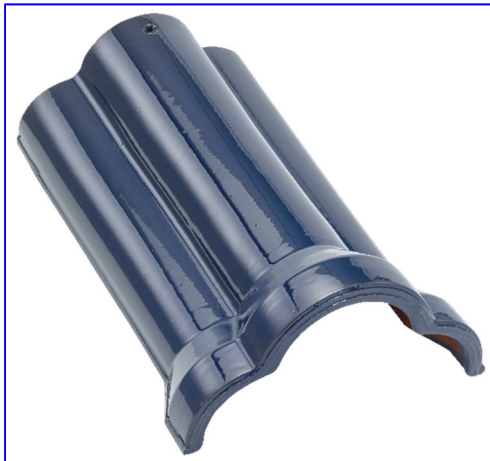


# Environmental Product Declaration



Declaration Code: EPD-LDZ-44.0



Gebr. Laumans  
GmbH & Co. KG

## Construction Products Made of Fired Clay Roof Tiles



**Basis:**

DIN EN ISO 14025  
EN15804

Company EPD  
Environmental  
Product Declaration

Publication date:  
17.03.2021

Next revision:  
17.03.2026



[www.ift-rosenheim.de/  
published EPDs](http://www.ift-rosenheim.de/published-EPDs)

# Environmental Product Declaration



Declaration Code: EPD-LDZ-44.0

<b>Programme operator</b>	ift Rosenheim GmbH Theodor-Gietl-Straße 7-9 D-83026 Rosenheim		
<b>Practitioner of the LCA</b>	Life Cycle Engineering Experts GmbH Birkenweg 24 64295 Darmstadt		
<b>Declaration holder</b>	Gebr. Laumans GmbH & Co. KG Stiegstraße 88 41379 Brüggen		
<b>Declaration code</b>	EPD-LDZ-44.0		
<b>Designation of declared product</b>	Roof tiles		
<b>Scope</b>	Roof tiles are used for the construction and refurbishment of buildings		
<b>Basis</b>	This EPD was prepared on the basis of EN ISO 14025:2011 and DIN EN 15804:2012+A1:2013. In addition, the "Allgemeiner Leitfaden zur Erstellung von Typ III Umweltproduktdeklarationen" (Guidance on preparing Type III Environmental Product Declarations) applies. The Declaration is based on the PCR documents "PCR-PT-1.0:2020 "Construction products made of baked clay" and "PCR Part A" PCR-A-0.2:2018PCR		
<b>Validity</b>	Publication date: 17.03.2021	Last revision: 01.06.2021	Next revision: 17.03.2026
	This verified Company Environmental Product Declaration (company EPD) applies solely to the specified products and is valid for a period of five years from the date of publication in accordance with DIN EN 15804.		
<b>LCA basis</b>	The LCA was prepared in accordance with DIN EN ISO 14040 and DIN EN ISO 14044. The base data includes both the data collected at the production site of Gebr. Laumans GmbH & Co. KG and the generic data derived from the "GaBi 9" database. LCA calculations were carried out for the included "cradle-to-gate" life cycle including all upstream chains (e.g. raw material extraction, etc.).		
<b>Notes</b>	The "Conditions and Guidance on the Use of ift Test Documents" apply. The declaration holder assumes full liability for the underlying data, certificates and verifications.		

<b>Christian Kehrer</b> Head of Certification and Surveillance Body	<b>Dr. Torsten Mielecke</b> Chairman of Expert Committee ift-EPD and PCR	<b>Prof. Dr. Eric Brehm</b> External verifier

## 1 General product information

### Product definition

The EPD relates to the product group "Construction products made of fired clay" and applies to:

**1 t of roof tiles  
made by Gebr. Laumans GmbH & Co. KG.**

The functional unit is obtained by summing up:

Assessed product	Density	Weight per unit area	Weight
Roofing tiles	1.975 kg/m <sup>3</sup>	46.2 kg/m <sup>2</sup>	2.9 – 4.3 kg/pc.
Roofing tiles incl. fitting tiles (accessories)	1.975 kg/m <sup>3</sup>	46.4 kg/m <sup>2</sup>	2.9 – 4.3 kg/pc.

Table 1: Product groups

The average unit is declared as follows:

Directly used material flows are determined using the average masses (kg) and assigned to the declared unit. All other inputs and outputs in the production were scaled to the declared unit in their entirety since no typical functional unit was available due to the great diversity of variants. The reference period is the year 2020.

The roofing tiles are defined by the specified technical data.

Designation	Value	Unit
Dimensional tolerance	< 2	%
Covering length	approx. 330 - 410	mm
Covering width	approx. 200 – 240	mm
Water impermeability Ø	≤ 0.8	-
Mechanical resistance (flexural strength)	≥ 1.2	kN
Durability (frost resistance - freeze-thaw)	Fulfilled	
Area required	10 – 14.3	pc. / m <sup>2</sup>
Weight per unit area	43.9 – 56.2	kg/m <sup>2</sup>
Density	approx. 1,975	kg / m <sup>3</sup>
Tile length	405 - 478	mm
Tile width	245 - 288	mm

The fitting tiles are defined by the specified technical data.

Designation	Value	Unit
Dimensional tolerance	<2	%
Covering length	approx. 330 - 410	mm
Covering width	approx. 204 – 325	mm
Water impermeability Ø	≤ 0.8	-
Mechanical resistance (flexural strength)	≥ 1.2	kN
Durability (frost resistance - freeze-thaw)	Fulfilled	
Requirement	2.5 – 3.04	pc./running metre
Density	approx. 1,975	kg/m <sup>3</sup>
Tile length	405 – 478	mm
Tile width	245 – 325	mm
Dimensional tolerance	<2	%

Fire safety

Designation	Value
Building material class	A1
Flaming droplets	d0
Flue gas production	s1

The validity of the EPD is restricted to the following models:

- IDEAL VARIABEL
- TIEFASUPRA
- TIEFA XLTOP
- TIEFA 2000
- RHEINLANDVARIABEL
- MULDENVARIABEL

## Product description

Roof tiles are plain or profiled common clay covering elements in individual dimensions for pitched roof coverings and external wall claddings. Clay roof tiles are weather resistant and resistant to UV-radiation and acids resulting from normal environmental effects. Roof tiles comply with the building code regulations for external fire performance of "Hard roofing". Clay roof tiles are made with single or multiple head, foot and side folds or without any folds.

For a detailed product description refer to the manufacturer specifications or the product specifications of the respective offer/quotation.

Roof tiles are considered as non-combustible and are subject to fire resistance class A1 as specified in EN 13501-1. Roof tiles are generally considered as not hazardous to waters. The mechanical destruction of clay roof tiles is not expected to cause any negative environmental impacts.

For detailed product descriptions refer to the manufacturer specifications at [www.laumans.de](http://www.laumans.de) or the product descriptions for the respective offer/quotation.

**Product manufacture**

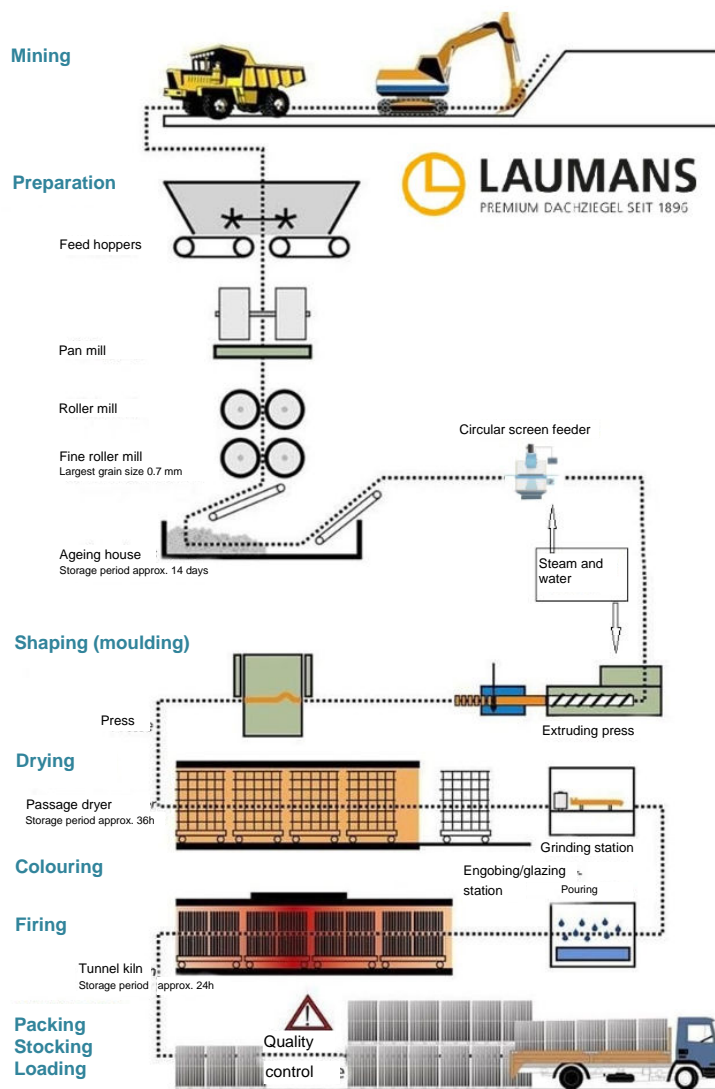


Figure 1: **Product manufacture**

The main components are mined in surface operations. After the topsoil has been removed, mining is usually carried out by mechanical shovels. Transport is in trucks. When the quarries are exhausted, they are recultivated in accordance with the mining permits and nature conservation requirements and largely restored to their previous use.

**Raw material preparation**

The individual raw material components are sampled and analysed for their ceramic properties and their mineralogical and chemical compositions in the in-house laboratory. During preparation, the components are combined into the operational mass according to their ceramic properties, homogenised and stored.

### Shaping/Moulding

The operational mass is pressed under vacuum in twin-shaft mixers and extruders to form slabs, which are then pressed in turret or rotary table presses by means of plaster moulds to form tiles. Various parameters such as press vacuum, slab properties (moisture, plasticity and weight) are checked regularly. All excess operational mass and faulty pressings are returned to the mass cycle.

### Drying

Drying prepares the plastic clay tile for the subsequent firing process and lasts approx. 35 hours for roofing tiles and approx. 72 hours for fitting tiles at approx. 60-70°C. Due to shrinking, the ceramic material reacts very sensitively and must be dried under defined conditions. The different drying parameters as well as residual humidity are continuously checked. Dried tile rejects (dried tile scrap) are returned to the operational mass in the raw material preparation.

### Colour

The dried roof tiles are engobed, sinter engobed or glazed using a pouring process according to requirements. The thickness of the engobes and glazes as well as the coating weight are checked on a regular basis. Any colour residues and the washing water are recycled and returned to the raw material cycle.

### Firing

The tiles are fired at approx. 1020 °C in tunnel kilns using natural gas. Firing is particularly energy-efficient thanks to two levels of tiles in the kiln. Space utilisation in the tunnel kiln is ideal due to the high charge. Laumans also optimises the energy performance in terms of heat demand by using almost the entire exhaust heat generated by the kiln during the firing process for drying the clay tiles. The firing time including preheating and cooling is approx. 24 hours. Firing gives the tiles their ceramic properties, which make them extremely durable and long-lasting. Fired tile rejects (fired tile scrap) are recycled for road and tennis court construction.

### Quality control

Conformity with the ceramic quality requirements specified in DIN EN 1304 and the relevant product dimensions is checked in-house by regular factory production control (FPC) and additional third-party monitoring.

### Applications

Roof tiles are used for the hard roofing of one and two-family homes, apartment buildings, halls and other buildings.

### Verifications

The following verifications are held:

- Product quality to DIN EN 1304

For further and updated verifications (including other national approvals) refer to [www.laumans.de](http://www.laumans.de).

**Quality assurance**

The following quality assurance systems are in place:

- Certificate "Factory production control" (FPC) 2016

**Additional information**

For additional evidence of fitness for use or certificates of conformity, if applicable, refer to the CE marking and the documents accompanying the product.

At Laumans, occupational health and safety are given high priority. A safety specialist is in charge of organising occupational health and safety at the company, and a company physician conducts regular examinations and is available at appropriate consulting times. Laumans has introduced a suggestion scheme, which gives every employee the opportunity to submit suggestions for improvements in occupational health and safety, work processes, raw material and energy efficiency and quality improvement.

**2 Materials used****Primary materials**

The primary materials used are listed in the LCA (see Section 7).

**Declarable substances**

The product contains no substances from the REACH candidate list (declaration dated 09.11.2020).

All relevant safety data sheets are available from Gebr. Laumans GmbH & Co. KG .

**3 Construction process stage****Processing recommendations, installation**

The technical regulations of the "Zentralverband des Deutschen Dachdeckerhandwerks" (Confederation of the German Roofing Trade) and the manufacturer's instructions for installation, operation, maintenance and dismantling must be observed. See [www.laumans.de](http://www.laumans.de). In the EU/EFTA (except Switzerland), marketing is governed by the Regulation (EU) No. 305/2011 dated 09.03.2011.

**4 Use stage****Emissions to the environment**

Leaching behaviour (IKOB) is to be expected. There are no known emissions to indoor air, water or soil. There may be VOC emissions.

The flue gas produced during firing is cleaned in a flue gas cleaning plant. The emission levels are checked regularly and are below the limits set out in the "BImSchG" (Federal Immission Law). Any noise and dust emissions are also checked and the limits strictly observed. The waste resulting from the production of the roof tiles is collected separately, recycled or disposed of properly in accordance with the waste numbers.

**Reference service life (RSL)**

The RSL information was provided by the manufacturer. The RSL shall refer to the declared technical and functional performance of the product within the building. It shall be established in accordance with specific rules set out in the European product standards and shall also take into account ISO 15686-1, -2, -7 and -8. Where European product standards

provide guidance on determining RSL, such guidance shall have priority. If it is not possible to determine the service life as the RSL in accordance with ISO 15686, the BBSR table "Nutzungsdauer von Bauteilen zur Lebenszyklusanalyse nach BNB" (service life of building components for life cycle assessment in accordance with the sustainable construction evaluation system) can be used. For further information and explanations refer to [www.nachhaltigesbauen.de](http://www.nachhaltigesbauen.de).

For this EPD the following applies:

No reference service life (RSL) can be stated for a cradle-to-gate EPD. The RSL must be stated as "not specified". The Module D is not specified in such an EPD.

According to the BBSR table, an optional service life of >50 years has been specified for the roof tiles manufactured by Gebr. Laumans GmbH & Co. KG

The service life is dependent on the characteristics of the product and in-use conditions. The characteristics described in the EPD are applicable, in particular the characteristics listed below:

- Outdoor environment: Climatic influences may have a negative impact on the service life.
- Indoor environment: No impacts known that have a negative effect on the service life.

Roof tiles are considered to be very durable and long-lasting. The material composition does not change during the service life. The service life depends on the conditions and places of use. According to the BBSR Table 2011/ No. 363.512 the reference service life exceeds 50 years.

The service life solely applies to the characteristics specified in this EPD or the corresponding references.

The reference service life (RSL) does not reflect the actual life span, which is usually determined from the service life and when the building is renovated. It does not provide any indication of durability, nor does it constitute a warranty with regard to the product's performance characteristics, nor any kind of guarantee.

## 5 End-of-life stage

### Possible end-of-life stages

The roof tiles are shipped to central collection points. If undamaged, the dismantled roof tiles can be used again according to their original intended use. Broken dismantled tiles are used in road or tennis court construction. The end-of-life stage depends on the site where the products are used and is therefore subject to the local regulations. Observe the locally applicable regulatory requirements.

### Disposal routes

The LCA does not include the average disposal routes.

End-of-life clay roof tiles can be disposed of as construction waste (non-hazardous waste) according to the AVV waste code 170102 (bricks). Packaging material can be returned to recycling via the company Interseroh.



All life cycle scenarios are detailed in the Annex.

## 6 Life Cycle Assessment (LCA)

Environmental product declarations are based on life cycle assessments (LCAs) which use material and energy flows for the calculation and subsequent representation of environmental impacts.

Such a life cycle assessment was developed as the basis for roof tiles. The LCA is in conformity with DIN EN 15804 and the international standards DIN EN ISO 14040, DIN EN ISO 14044, ISO 21930 and EN ISO 14025.

The LCA is representative of the products presented in the Declaration and the specified reference period.

### 6.1 Definition of goal and scope

#### Goal

The goal of the LCA is to demonstrate the environmental impacts of the products. In accordance with DIN EN 15804, the environmental impacts covered by this Environmental Product Declaration are presented for the entire product life cycle in the form of basic information. No other additional environmental impacts are specified.

#### Data quality, data availability and geographical and time-related system boundaries

The goal of the LCA is to demonstrate the environmental impacts of the products. In accordance with DIN EN 15804, the environmental impacts covered by this Environmental Product Declaration are presented for the entire product life cycle in the form of basic information. No other additional environmental impacts are specified.

The generic data originate from the "GaBi 9" professional and building materials databases. The last update of both databases was in 2020. Data from before this date originate also from these databases and are not more than 4 years old. No other generic data were used for the calculation.

Data gaps were either filled with comparable data or conservative assumptions, or the data were cut off in compliance with the 1% rule.

The life cycle was modelled using the sustainability software tool "GaBi ts" for the development of Life Cycle Assessments.

#### Scope / system boundaries

The system boundaries refer to the supply of raw materials and purchased parts and the manufacture of the roof tiles.

No additional data from pre-suppliers/subcontractors or other sites were taken into consideration.

#### Cut-off criteria

All company data collected, i.e. all commodities/input and raw materials used, the thermal energy and electricity consumption, were taken into consideration.

The boundaries cover only the product-relevant data. Building sections/parts of facilities that are not relevant to the manufacture of the products, were excluded.

The transport distances of the pre-products used were taken into consideration as a function of >99% of the mass of inputs. The remaining transport distances of the primary products/pre-products to the plant in Brügggen were not taken into consideration.

The criteria for the exclusion of inputs and outputs as set out in DIN EN 15804 are fulfilled. From the data analysis it can be assumed that the total of negligible processes per life cycle stage does not exceed 1% of the mass/primary energy. This way the total of negligible processes does not exceed 5% of the energy and mass input. The life cycle assessment also includes material and energy flows that account for less than 1%.

## 6.2 Inventory analysis

<b>Goal</b>	All material and energy flows are described below. The processes covered are presented as input and output parameters and refer to the declared/functional units.
<b>Life cycle stages</b>	The Annex shows the entire life cycle of roof tiles. The manufacturing stages "A1 – A3" have been taken into consideration.
<b>Benefits</b>	The below benefits have been defined as per DIN EN 15804: <ul style="list-style-type: none"> <li>• Benefits from recycling</li> </ul>
<b>Allocation of co-products</b>	The manufacture of the product does not give rise to any allocations.
<b>Allocations for re-use, recycling and recovery</b>	If the products are reused/recycled and recovered during the product stage (rejects), the components are shredded, if necessary and then sorted into their single constituents. This is done by various process plants, e.g. magnetic separators. The system boundaries were set following their disposal, reaching the end-of-waste status.
<b>Allocations beyond life cycle boundaries</b>	A recycling potential was taken into consideration that reflects the economic value of the product after recycling (recyclate). The system boundary set for the recycled material refers to collection.
<b>Secondary material</b>	The use of secondary materials by Gebr. Laumans GmbH & Co. KG was not considered in Module A3. Secondary material is not used.
<b>Inputs</b>	The LCA includes the following production-relevant inputs per 1 t of roof tiles: <p><b>Energy</b></p> <p>The gas input material is based on "Thermische Energie aus Erdgas Deutschland" (thermal energy from natural gas, Germany). The electricity mix is based on "Strom aus Wasserkraft Deutschland" (electricity from German hydropower).</p>

Part of the process heat is used for space heating. However, this cannot be quantified, hence a "worst case" figure was used for the product.

The energy consumed by Laumans for the manufacture of roof tiles is kept as low as possible and the specific energy demand is constantly being improved.

### Water

The water consumed by the individual process steps for the manufacture amounts to a total of 95.55 l per t of roofing tiles and 90.16 l per t of roofing tiles including fitting tiles (accessories).

The fresh water consumption specified in Section 6.3 originates (amongst other sources) from the pre-product process chain and the roof tile manufacturing process.

### Raw material / pre-products

The chart below shows the share of raw materials/pre-products in percent.

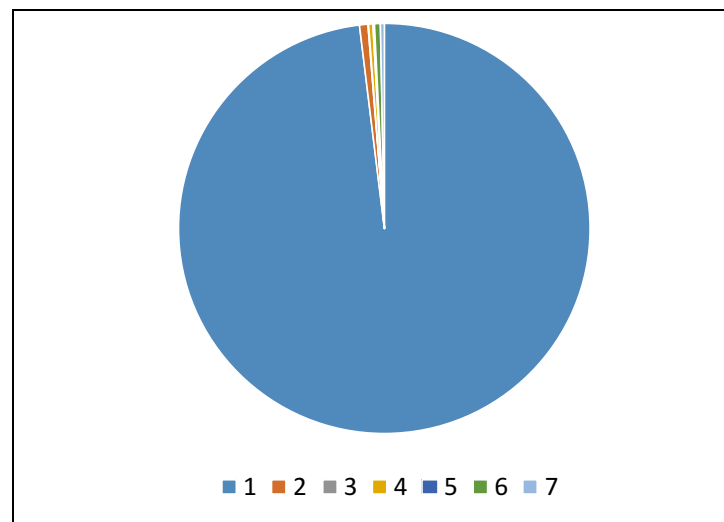


Figure 2: Percentage of individual materials for roofing tiles and roofing tiles incl. fitting tiles (accessories) per declared unit.

No.	Material	Mass in %
1	Clay	98
2	Grinding dust	< 1
3	Barium carbonate	< 1
4	Engobe	< 1
5	Glaze	< 1
6	Kaolin sand	< 1
7	Glass powder	< 1

Table 2: Percentage of individual materials for roofing tiles and roofing tiles incl. fitting tiles (accessories) per declared unit.

Laumans clay roof tiles are made of natural raw materials. The main components of the ceramic mass are clays and loess loams. Some additives such as kaolin sand, glass powder and barium carbonate can be added to the main components. The contents can vary according to the ceramic properties.

### Clays

Erosion weathered the feldspars of the rocks to clay minerals. These fines were transported by flowing waters and deposited where the current slowed down.

### Kaolin sand

Kaolin sand is added to regulate the shrinkage properties.

### Additives

If required, a small amount of barium carbonate is added to bind efflorescent salts in the body.

### Engobes

Engobes are applied to the tile surface as a coloured coating by a pouring process before firing. They are high-clay slurries and usually contain colour pigments (coloured metal oxides). Depending on the desired gloss, glass frits may also be included. Glassy engobes are called sintered engobes.

### Glazes

Glazes are also applied to the tile surface as a coloured coating by a pouring process before firing. Glazes are ceramic coatings that fuse with the tile during firing and give it that shiny glassy appearance. Laumans` Brillant glazes are available in a wide range of colours and offer maximum gloss. The glazes make the surface hard and robust, as well as smooth and stain resistant. The iridescent shades of varying intensity provide a natural play of colour. In addition to the Brillant glazes, Laumans` product range also includes Trend glazes, whose texture corresponds to the Brilliant glazes, but which differ significantly in the visual effect due to the gloss level. The satin glaze coating of the Trend glazes reflects over 90% less light. For a deliberately matt look.

Water is added to process the raw materials and escapes as water vapour in the further production steps. All the components are fired at approx. 1020°C and thus combined to form a durable clay tile.

### Ancillaries and consumables

No ancillaries and consumables are used.

### Product packaging

The amounts used for product packaging of roofing tiles are as follows:

No.	Material	Mass in kg
1	PE film	1.24
2	PP strap	1.46
3	Cardboard/board/paper	0.31

Table 3: Weight in kg of packaging per declared unit (roofing tiles)

The amounts used for the product packaging of roofing tiles including fitting tiles (accessories) are as follows:

No.	Material	Mass in kg
1	PE film	1.18
2	PP strap	1.38
3	Cardboard/board/paper	0.30

Table 4: Weight in kg of packaging per declared unit (roofing tiles incl. fitting tiles)

The roof tiles are bundled in handy small packages and stacked on wooden pallets. Only PE material is used as packaging material, which can be returned to the material cycle through recycling by Inteseroh. The palletised clay roof tiles are stored at the plant premises until order picking and loading. The wooden pallets can be returned and are then reused.

## Outputs

The LCA includes the following production-relevant outputs per 1 t of roof tiles:

### Waste

Secondary raw materials were included in the benefits. See Section 6.3 Impact assessment.

### Waste water

The manufacture does not produce any waste water.

## 6.3 Impact assessment

### Goal

The impact assessment covers both inputs and outputs. The impact categories applied are named below:

### Impact categories

The models for impact assessment were applied as described in DIN EN 15804-A1.

The impact categories presented in the EPD are as follows:

- depletion of abiotic resources (fossil fuels);
- depletion of abiotic resources (mineral substances);
- acidification of soil and water;
- ozone depletion;
- global warming;
- eutrophication;
- photochemical ozone creation.

### Waste

The waste generated during the production of 1 t of roof tiles is evaluated and shown separately for the fractions trade wastes, special wastes and radioactive wastes. Since waste handling is modelled within the system boundaries, the amounts shown refer to the deposited wastes. A portion of the waste indicated is generated during the manufacture of the pre-products.

Results per 1 t of roofing tiles		
	A1-A3	Unit
<b>Central environmental impacts</b>		
GWP	156.00	kg CO <sub>2</sub> eq.
ODP	1.94E-09	kg CFC -11 eq.
AP	8.24E-02	kg SO <sub>2</sub>
EP	1.68E-02	kg PO <sub>4</sub> eq.
POCP	1.05E-02	kg ethene eq.
ADPE	9.81E-06	kg Sb eq.
ADPF	2,480.00	MJ
<b>Use of resources</b>		
PERE	184.00	MJ
PERM	0.00	MJ
PERT	184.00	MJ
PENRE	2,480.00	MJ
PENRM	0.00	MJ
PENRT	2,480.00	MJ
SM	0.00	kg
RSF	0.00	MJ
NRSF	0.00	MJ
FW	0.31	m <sup>3</sup>
<b>Waste categories</b>		
HWD	7.90E-05	kg
NHWD	0.60	kg
RWD	1.25E-03	kg
<b>Output material flows</b>		
CRU	0.00	kg
MFR	92.80	kg
MER	0.00	kg
EEE	0.00	MJ
EET	0.00	MJ

**Key:**

**GWP** – global warming potential    **ODP** – ozone depletion potential    **AP** - acidification potential    **EP** - eutrophication potential    **POCP** - photochemical ozone formation potential    **ADPE** - abiotic depletion potential – non-fossil resources  
**ADPF** - abiotic depletion potential – fossil resources    **PERE** - Use of renewable primary energy    **PERM** - use of renewable primary energy resources    **PERT** - total use of renewable primary energy resources    **PENRE** - use of non-renewable primary energy    **PENRM** - use of non-renewable primary energy resources    **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** - net use of 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    **EEE** - exported electrical energy    **EET** - exported thermal energy

Results per 1 t of roofing tiles incl. fitting tiles (accessories)		
	A1-A3	Unit
<b>Central environmental impacts</b>		
GWP	189.00	kg CO <sub>2</sub> eq.
ODP	1.94E-09	kg CFC -11 eq.
AP	0.11	kg SO <sub>2</sub>
EP	2.06E-02	kg PO <sub>4</sub> eq.
POCP	1.38E-02	kg ethene eq.
ADPE	1.40E-05	kg Sb eq.
ADPF	3010.00	MJ
<b>Use of resources</b>		
PERE	285.00	MJ
PERM	0.00	MJ
PERT	285.00	MJ
PENRE	3,010.00	MJ
PENRM	0.00	MJ
PENRT	3,010.00	MJ
SM	0.00	kg
RSF	0.00	MJ
NRSF	0.00	MJ
FW	0.40	m <sup>3</sup>
<b>Waste categories</b>		
HWD	7.90E-05	kg
NHWD	0.94	kg
RWD	6.12E-04	kg
<b>Output material flows</b>		
CRU	0.00	kg
MFR	87.50	kg
MER	0.00	kg
EEE	0.00	MJ
EET	0.00	MJ
<b>Key:</b> <b>GWP</b> – global warming potential <b>ODP</b> – ozone depletion potential <b>AP</b> - acidification potential <b>EP</b> - eutrophication potential <b>POCP</b> - photochemical ozone formation potential <b>ADPE</b> - abiotic depletion potential – non-fossil resources <b>ADPF</b> - abiotic depletion potential – fossil resources <b>PERE</b> - Use of renewable primary energy <b>PERM</b> - use of renewable primary energy resources <b>PERT</b> - total use of renewable primary energy resources <b>PENRE</b> - use of non-renewable primary energy <b>PENRM</b> - use of non-renewable primary energy resources <b>PENRT</b> - total use of non-renewable primary energy resources <b>SM</b> - use of secondary material <b>RSF</b> - use of renewable secondary fuels <b>NRSF</b> - use of non-renewable secondary fuels <b>FW</b> - net use of fresh water <b>HWD</b> - hazardous waste disposed <b>NHWD</b> - non-hazardous waste disposed <b>RWD</b> - radioactive waste disposed <b>CRU</b> - components for re-use <b>MFR</b> - materials for recycling <b>MER</b> - materials for energy recovery <b>EEE</b> - exported electrical energy <b>EET</b> - exported thermal energy		

6.4 Interpretation, LCA presentation and critical review

Evaluation

The environmental impacts of 1 t of roof tiles are dominated primarily by the energy demand (specifically the natural gas demand) of the manufacturing process in all environmental categories. Packaging and the clay used are of secondary importance.

The chart below shows the allocation of the main environmental impacts.

The values obtained from the LCA calculation are suitable for the certification of buildings.

Chart

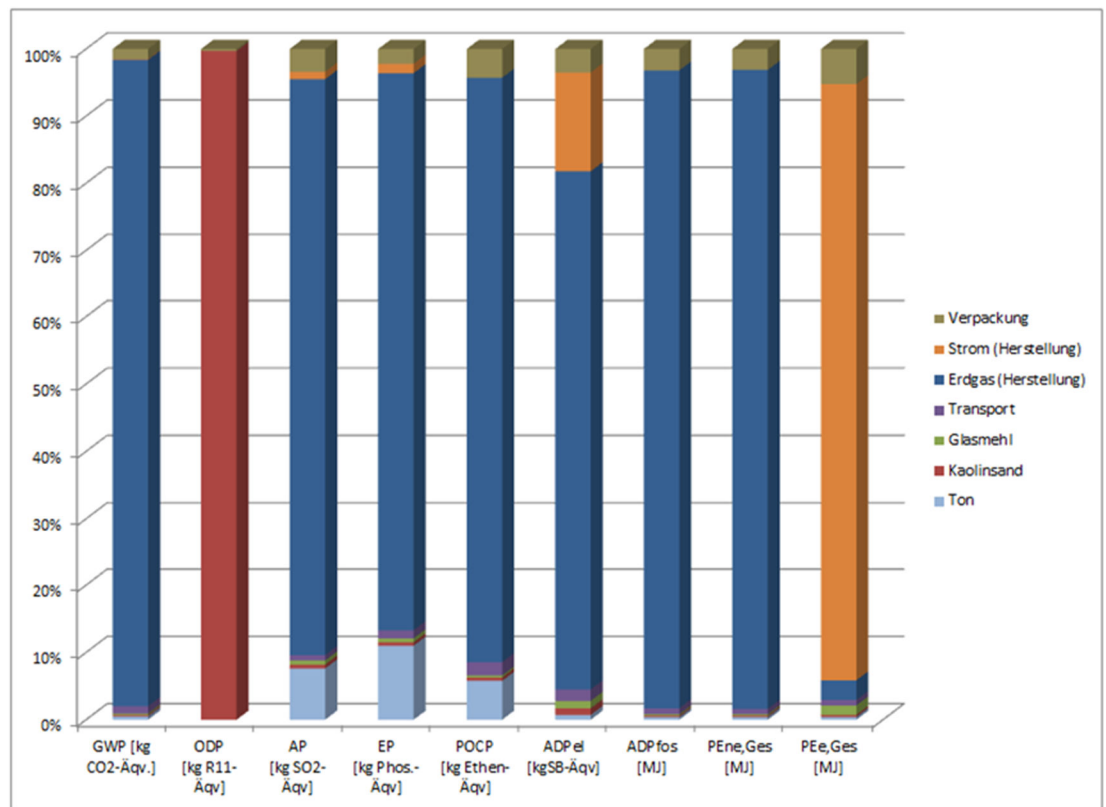


Figure 3: Percentage of inputs in selected environmental impact categories for roofing tiles



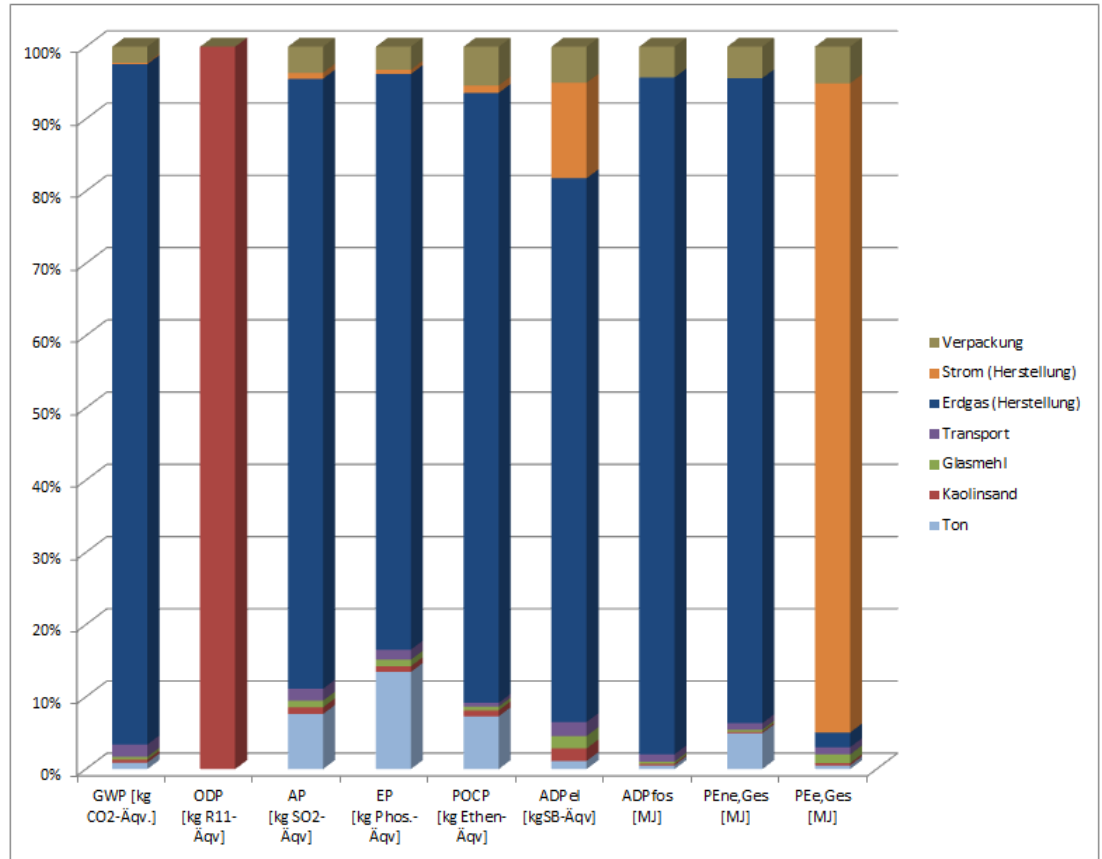


Figure 4: Percentage of inputs in selected environmental impact categories for roofing tiles incl. fitting tiles (accessories)

**Report**

The LCA underlying this EPD was developed according to the requirements of DIN EN ISO 14040 and DIN EN ISO 14044 as well as DIN EN 15804 and DIN EN ISO 14025. It is not addressed to third parties for reasons of confidentiality. It is deposited with the ift Rosenheim. The results and conclusions reported to the target group are complete, correct, without bias and transparent. The results of the study are not designed to be used for comparative statements intended for publication.

**Critical review**

The critical review of the LCA and of the report took place in the course of verification of the EPD and was carried out by Dr. Eric Brehm, an external verifier.

**7 General information regarding the EPD**

**Comparability**

This EPD was prepared in accordance with DIN EN 15804 and is therefore only comparable to those EPDs that also comply with the requirements set out in DIN EN 15804.

Any comparison must refer to the building context and the same boundary conditions of the various life cycle stages.

For comparing EPDs of construction products, the rules set out in DIN EN 15804 (Clause 5.3) apply.



Product group: "Construction products made of fired clay"

The detailed individual results of the products were summarised on the basis of conservative assumptions and differ from the average results. Identification of the product groups and the resulting variations are documented in the background report.

**Communication**

The communications format of this EPD meets the requirements of EN 15942:2012 and is therefore the basis for B2B communication. Only the nomenclature has been changed according to DIN EN 15804.

**Verification**

Verification of the Environmental Product Declaration is documented in accordance with the ift "Richtlinie zur Erstellung von Typ III Umweltproduktdeklarationen" (Guidance on preparing Type III Environmental Product Declarations) in accordance with the requirements set out in DIN EN ISO 14025.

The Declaration is based on the PCR documents "PCR-PT-1.0:2020 "Construction products made of baked clay" and "PCR Part A" PCR-A-0.2:2018

The European standard EN 15804 serves as the core PCR <sup>a)</sup>
Independent verification of the Declaration and statement according to EN ISO 14025:2010 <input type="checkbox"/> internal <input checked="" type="checkbox"/> external
Independent third party verifier: <sup>b)</sup> Prof. Dr. Eric Brehm
<sup>a)</sup> Product category rules <sup>b)</sup> Optional for business-to-business communication Mandatory for business-to-consumer communication (see EN ISO 14025:2010, 9.4)

**Revisions of this document**

No.	Date	Note:	Practitioner of the LCA	Verifier
1	05.03.2021	External verification	Hilz	Brehm
2	31.05.2021	Revision	Hilz	Brehm

## 8 Bibliography

1. **Klöpffer, W und Grahl, B.** *Ökobilanzen (LCA)*. Weinheim: Wiley-VCH-Verlag, 2009.
2. **Eyerer, P. and Reinhardt, H.-W.** *Ökologische Bilanzierung von Baustoffen und Gebäuden - Wege zu einer ganzheitlichen Bilanzierung. (LCA of building materials and buildings - Routes to integrated LCA)*. Basel: Birkhäuser Verlag, 2000.
3. **Gefahrstoffverordnung – GefStoffV (Hazardous substances regulation)** *Verordnung zum Schutz vor Gefahrstoffen (Regulation on protection against hazardous substances)*, Berlin: BGBl. (Federal Gazette) I S. 3758, 2017.
4. **Chemikalien-Verbotsverordnung – ChemVerbotsV (Chemicals Prohibition Regulation)** *Verordnung über Verbote und Beschränkungen des Inverkehrbringens gefährlicher Stoffe, Zubereitungen und Erzeugnisse Chemikaliengesetz (Regulation on bans and restrictions of the placing on the market of hazardous substances, formulations and products covered by the Chemicals Law)*, Berlin: BGBl. (Federal Gazette) I S. 1328, 2017.
5. **DIN EN ISO 14040:2018-05.** *Environmental management - Life cycle assessment - Principles and framework*. Berlin: Beuth Verlag GmbH, 2018.
6. **DIN EN ISO 14044:2006-10.** *Environmental management - Life cycle assessment - Requirements and guidelines..* Berlin: Beuth Verlag GmbH, 2006.
7. **EN ISO 14025:2011-10.** *Umweltkennzeichnungen und -deklarationen Typ III Umweltdeklarationen - Grundsätze und Verfahren.(Environmental labels and declarations - Type III environmental declarations - Principles and procedures)* Berlin: Beuth Verlag GmbH, 2011.
8. **OENORM S 5200:2009-04-01** *Radioactivity in construction materials*. Berlin: Beuth Verlag GmbH, 2009.
9. **EN 15942:2012-01.** *Sustainability of construction works - Environmental product declarations - Communication format business-to-business*. Berlin: Beuth Verlag GmbH, 2012.
10. **EN 15804:2012+A1:2013.** *Sustainability of construction works - Environmental product declarations - Rules for the product categories*. Berlin: Beuth Verlag GmbH, 2013.
11. **Bundesministerium für Umwelt, Naturschutz, Bau und Reaktorsicherheit (Federal Ministry for the Environment, Nature Conservation and Nuclear Safety) Berlin,** *Leitfaden Nachhaltiges Bauen (Guidance on Sustainable Building)* Berlin: s.n., 2016.
12. **DIN EN 13501-1:2010-01.** *Fire classification of construction products and building elements - Part 1: Classification using test data from reaction to fire tests* Berlin: Beuth Verlag GmbH, 2010.
13. **DIN EN ISO 16000 Part 6, 9 11** *Indoor air: Determination of the emission of volatile organic compounds from building products and furnishing* Berlin: Beuth Verlag GmbH, 2012, 2008, 2006.
14. **ISO 21930:2017-07.** *Sustainability in building construction - Environmental declaration of building products* Berlin: Beuth Verlag, 2017.
15. **Bundesimmissionsschutzgesetz – BImSchG (Federal Immission Law)** *Gesetz zum Schutz vor schädlichen Umwelteinwirkungen durch Luftverunreinigungen, Geräusche, Erschütterungen und ähnlichen Vorgängen (Law on harmful environmental impacts by air contamination, noise, vibrations and similar processes)*. Berlin: BGBl. (Federal Gazette) I S. 3830, 2017.
16. **Chemikaliengesetz – ChemG (Chemicals Act)** *Chemikaliengesetz – ChemG (Chemicals Act) Gesetz zum Schutz vor gefährlichen Stoffen Unterteilt sich in Chemikaliengesetz und eine Reihe von Verordnungen; hier relevant (Law on protection against hazardous substances - Subdivided into Chemicals Law and a series of regulations; of relevance here): Gesetz zum Schutz vor gefährlichen Stoffen (Law on protection against hazardous substances)* Berlin: BGBl. (Federal Gazette) I S. 1146, 2017.
17. **IKP Universität Stuttgart and PE Europe GmbH GaBi 10: Software and database for LCA.** Leinfelden-Echterdingen: s.n, 2020
18. **DIN EN ISO 12457 Part 1-4** *Characterization of waste - Leaching; Compliance test for leaching of granular waste materials and sludges - Part 1-4:* Berlin: Beuth Verlag GmbH, 2003.
19. **ift-Guideline NA-01/3.** *Allgemeiner Leitfaden zur Erstellung von Typ III Umweltproduktdeklarationen (Guidance on preparing Type III Environmental Product Declarations)* Rosenheim : ift Rosenheim GmbH, 2015
20. **PCR Part A.** *Product category rules for environmental product declarations as per EN ISO 14025 and EN 15804.* Rosenheim: ift Rosenheim, 2018
21. **PCR Part B - Construction products made of baked clay** *Product category rules for environmental product declarations as per EN ISO 14025 and EN 15804* Rosenheim: ift Rosenheim, 2020

## 9 Annex

### Description of life cycle scenarios for roof tiles

Product stage			Construction stage		Use stage							End-of-life stage				Benefits and loads from beyond the system boundaries
A1	A2	A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
Raw material supply	Transport	Manufacture	Transport	Construction/Installation	Use	Inspection, maintenance, cleaning	Repair	Exchange / Replacement	Improvement / Modernisation	Operational energy use	Operational water use	Deconstruction	Transport	Waste management	Disposal	Re-use Recovery Recycling potential
✓	✓	✓	—	—	—	—	—	—	—	—	—	—	—	—	—	—

**Note:** The standard scenarios selected are presented in bold type. They were also used for calculating the indicators in the summary table.

- ✓ Included in the LCA
- Not included in the LCA

## **Imprint**

### **Practitioner of the LCA**

Life Cycle Engineering Experts GmbH  
Birkenweg 24  
64295 Darmstadt

### **Programme operator**

ift Rosenheim GmbH  
Theodor-Gietl-Str. 7-9  
D-83026 Rosenheim  
Phone: 0 80 31/261-0  
Fax: 0 80 31/261 290  
Email: [info@ift-rosenheim.de](mailto:info@ift-rosenheim.de)  
[www.ift-rosenheim.de](http://www.ift-rosenheim.de)

### **Declaration holder**

Gebr. Laumans GmbH & Co. KG  
Stiegstraße 88  
41379 Brüggen

### **Notes**

This EPD is mainly based on the work and findings of the Institut für Fenstertechnik e.V., Rosenheim (ift Rosenheim) and specifically on the ift-Richtlinie NA-01/3 Allgemeiner Leitfaden zur Erstellung von Typ III Umweltproduktdeklarationen. (Guideline NA.01/3 - Guidance on preparing Type III Environmental Product Declarations)  
The publication and all its parts are protected by copyright. Any utilisation outside the confined limits of the copyright provisions is not permitted without the consent of the publishers and is punishable. In particular, this applies to any form of reproduction, translations, storage on microfilm and the storage and processing in electronic systems.

### **Layout**

ift Rosenheim GmbH - 2018

### **Photographs (front page)**

Gebr. Laumans GmbH & Co. KG

© ift Rosenheim, 2021



ift Rosenheim GmbH  
Theodor-Gietl-Str. 7-9  
D-83026 Rosenheim  
Phone: +49 (0) 80 31/261-0  
Fax: +49 (0) 80 31/261-290  
Email: [info@ift-rosenheim.de](mailto:info@ift-rosenheim.de)  
[www.ift-rosenheim.de](http://www.ift-rosenheim.de)