the production equipment and construction of the infrastructure were not included in the analysis. Administrative processes were not included either – the inputs and outputs are balanced in the production phase.

6. Environmental Data Sources

All inputs and outputs were given in the SI units, namely:
- Material and auxiliary inputs and product outputs in kg
- Sources used as energy input (primary energies) including renewable energy sources (water energy, wind energy) were specified in kWh or units of measure (UM)
- Water consumption was specified in m^3 (cubic meters);
- Inputs regarding transport were expressed in km (distance), tkm (transport of material) and kg (consumption of diesel and propane)
- The time was specified in practical units depending on the evaluation scale: minutes, hours, days, years.

The input data were obtained from an organisation registered in the SAP information system, from outputs of the monitoring and the waste and emission measurement.
System used for the complete analysis of the environmental parameters:
- computer software SimaPro, version 8.0.3.14 SimaPro Analyst (database Ecoinvent version 3, ELCD)

7. Data Quality

The data used for calculation of EPD correspond to the following principles:
Time period: The producer's information for the year 2016 is used for the specific data (the requirement to use average data for the period of 1 year was satisfied). Data for the period of 3 years – averaged to 1 year – are used in the particular cases (use of the waste balance reports). The reason is to eliminate the year-on-year fluctuation of the waste production. Data from the Ecoinvent database version 3 are used for generic data.
Technological aspect: The data correspond to the current production of individual types of products in all plants and the current condition of the equipment used in the individual plants (the product recipes, technological procedures).
Geographical aspect: The generic data from the Ecoinvent database are used with validity for the Czech Republic (e.g. energy mix of electric power production) and if the data are not available for the CR, data valid for the EU are used.

8. Evaluated Period

The basic data of the analysis are based on operating data of the individual assessed LASSELSBERGER, s.r.o. plants recorded in 2016, or from average values given for the years 2014 to 2016 (e.g. production of waste, consumption of spare parts for the equipment).

9. Allocation

10. Comparability

11. Variability of Products

12. LCA: Results

12.1. Bla type

For calculations of environmental parameters specified in this EPD, only inventory data concerning the production of ceramic tiles were used.
The manufacturing process of all plants includes so called closed-loop-recycling; all of the assessed plants have a return system for part of the water used in the production.
To calculate aggregated data for a given type of product that is produced in more plants, the data were calculated in the proportion of the plants' production in m^2.

Environmental declarations on the product from the different programmes need not be comparable. Comparison or assessment of data given in the EPD is only possible if all of the compared data given in accordance with EN 15804+A1 have been detected according to the same rules.

The results presented in the EPD represent values for average ceramic tiles of the Bla, Blb and BIII types. The Blb type is only produced in one plant. The other types of products are always produced in two plants with small differences in the equipment. The structure of the production shows a small variability and hence consumption of the components for the average product is relatively stable.

The information on environmental impacts is given in the following tables. They are related to the declared unit (FU) – $1m^2$ of the produced product.
The impacts were evaluated by application of characterising factors used in the European reference database of the life cycle (ELCD) provided by the European Commission – General Headquarters of the Joint Research Centre – Institute of the Environment and Sustainability contained in EN 15804+A1:2014.

Table 3

LCA result – Parameters describing environmental impacts									
Parameter	**Unit**	**A1-A3**	**A4**	**A5**	**B2**	**C2**	**C3**	**C4**	**D**
Global warming potential (GWP)	kg CO2 eq.	8.18	2.19	0.766	1.65	0.564	4.58E-2	4.11E-2	-0.0539
Ozone layer depletion potential (ODP)	kg CFC 11 eq.	2.34E-6	1.51E-7	2.21E-8	1.52E-7	3.76E-8	2.98E-9	1.23E-8	-6.05E-9
Soil and water acificication potential (AP)	kg SO2 eq.	0.0384	8.04E-3	2.15E-3	1.06E-2	2.19E-3	3.20E-4	2.44E-4	-3.20E-4
Eutrophication potential (EP)	kg (PO4)3- eq.	0.0254	1.69E-3	3.88E-4	2.12E-3	5.28E-4	7.44E-5	5.98E-5	-1.14E-4
Ground-level ozone potential (POCP)	kg Ethene eq.	2.08E-3	3.27E-4	7.46E-5	4.69E-4	8.15E-5	8.30E-6	8.98E-6	-1.38E-5
Raw-material decrease potential (ADP-elements) for non-fossil sources	kg Sb eq.	8.61E-6	5.35E-6	7.77E-7	1.10E-5	1.71E-6	1.39E-8	0	3.81E-9
Raw-material decrease potential (ADP-fossil fuels) for fossil sources	MJ, calorific valueits	75.8	32.3	4.04	46.4	8.18	0.638	3.79E-4	0.0756

Table 4

LCA result – Parameters describing consumption of sources									
Parameter	**Unit**	**A1-A3**	**A4**	**A5**	**B2**	**C2**	**C3**	**C4**	**D**
Consumption of renewable primary energy except sources of energy used as raw material	MJ	1.82	0	0	0	0	0	0	0
Consumption of renewable sources of primary energy used as a raw material	MJ	0	0	0	0	0	0	0	0
The total consumption of renewable sources of primary energy (primary energy and sources of primary energy used as raw material)	MJ	1.82	0	0	0	0	0	0	0
Consumption of non-renewable primary energy except sources of energy used as a raw material	MJ	127	4.43	3.86E-3	0	0.546	0	0	0
Consumption of non-renewable sources of primary energy used as a raw material	MJ	0	0	0	0	0	0	0	0
Total consumption of non-renewable sources of primary energy (primary energy and sources of primary energy used as a raw material)	MJ	127	4.43	3.86E-3	0	0.546	0	0	0
Consumption of secondary raw materials	MJ	0	0	0	0	0	0	0	0
Consumption of renewable secondary raw materials	MJ	0	0	0	0	0	0	0	0
Consumption of non-renewable secondary fuels	MJ	0.0360	0	0	0	0	0	0	0
Net potable water consumption	m^3	1.02E-2	0	9.73E-4	5.2E-3	0	0	0	0

Table 5

LCA result – Other environmental information – description of the waste category and output flows									
Parameter	**Unit**	**A1-A3**	**A4**	**A5**	**B2**	**C2**	**C3**	**C4**	**D**
Removed hazardous waste	kg	0	0	0	0	0	0	0	0
Removed other waste	kg	1.95	0	1.73E-2	0	0	0	5.79	0
Removed radioactive waste	kg	0	0	0	0	0	0	0	0
Structural elements for re-utilisation	Kg	0	0	0	0	0	0	0	0
Materials for recycling	Kg	3.84	0	1.58E-2	0	0	13.5	0	13.5
Materials for energy utilization	kg	1.46E-2	0	1.03E-2	0	0	0	0	0
Exported energy	UM per energy provider	0	0	0	0	0	0	0	1.20

12.2. **BIb type**

Table 6

LCA result – Parameters describing environmental impacts									
Parameter	**Unit**	**A1-A3**	**A4**	**A5**	**B2**	**C2**	**C3**	**C4**	**D**
Global warming potential (GWP)	kg CO2 eq.	13.4	1.99	0.632	1.65	0.473	0.038	3.45E-2	-4.53E-2
Ozone layer depletion potential (ODP)	kg CFC 11 eq.	3.67E-6	1.38E-7	1.79E-8	1.52E-7	3.15E-8	2.50E-9	1.03E-8	-5.08E-9
Soil and water acidification potential (AP)	kg SO2 eq.	6.89E-2	6.46E-3	1.76E-3	1.06E-2	1.83E-3	2.69E-4	2.05E-4	-2.69E-4
Eutrophication potential (EP)	kg (PO4)3- eq.	3.16E-2	1.47E-3	3.07E-4	2.12E-3	4.43E-4	6.24E-5	5.02E-5	-9.58E-5
Ground-level ozone potential (POCP)	kg Ethene eq.	3.35E-3	2.71E-4	6.00E-5	4.69E-4	6.84E-5	6.97E-6	7.54E-6	-1.16E-5
Raw-material decrease potential (ADP-elements) for non-fossil sources	kg Sb eq.	2.67E-5	4.97E-6	6.84E-7	1.10E-5	1.43E-6	1.17E-8	0	2.36E-9
Raw-material decrease potential (ADP-fossil fuels) for fossil sources	MU, calorific value	136	29.4	3.45	46.4	6.86	0.535	3.18E-4	0.0634

Table 7

LCA result – Parameters describing consumption of sources								
Parameter	**Unit**	**A1-A3**	**A4**	**A5**	**B2**	**C2**	**C3**	**C4**	**D**
Consumption of renewable primary energy except sources of energy used as raw material	MJ	1.70	0	0	0	0	0	0	0
Consumption of renewable sources of primary energy used as a raw material	MJ	0	0	0	0	0	0	0	0
The total consumption of renewable sources of primary energy (primary energy and sources of primary energy used as raw material)	MJ	1.70	0	0	0	0	0	0	0
Consumption of non-renewable primary energy except sources of energy used as a raw material	MJ	184	4.13	3.42E-3	0	0	0	0	0
Consumption of non-renewable sources of primary energy used as a raw material	MJ	0	0	0	0	0	0	0	0
Total consumption of non-renewable sources of primary energy (primary energy and sources of primary energy used as a raw material)	MJ	184	4.13	3.42E-3	0	0.458	0	0	0
Consumption of secondary raw materials	MJ	0	0	0	0	0	0	0	0
Consumption of renewable secondary raw materials	MJ	0	0	0	0	0.458	0	0	0
Consumption of non-renewable secondary fuels	MJ	3.36E-2	0	0	0	0	0	0	0
Net potable water consumption	m^3	3.82E-2	0	8.19E-4	5,2E-3	0	0	0	0

Table 8

LCA result – Other environmental information – description of the waste category and output flows									
Parameter	**Unit**	**A1-A3**	**A4**	**A5**	**B2**	**C2**	**C3**	**C4**	**D**
Removed hazardous waste	kg	0	0	0	0	0	0	0	0
Removed other waste	kg	0.483	0	1.30E-2	0	0	0	4.86	0
Removed radioactive waste	kg	0	0	0	0	0	0	0	0
Structural elements for re-utilisation	kg	0	0	0	0	0	0	0	0
Materials for recycling	kg	1.04	0	9.54E-2	0	0	11.3	0	11.3
Materials for energy utilisation	kg	5.3E-4	0	1.23E-2	0	0	0	0	0
Exported energy	UM per energy provider	0	0	0	0	0	0	0	0.63

Table 9

LCA result – Parameters describing environmental impacts (FU = 1 m2 of the product)									
Parameter	**Unit**	**A1–A3**	**A4**	**A5**	**B2**	**C2**	**C3**	**C4**	**D**
Global warming potential (GWP)	kg CO2 eq.	8.40	1.52	0.756	0.127	0.370	3.00E-2	2.69E-2	-3.54E-2
Ozone layer depletion potential (ODP)	kg CFC 11 eq.	1.94E-6	1.05E-7	2.16E-8	1.17E-8	2.46E-8	1.95E-9	8.07E-9	-3.97E-9
Soil and water acification potential (AP)	kg SO2 eq.	4.51E-2	5.22E-3	2.12E-3	8.19E-4	1.43E-3	2.10E-4	1.6E-4	-2.10E-4
Eutrophication potential (EP)	kg (PO4)3- eq.	2.12E-2	1.15E-3	3.73E-4	1.63E-4	3.46E-4	4.88E-5	3.92E-5	-7.48E-5
Ground-level ozone potential (POCP)	kg Ethene eq.	2.16E-3	2.16E-3	7.30E-5	3.60E-5	5.35E-5	5.44E-6	5.89E-6	-9.06E-6
Raw-material decrease potential (ADP-elements) for non-fossil sources	kg Sb eq.	1.80E-5	3.77E-6	8.08E-7	8.46E-7	1.12E-6	9.14E-9	0	1.84E-9
Raw-material decrease potential (ADP-fossil fuels) for fossil sources	MU, calorific value	91.8	22.5	4.15	3.57	5.36	0.418	2.49E-4	4.95E-2

Table 10

LCA result – Parameters describing consumption of sources									
Parameter	**Unit**	**A1-A3**	**A4**	**A5**	**B2**	**C2**	**C3**	**C4**	**D**
Consumption of renewable primary energy except sources of energy used as raw material	MJ	1.13	0	0	0	0	0	0	0
Consumption of renewable sources of primary energy used as a raw material	MJ	0	0	0	0	0	0	0	0
The total consumption of renewable sources of primary energy (primary energy and sources of primary energy used as raw material)	MJ	1.13	0	0	0	0	0	0	0
Consumption of non-renewable primary energy except sources of energy used as a raw material	MJ	90.8	3.13	3.35E-3	0	0.358	0	0	0
Consumption of non-renewable sources of primary energy used as a raw material	MJ	0	0	0	0	0	0	0	0
Total consumption of non-renewable sources of primary energy (primary energy and sources of primary energy used as a raw material)	MJ	90.8	3.13	3.35E-3	0	0.358	0	0	0
Consumption of secondary raw materials	MJ	0	0	0	0	0	0	0	0
Consumption of renewable secondary raw materials	MJ	0	0	0	0	0	0	0	0
Consumption of non-renewable secondary fuels	MJ	2.24E-2	0	0	0	0	0	0	0
Net potable water consumption	m^3	1.32E-2	0	9.80E-4	4.0E-4	0	0	0	0

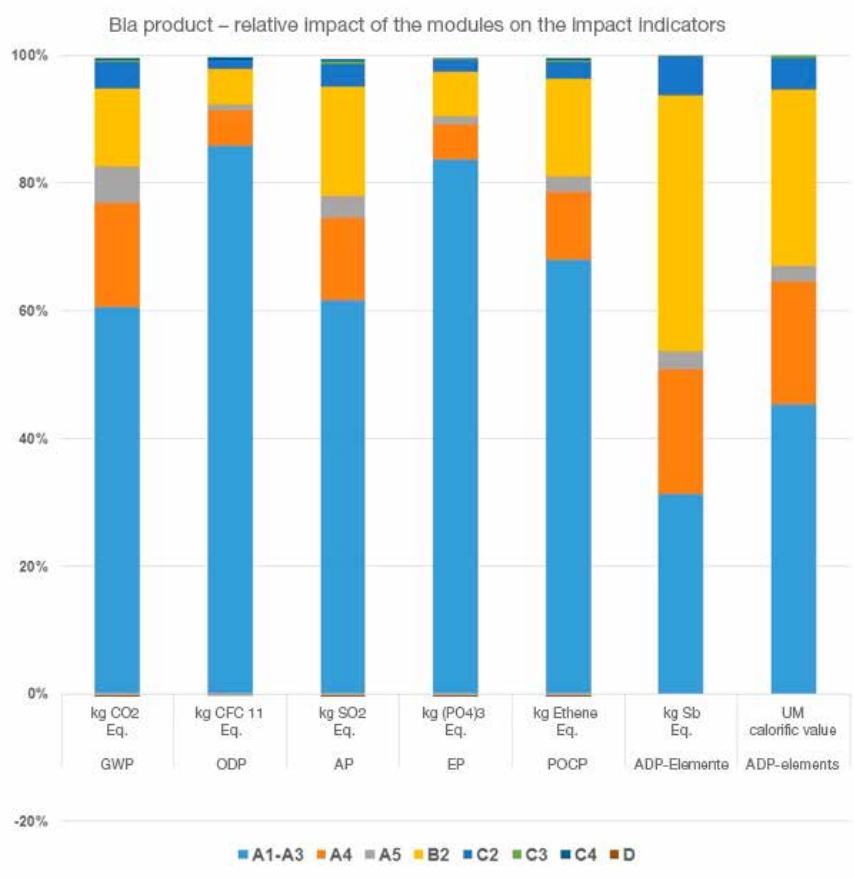
13.
LCA: Interpretation

Table 11

LCA result – Other environmental information – description of the waste category and output flows									
Parameter	**Unit**	**A1-A3**	**A4**	**A5**	**B2**	**C2**	**C3**	**C4**	**D**
Removed hazardous waste	kg	0	0	0	0	0	0	0	0
Removed other waste	kg	6.94E-2	0	1.33E-2	0	0	0	3.79	0
Removed radioactive waste	kg	0	0	0	0	0	0	0	0
Structural elements for re-utilisation	kg	0	0	0	0	0	0	0	0
Materials for recycling	kg	0.152	0	9.26E-2	0	0	8.85	0	8.85
Materials for energy utilisation	kg	9.30E-4	0	1.25E-2	0	0	0	0	0
Exported energy	UM per energy provider	0	0	0	0	0	0	0	0.726

As regards the impacts of individual information modules on the individual parameters of environmental impacts, the production phase A1 to A3 has the greatest impact. The information modules A4 and partly also B2 have another important impact, which occurs throughout the whole reference life.
As regards the individual types of products, the BIII type shows lower environmental impact values, which corresponds to the composition of the input materials and the lower demands of the manufacturing equipment.
The large amount of the above-mentioned data on environmental impacts allows comparison of individual dependences if necessary.

The share of information modules A1 to D on the individual impact categories is illustrated in the following charts:



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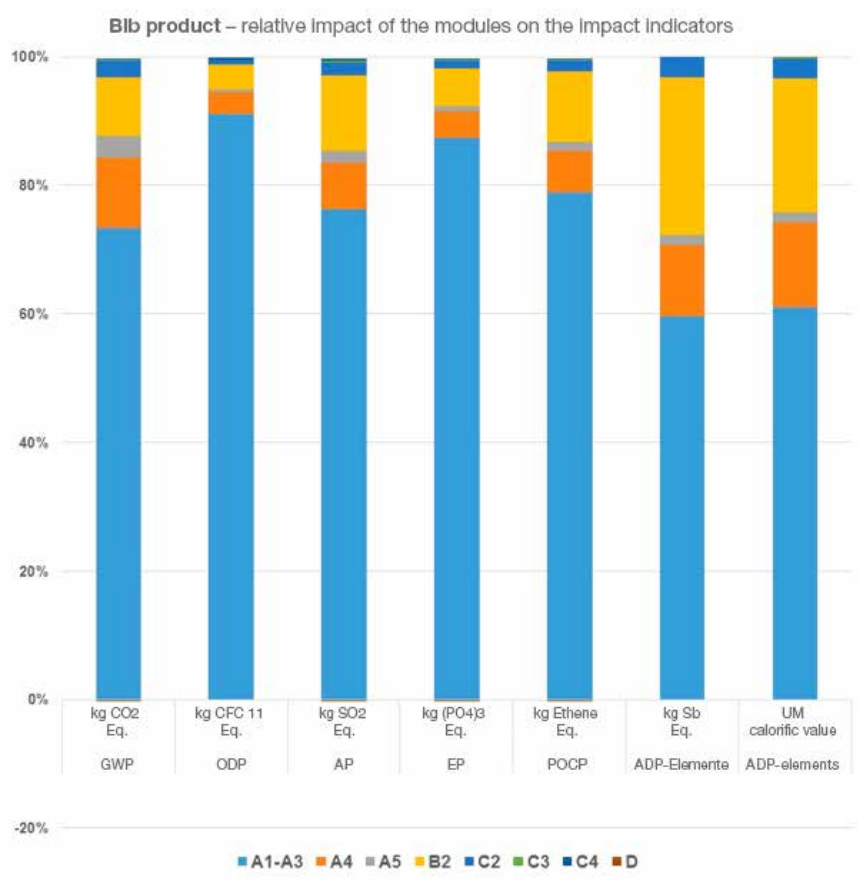
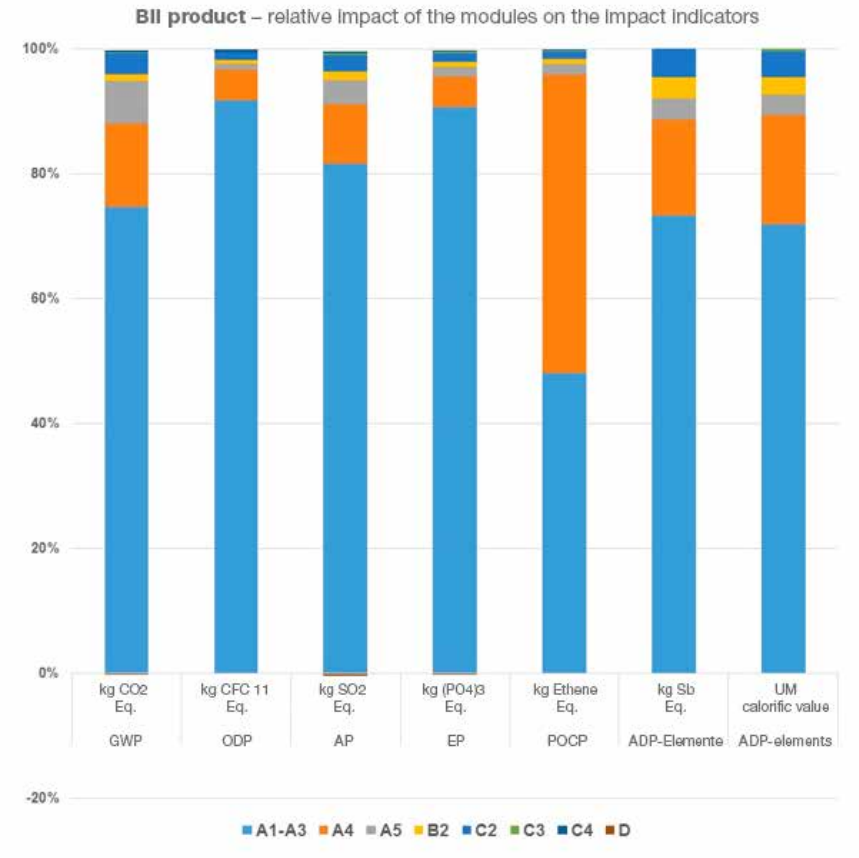

BIb product – relative impact of the modules on the impact indicators
100%
80%
60%
40%
20%
0%
-20%
kg CO2 Eq.
GWP
kg CFC 11 Eq.
ODP
kg SO2 Eq.
AP
kg (PO4)3 Eq.
EP
kg Ethene Eq.
POCP
kg Sb Eq.
ADP-Elemente
UM calorific value
ADP-elements
A1-A3 A4 A5 B2 C2 C3 C4 D


BII product – relative impact of the modules on the impact indicators
100%
80%
60%
40%
20%
0%
-20%
kg CO2 Eq.
GWP
kg CFC 11 Eq.
ODP
kg SO2 Eq.
AP
kg (PO4)3 Eq.
EP
kg Ethene Eq.
POCP
kg Sb Eq.
ADP-Elemente
UM calorific value
ADP-elements
A1-A3 A4 A5 B2 C2 C3 C4 D

14.
LCA: Additional Information

Additional information is not used
The basic rules for safety of work and rules of professional trade union organisations apply for work with ceramic tiles; it is not necessary to adopt any special measures for protection of the workers' health.

15.
Used Sources

ČSN EN 14411 ed.3:2011 Specifications of masonry elements – Part 4: Aerated concrete block (Specification for masonry units – Part 4: Autoclaved aerated concrete masonry units)
ČSN ISO 14025:2010 Environmental labels and declarations – Type III environmental declarations – Principles and procedures
ČSN EN 15804-A1:2014 Sustainability of construction works – Environmental product declarations – Core rules for the product category of construction products
ČSN EN ISO 14040:2006 Environmental management – Life Cycle Assessment – Principles and Framework
ČSN EN ISO 14044:2006 Environmental management – Life Cycle Assessment – Requirements and Guidelines
ČSN ISO 14063:2007 Environmental management – Environmental Communication – Guidelines and Examples
ČSN EN 15643-1:2011 Sustainability of Buildings – Sustainability Assessment of Buildings – Part 1: General framework (Sustainability of construction works – Sustainability assessment of buildings – Part 1: General framework)
ČSN EN 15643-2:2011 Sustainability of Buildings – Sustainability Assessment of Buildings – Part 2: Framework for assessing the environmental properties (Sustainability of construction works – Assessment of buildings – Part 2: Framework for the assessment of environmental properties
ČSN EN 15942:2013 Sustainability of Buildings – Environmental Declaration on the Product – Format of Communication between Companies
TNI CEN/TR 15941:2012 Sustainability of buildings – Environmental Declaration on the Product – Methodology for Selection and Application of Generic Data
PCR (CET PCR Ceramic Tiles 2014) processed by EUROPEAN CERAMIC TILE MANUFACTURERS' FEDERATION, Rue de la Montagne 17 – B-1000 BRUXELLES
Law No. 185/2001 Coll., as amended (Law on waste)
Regulation No. 93/2016 Coll. Waste catalogue – Waste catalogue
EU Decree No. 1907/2006 on registration, evaluation, authorisation and restriction of chemicals and on establishment of the European Chemicals Agency – REACH (registration, evaluation and authorisation of chemicals)
EU Parliament and Council Decree No. 1272/2008 on classification, marking and labelling of substances and mixtures, change and cancelling of regulations 67/548/EEC and 1999/45/EC and on change of the Decree (EU) No. 1907/2006 (CLP decree)
SimaPro LCA Package, Pré Consultants, the Netherlands,
Ecoinvent Centre, www.ecoinvent.org

The explanatory documents can be obtained from the quality manager of Lasselsberger s.r.o.

16.
EPD Verification

Verification:

The ČSN EN 15804 standard produced by CEN serves as the basic PCR	
Independent verification of the declaration pursuant to ČSN ISO 14025	
○ internal	● external
Third party verifier:	
Certification authority for EPD: Elektrotechnický zkušební ústav, s.p. Street: Pod Lisem 129 Town: Praha 8 – Troja	

This document is a translation of the EPD issued in Czech. In case of doubt use the Czech version of this EPD as a reference.

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