Environmental Product Declaration (EPD)

Declaration Code: EPD-KFA-GB-84.0

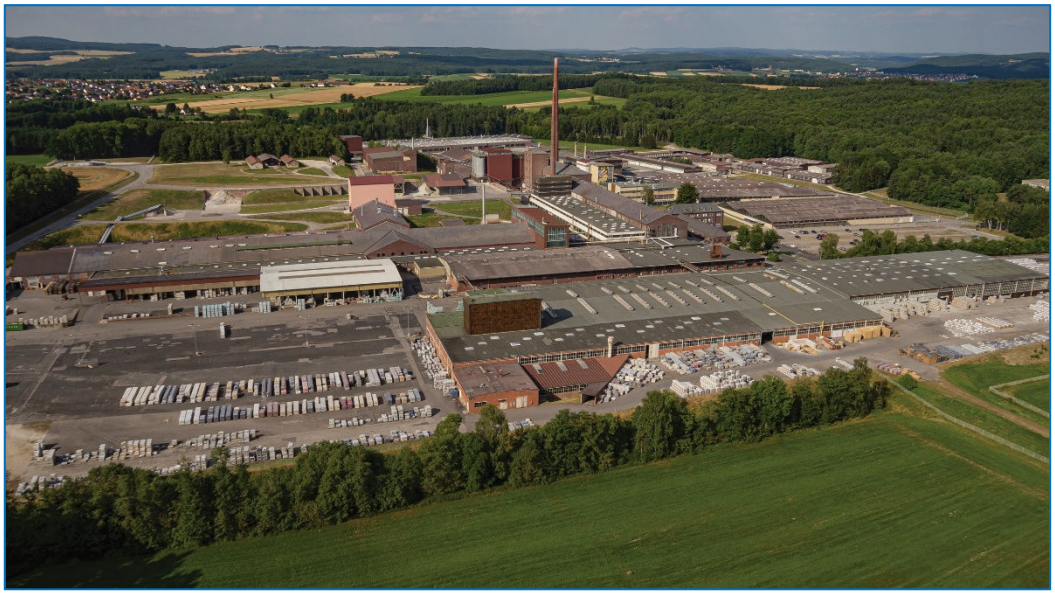
DEUTSCHE STEINZEUG AGROB BUCHTAL

AGROB Buchtal GmbH

ECO PLATFORM EPD VERIFIED

façade cladding

KeraTwin Ceramic System



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Basis:

DIN EN ISO 14025
EN 15804 + A2

Company EPD
Environmental
Product **D**eclaration

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Environmental Product Declaration (EPD)

Declaration Code: EPD-KFA-GB-84.0

Programme operator	ift Rosenheim GmbH Theodor-Gietl-Straße 7-9 D-83026 Rosenheim		
Practitioner of the LCA	LCEE GmbH Birkenweg 24 D-64295 Darmstadt		
Declaration holder	AGROB Buchtal GmbH Buchtal 1 D-92521 Schwarzenfeld www.agrob-buchtal.de		
Declaration code	EPD-KFA-GB-84.0		
Designation of declared product	KeraTwin Ceramic System		
Scope	Rear-ventilated curtain-type ceramic façade cladding system including aluminium fastening profiles		
Basis	This EPD was prepared on the basis of EN ISO 14025:2011 and DIN EN 15804:2012+A2:2019. 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 Part A” PCR-A-1.0:2023 and "Fassaden und Dächer ” PCR-FA-4.0:2023.		
Validity	Publication date: 24.06.2024	Last revision: 08.07.2024	Valid until 24.08.2029
	This verified company Environmental Product Declaration 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.		
LCA basis	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 AGROB Buchtal GmbH and the generic data from the ”LCA for Experts 10“ database. LCA calculations were carried out for the included “cradle to grate, with options” life cycle including all upstream chains (e.g. raw material extraction, etc.).		
Notes	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.		

Christoph Seehauser Deputy Head of Sustainability	Dr. Torsten Mielecke Chairman of Expert Committee ift-EPD and PCR	Patrick Wortner External verifier

1 General product information

Product definition

The EPD relates to the product group façade cladding and applies to:

1 m² of KeraTwin Ceramic System
made by AGROB Buchtal GmbH

The declared unit is obtained as follows:

Assessed product	Declared unit	mass per unit area
KeraTwin	1 m²	31.80 kg/m²

Table 1: Product groups

The average unit is declared as follows:
Directly used material flows are determined using masses (kg) produced and assigned to the declared unit. All other inputs and outputs in the production are assigned to the declared unit in their entirety. The reference period is the year 2020.

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

- KeraTwin Ceramic System including aluminium fastening profiles

Product description

With its variety of colors, formats and surface finishes, KeraTwin® offers the architect enormous freedom of design. And as diverse fastening alternatives ensure technical and structural versatility, this system offers the appropriate solution to any challenge – even on difficult bases.
With their thickness of only 20 mm and relatively low weight of 32 kg/m², the panels are easy to transport, modify and install. As the panels are simply hung on a system rail, no additional tools are required for installation. Lengths of up to 1,800 mm are available.
The joints are realised in such a way that the construction is optimally protected against driving rain. All KeraTwin-Panels are equiped with photocatalytically active Hytect-surface coating that prevents the formation of algae, moss and microbes while the self-washing effect ensures permanently clean facades. The coating reduces air pollutants such as NOx.

Product manufacture

Mixing and preparation of raw materials → extruding → drying → glazing → firing → packaging → shipping

Scope

Rear-ventilated curtain-type ceramic façade cladding system including aluminium fastening profiles for a wide variety of building types including business and office buildings, schools and universities, hospitals, multi-storey residential building and industrial buildings.

Verifications

The following verifications are held:

- DoP Nr. 0001-12 KeraTwin according to DIN EN 14411

For further and updated verifications (incl. other national approvals) refer to www.agrob-buchtal.de.

Management systems

The following management systems are in place:

- Quality management system in accordance with DIN EN ISO 9001:2015
- Energy management system in accordance with DIN EN ISO 50001:2018

Additional information

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

2 Materials used

Primary materials

The primary materials used are specified in Section 6.2 Inventory analysis (Inputs).

Declarable substances

The product contains no substances from the REACH candidate list (declaration dated 2nd March 2024).

All relevant safety data sheets are available from AGROB Buchtal GmbH

3 Construction process stage

Processing recommendations, installation

Observe the instructions for mounting/installation, operation, maintenance and disassembly, provided by the manufacturer. See www.agrob-buchtal.de

4 Use stage

Emissions to the environment

No emissions to indoor air, water or soil are known. There may be VOC emissions.

Reference service life (RSL)

The RSL information was provided by the manufacturer. The RSL shall be specified under defined reference in-use conditions and shall refer to the declared technical and functional performance of the product within the building. It shall be established in accordance with any specific rules given in European product standards, or, if not available, in accordance with a c-PCR. It shall also take into account ISO 15686-1, -2, -7 and -8. Where European product standards or a c-PCR provide guidance on deriving the 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.

For this EPD the following applies:
For a “Cradle to gate with options” EPD with the modules C1-C4 and module D (A1-A3 + C + D and one or more additional modules from A4 to B7), the reference service life (RSL) can only be stated if the reference in-use conditions are specified.

According to the BBSR table an optional service life of 50 years is specified for KeraTwin Ceramic System made by AGROB Buchtal GmbH.

The service life is dependent on the characteristics of the product and the in-use conditions. The in-use conditions 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: product not intended for indoor use

The service life applies solely to the characteristics specified in this EPD or the corresponding references.
The RSL does not reflect the actual life span, which is usually determined by the service life and the refurbishment of a building. It does not give any information on the useful life, warranty referring to performance characteristics or guarantees.

5 End-of-life stage

Possible end-of-life stages

The KeraTwin Ceramic System is shipped to central collection points. There the products are generally shredded and sorted into their original constituents. 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.

This EPD shows the end-of-life modules according to the market situation.
Aluminium and ceramic panels are recycled to a certain percentage. Residual fractions are sent to landfill.

Disposal routes

The LCA includes the average disposal routes.

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 for the KeraTwin Ceramic System, serving as the basis. The LCA is in conformity with the requirements set out in DIN EN 15804 and the international standards DIN EN ISO 14040, DIN EN ISO 14044 and EN ISO 14025 as well as based on ISO 21930.

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. Apart from these, no other environmental impacts are specified.

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

The specific data originate exclusively from the 2020 fiscal year. They were collected on-site at the plant located in Schwarzenfeld and come in parts from company records and partly from values directly obtained by measurement. Validity of the data was checked by the ift Rosenheim.

The generic data come from the “LCA for Experts 10” professional and building materials databases. The last update of both databases was in 2023. Data from before this date come also from these databases and are not more than ten years old. No other generic data were used for the calculation.

The generic data selected are as accurate as possible in terms of geographical reference. If no country-specific datasets are available or regional reference cannot be established, European or global datasets are used.

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 “LCA for Experts" for the development of life cycle assessments.

The data quality complies with the requirements of prEN15941:2022.

Scope / system boundaries

The system boundaries refer to the supply of raw materials and purchased parts, manufacture/production, use and end-of-life stage of the KeraTwin Ceramic System.
No additional data from pre-suppliers/subcontractors or other sites were taken into consideration.

Cut-off criteria

All the data that the company records, i.e. all commodities/input and raw materials used, the thermal energy used 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 raw materials, ancillary materials and packagings were taken into consideration.

The transport mix is composed as follows and is based on the research project "EPDs für transparente Bauelemente" (EPDs for transparent building components).

- Truck, 26 – 28 t total weight / 18.4 t payload, Euro 6, freight, 85 % capacity used

In addition to the transport distances for pre-products, the transport distances for waste were also taken into consideration. The transport of waste in A3 was presented by the following standard scenario:

- Transport to collection point using 40 t truck (Euro 0-6 mix), diesel, 27 t payload, 50 % capacity used, 100 km (1)

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. All in all, the total of negligible processes does not exceed 5% of the energy and mass input. The life cycle calculation also includes material and energy flows that account for less than 1 %.

6.2 Inventory analysis

Goal

All material and energy flows are described below. The processes covered are presented as input and output parameters and refer to the declared unit.

Life cycle stages

The Annex shows the entire life cycle of KeraTwin Ceramic System. The “Product stage” (A1 - A3), “Construction process stage” (A5), “End-of-life stage” (C1 - C4) and the “Benefits and loads beyond the system boundaries” (D) are considered.

Benefits

The below benefits have been defined in accordance with DIN EN 15804:

- Benefits from recycling
- Benefits (thermal and electrical) from incineration

Allocation of co-products

The manufacture does not give rise to allocations

Allocations for reuse, recycling and recovery

If the products are reused/recycled and recovered during the product stage (rejects) the components are shredded/broken and fed back into the manufacturing process continously. This is done by various process plants.

The system boundaries were set following their disposal, reaching the end-of-waste state.

Allocations beyond life cycle boundaries

The use of recycled materials in the manufacturing process was based on the current market-specific situation. A recycling potential that reflects the economic value of the product after recycling (recyclate) was also taken into account .
Post-consumer secondary material stated as input into the production process, is calculated in module 1 without loads. No benefits are allocated to module D, but consumption is allocated to modules C3 and C4 (worst case scenario).
The system boundary set for the recycled material refers to collection.

Secondary material

The use of secondary material by AGROB Buchtal GmbH was considered in module A3. Pre-consumer secondary material was used (closed loop recycling of rejects). Post-consumer secondary material was not used.

Inputs

The LCA includes the following production-relevant inputs per 1 m² ofKeraTwin Ceramic System:

Energy
The gas input material is based on “Erdgas Deutschland“ (natural gas Germany). The electricity mix is based on ”Strommix Deutschland 2020“

A portion of the process heat is used for space heating. This can, however, not be quantified and a “worst case” figure was taken into account for the product.

Water
70 l per m² water consumed by the individual process steps for the production.
The consumption of freshwater specified in Section 6.3 originates (among others) from the process chain of the pre-products and the process water used for manufacturing.

Raw material/pre-products
The chart below shows the share of raw materials/pre-products in %.

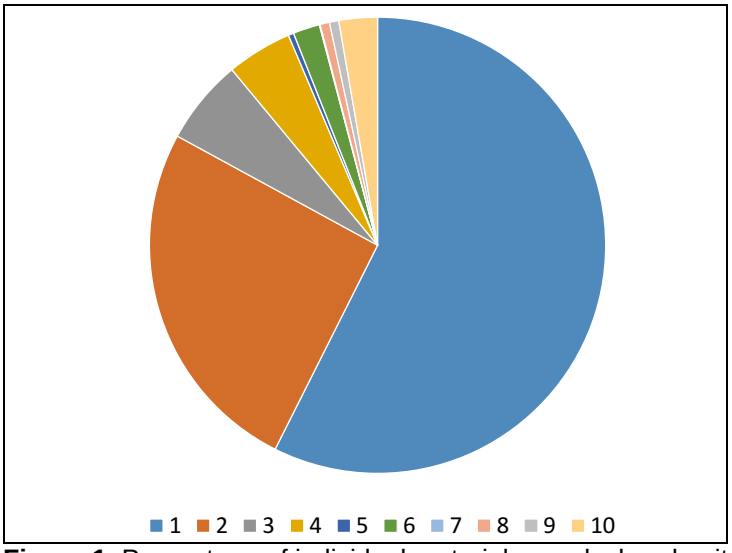


Figure 1: Percentage of individual materials per declared unit

No.	Material	Mass in %
1	clay	57
2	fire clay	26
3	feldspar	6
4	quartz powder	5
5	kaolin	< 1
6	talcum	2
7	zirconium silicate	< 1
8	enamel	< 1
9	aluminium	< 1
10	recycled reject material	3

Table 2: Percentage of individual materials per declared unit

Ancillary materials and consumables
No ancillary materials and consumables are used.

Product packaging
The amounts used for product packaging are as follows:

No.	Material	Mass in kg
1	Cardboard	5.90E-02
2	PE film	2.30E-02

Table 3: Weight in kg of packaging per declared unit

Biogenic carbon content

No.	Component	Content in kg C per m²
1	Product	0,00
2	Associated packaging	2,30E-02

Table 4: Biogenic carbon content of the product and the packaging at gate

Outputs

The LCA includes the following production-relevant outputs per 1 m² of the KeraTwin Ceramic System:

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

Waste water
The manufacture produces 36 l of waste water that are fully reused in a closed-loop process.

6.3 Impact assessment

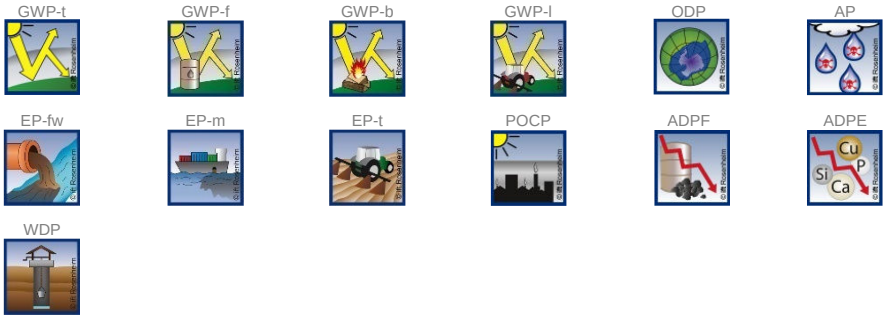
Goal

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

Core indicators

The models for impact assessment were applied as described in DIN EN 15804+A2.
The impact categories presented in the EPD as core indicators are as follows:

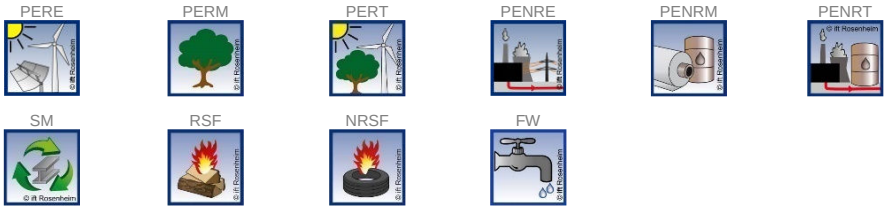
- Climate change – total (GWP-t)
- Climate change – fossil (GWP-f)
- Climate change – biogenic (GWP-b)
- Climate change - land use and land use change (GWP-l)
- Ozone depletion (ODP)
- Acidification (AP)
- Eutrophication aquatic freshwater (EP-fw)
- Eutrophication aquatic marine (EP-m)
- Eutrophication terrestrial (EP-t)
- Photochemical ozone creation (POCP)
- Depletion of abiotic resources - fossil fuels (ADPF)
- Depletion of abiotic resources - minerals and metals (ADPE)
- Water use (WDP)



Use of resources

The models for impact assessment were applied as described in DIN EN 15804-A2.
The following parameters for the use of resources are shown in the EPD:

- Renewable primary energy as energy source (PERE)
- Renewable primary energy for material use (PERM)
- Total use of renewable primary energy (PERT)
- Non-renewable primary energy as energy resource (PENRE)
- Renewable primary energy for material use (PENRM)
- Total use of non-renewable primary energy (PENRT)
- Use of secondary materials (SM)
- Use of renewable secondary fuels (RSF)
- Use of non-renewable secondary fuels (NRSF)
- Net use of freshwater resources (FW)

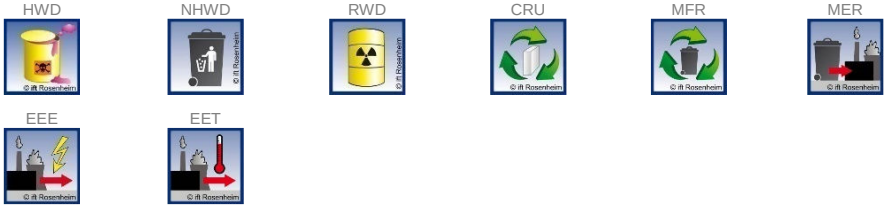


Waste

The waste generate during the production of 1 m² of KeraTwin Ceramic System 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.

The models for impact assessment were applied as described in DIN EN 15804-A2.
The waste categories and indicators for output material flows presented in the EPD are as follows:

- Hazardous waste disposed (HWD)
- Non-hazardous waste disposed (NHWD)
- Radioactive waste disposed (RWD)
- Components for reuse (CRU)
- Materials for recycling (MFR)
- Materials for energy recovery (MER)
- Exported electrical energy (EEE)
- Exported thermal energy (EET)



Additional environmental impact indicators

The models for impact assessment were applied as described in DIN EN 15804-A2.
The additional impact categories presented in the EPD are as follows:

- Particulate matter emissions (PM)
- Ionising radiation, human health (IRP)
- Ecotoxicity – freshwater (ETP-fw)
- Human toxicity - cancer effect (HTP-c)
- Human toxicity - non-cancer effect (HTP-nc)
- Land use related impacts / soil quality (SQP)

PM 

IRP 

ETP-fw 

HTP-c 

HTP-nc 

SQP 

	Results per 1 m² of KeraTwin Ceramic System															
	Unit	**A1-A3**	**A4**	**A5**	**B1**	**B2**	**B3**	**B4**	**B5**	**B6**	**B7**	**C1**	**C2**	**C3**	**C4**	**D**
Core indicators																
GWP-t	kg CO_2 eq.	22.68	ND	0.16	ND	ND	ND	ND	ND	ND	ND	0.00	0.12	0.10	4.6E-02	-2.70
GWP-f	kg CO_2 eq.	22.69	ND	7.00E-02	ND	ND	ND	ND	ND	ND	ND	0.00	0.12	0.10	4.8E-02	-2.70
GWP-b	kg CO_2 eq.	-1.90E-02	ND	8.00E-02	ND	ND	ND	ND	ND	ND	ND	0.00	-5.50E-04	3.27E-04	1.66E-03	-2.58E-04
GWP-l	kg CO_2 eq.	6.63E-03	ND	6.34E-07	ND	ND	ND	ND	ND	ND	ND	0.00	7.32E-04	3.78E-04	1.52E-04	-6.17E-04
ODP	kg CFC-11 eq.	1.29E-10	ND	2.46E-14	ND	ND	ND	ND	ND	ND	ND	0.00	2.14E-14	1.21E-12	1.26E-13	-5.32E-12
AP	mol H^+ eq.	3.00E-02	ND	3.77E-05	ND	ND	ND	ND	ND	ND	ND	0.00	1.51E-04	4.31E-04	3.47E-04	-9.14E-03
EP-fw	kg P eq.	3.06E-05	ND	6.61E-09	ND	ND	ND	ND	ND	ND	ND	0.00	2.85E-07	3.77E-07	9.91E-08	-1.73E-06
EP-m	kg N eq.	9.99E-03	ND	1.08E-05	ND	ND	ND	ND	ND	ND	ND	0.00	5.85E-05	1.95E-04	8.99E-05	-1.78E-03
EP-t	mol N eq.	0.11	ND	1.75E-04	ND	ND	ND	ND	ND	ND	ND	0.00	6.64E-04	2.14E-03	9.88E-04	-2.00E-02
POCP	kg NMVOC eq.	3.00E-02	ND	2.83E-05	ND	ND	ND	ND	ND	ND	ND	0.00	1.31E-04	5.22E-04	2.71E-04	-5.21E-03
ADPF*²	MJ	362.09	ND	4.00E-02	ND	ND	ND	ND	ND	ND	ND	0.00	1.66	1.88	0.65	-37.22
ADPE*²	kg Sb eq.	1.17E-06	ND	1.83E-10	ND	ND	ND	ND	ND	ND	ND	0.00	8.71E-09	8.88E-08	2.27E-09	-1.23E-07
WDP*²	m^3 world eq. deprived	2.10	ND	2.00E-02	ND	ND	ND	ND	ND	ND	ND	0.00	6.36E-04	1.00E-02	5.37E-03	-0.72
Use of resources																
PERE	MJ	81.59	ND	0.952	ND	ND	ND	ND	ND	ND	ND	0.00	0.11	0.60	0.11	-12.21
PERM	MJ	0.94	ND	-0.94	ND	ND	ND	ND	ND	ND	ND	0.00	0.00	0.00	0.00	0.00
PERT	MJ	82.53	ND	1.2E-02	ND	ND	ND	ND	ND	ND	ND	0.00	0.11	0.60	0.11	-12.21
PENRE	MJ	362.22	ND	0.52	ND	ND	ND	ND	ND	ND	ND	0.00	1.66	1.88	0.65	-37.28
PENRM	MJ	0.48	ND	-0.48	ND	ND	ND	ND	ND	ND	ND	0.00	0.00	0.00	0.00	0.00
PENRT	MJ	362.70	ND	4.00E-02	ND	ND	ND	ND	ND	ND	ND	0.00	1.66	1.88	0.65	-37.28
SM	kg	2.06	ND	0.00	ND	ND	ND	ND	ND	ND	ND	0.00	0.00	0.00	0.00	0.00
RSF	MJ	0.00	ND	0.00	ND	ND	ND	ND	ND	ND	ND	0.00	0.00	0.00	0.00	0.00
NRSF	MJ	0.00	ND	0.00	ND	ND	ND	ND	ND	ND	ND	0.00	0.00	0.00	0.00	0.00
FW	m^3	0.13	ND	3.98E-04	ND	ND	ND	ND	ND	ND	ND	0.00	9.77E-05	5.28E-04	1.65E-04	-2.00E-02
Waste categories																
HWD	kg	1.06E-07	ND	4.97E-13	ND	ND	ND	ND	ND	ND	ND	0.00	4.45E-12	1.11E-10	1.41E-11	-1.56E-09
NHWD	kg	1.38	ND	2.05E-03	ND	ND	ND	ND	ND	ND	ND	0.00	2.42E-04	8.12E-04	3.26	-1.18
RWD	kg	1.10E-02	ND	1.24E-06	ND	ND	ND	ND	ND	ND	ND	0.00	1.74E-06	5.19E-05	7.34E-06	-2.63E-03
Output material flows																
CRU	kg	0.00	ND	0.00	ND	ND	ND	ND	ND	ND	ND	0.00	0.00	0.00	0.00	0.00
MFR	kg	6.54	ND	0.00	ND	ND	ND	ND	ND	ND	ND	0.00	0.00	30.66	0.00	0.00
MER	kg	0.00	ND	0.00	ND	ND	ND	ND	ND	ND	ND	0.00	0.00	0.00	0.00	0.00
EEE	MJ	0.00	ND	0.23	ND	ND	ND	ND	ND	ND	ND	0.00	0.00	0.00	0.00	0.00
EET	MJ	0.00	ND	0.55	ND	ND	ND	ND	ND	ND	ND	0.00	0.00	0.00	0.00	0.00

Key:
GWP-t – climate change - total **GWP-f** – climate change - fossil **GWP-b** – climate change - biogenic **GWP-l** – climate change - land use and land use change **ODP** – ozone depletion **AP** - acidification **EP-fw** - eutrophication - aquatic freshwater **EP-m** - eutrophication - aquatic marine **EP-t** - eutrophication - terrestrial **POCP** - photochemical ozone formation **ADPF*²** - depletion of abiotic resources – fossil fuels **ADPE*²** - depletion of abiotic resources – minerals and metals **WDP*²** – water use **PERE** - use of renewable primary energy **PERM** - use of renewable primary energy resources used as raw materials **PERT** - total use of renewable primary energy **PENRE** - use of non-renewable primary energy **PENRM** - use of non-renewable primary energy resources used as raw materials **PENRT** - total use of non-renewable primary energy **SM** - use of secondary materials **RSF** - use of renewable secondary fuels **NRSF** - use of non-renewable secondary fuels **FW** - net use of freshwater **HWD** - hazardous waste disposed **NHWD** - non-hazardous waste disposed **RWD** - radioactive waste disposed **CRU** - components for reuse **MFR** - materials for recycling **MER** - materials for energy recovery **EEE** - exported electrical energy **EET** - exported thermal energy **ND** - not declared

	Results per 1 m² of KeraTwin Ceramic System															
	Unit	**A1-A3**	**A4**	**A5**	**B1**	**B2**	**B3**	**B4**	**B5**	**B6**	**B7**	**C1**	**C2**	**C3**	**C4**	**D**
Additional environmental impact indicators																
PM	Disease incidence	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
IRP*[1]	kBq U235 eq.	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
ETP-fw*[2]	CTUe	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
HTP-c*[2]	CTUh	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
HTP-nc*[2]	CTUh	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
SQP*[2]	Dimensionless.	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND

Key:
PM – particulate matter emissions **IRP*[1]** – ionising radiation – human health **ETP-fw*[2]** - ecotoxicity – aquatic freshwater **HTP-c*[2]** - human toxicity potential – cancer effect **HTP-nc*[2]** - human toxicity potential – non-cancer effect **SQP*[2]** – land use related impacts / soil quality **ND** - not declared

Disclaimers

*1 This impact category deals mainly with the eventual impact of low-dose ionising radiation on human health of the nuclear fuel cycle. It does not consider effects due to possible nuclear accidents, occupational exposure nor due to radioactive waste disposal in underground facilities. Potential ionising radiation from the soil, from radon and from some building materials is also not measured by this indicator

*2 The results of this environmental impact indicator shall be used with care as the uncertainties on these results are high or as there is limited experience with the indicator

6.4 Interpretation, LCA presentation and critical review

Evaluation

The environmental impacts during the manufacture of KeraTwin panels result mainly from the use of natural gas and the aluminium profiles and their specific upstream chains. The environmental impacts of transportation, enamel and clay/firing clay are insignificant in comparison.

The charts below show the distribution of the main environmental impacts.

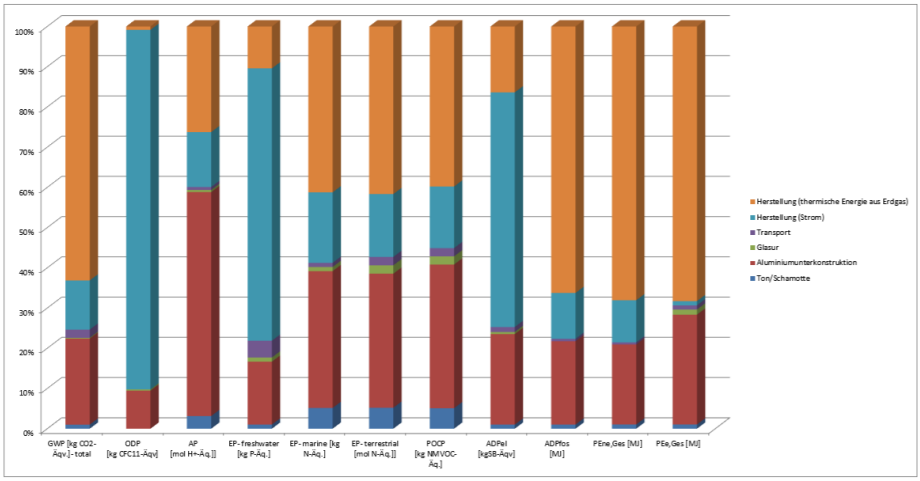


Figure 2: Percentage of the modules in selected environmental impact categories

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

Report

The LCA report 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 was carried out by Mr Florian Brechleiter, an independent ift verifier. In addition, the report was reviewed in the course of verification of the EPD carried out by Patrick Wortner, 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.

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 Part A” PCR-A-1.0:2023 and "Fassaden und Dächer ” PCR-FA-4.0:2023.

The European standard EN 15804 serves as the core PCR [a)]
Independent external verification of the Declaration and statement according to EN ISO 14025:2010
Independent third party verifier: [b)] MBA and Eng.,Dipl.-Ing. (FH) Partrick Wortner
[a)] Product category rules [b)] 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	Verifier
1	24.06.2024	External verification	Brechleiter	Wortner
2	26.06.2024	Editorial changes	Brechleiter	-
3	08.07.2024	Editorial changes	Brechleiter	-

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9 Annex

Description of life cycle scenarios for KeraTwin Ceramic System

Product stage			Con-struction process 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 process	Use	Maintenance	Repair	Replacement	Modification/refurbishment	Operational energy use	Operational water use	Deconstruction/demolition	Transport	Waste processing	Disposal	Reuse Recovery Recycling potential
✓	✓	✓	—	✓	—	—	—	—	—	—	—	✓	✓	✓	✓	✓

* For the declared B modules, the calculation of the results is based on the specified RSL related to one year.

Table 5: Overview of applied life cycle stages

Calculation of the scenarios was based on a defined RSL (see Section 4 Use stage).

The scenarios were based on information provided by the manufacturer. The scenarios were furthermore based on the research project “EPDs for transparent building components. (1)

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

A5 Construction/installation process

No.	Scenario	Description
A5	**Manual**	**According to the manufacturer the products are installed without using additional lifting and auxiliary devices**
In case of deviating consumption during installation/assembly of the products which forms part of the site management, they are covered at the construction works level. In anlehAncillary materials, consumables, use of energy and water, use of other resources, material losses, direct emissions as well as waste materials during installation are negligible. It is assumed that the packaging material in the module “construction / installation” is sent to waste handling. Waste is only thermally recycled or disposed of in line with the conservative approach. Films/foils / protective covers, wood and cardboard in waste incineration plants. Wood sent to landfill. Benefits from A5 are specified in module D. Benefits from waste incineration: electricity replaces electricity mix (DE); thermal energy replaces thermal energy from natural gas (DE). Transport to the recycling plants is not taken into account. Since only one scenario is used, the results are shown in the relevant summary table.		

C1 Deconstruction, demolition

No.	Scenario	Description
C1	**Deconstruction**	Following EN 17213: **Deconstruction of non-glass materials: 95%** **Residues: on landfill**
No relevant inputs or outputs apply to the scenario selected. The energy consumed for deconstruction is negligible. Any arising consumption is marginal. Since only one scenario is used, the results are shown in the relevant summary table. In case of deviating consumption, the removal of the products forms part of the site management and is covered at the construction works level.		

C2 Transport

No.	Scenario	Description
C2	**Transport**	**Transport to collection point using 32 t truck (Euro 6 mix), diesel, 24.7 t payload, 85 % capacity used, 50 km**
Since only one scenario is used, the results are shown in the relevant summary table.		

C3 Waste management

No.	Scenario	Description
C3	Current market situation	**Share for recirculation of materials:** • **Aluminium 95 % in melt** (GDA, 2018) • **Ceramic façade panels 94.5 %** (Kreislaufwirtschaft Bau Monitoringbericht 2020) • **Remainder to landfill**

Electricity consumption of incineration plant 0.5 MJ/kg.

The table below describes the disposal processes and their percentage by mass/weight. The calculation is based on the above mentioned proportions in percent related to the declared unit of the product system.

C3 Disposal	Unit	C3
Collection process, collected separately	kg	30.21
Collection process, collected as mixed construction waste	kg	1,59
Recovery system, for reuse	kg	0
Recovery system, for recycling	kg	30.63
Recovery system, for energy recovery	kg	0
Disposal	kg	3.25

Since only one scenario is used, the results are shown in the summary table.

C4 Disposal

No.	Scenario	Description
C4	Disposal	**The non-recordable amounts and losses within the re-use/recycling chain (C1 and C3) are modelled as “dis-posed” (DE).**

The consumption in scenario C4 results from physical pre-treatment, waste recycling and management of the disposal site. The benefits obtained here from the substitution of primary material production are allocated to module D, e.g. electricity and heat from waste incineration.

Since only one scenario is used, the results are shown in the summary table.

D Benefits and loads from beyond the system boundaries

No.	Scenario	Description[1]
D	Recycling potential	**Aluminium scrap from C3 excluding the recyclate used in A3 replaces 60 % of aluminium;** **Ceramic components replace 94.5 % of gravel 2/32 (DE)** **Benefits from waste incineration: electricity replaces electricity mix (DE); thermal energy replaces thermal energy from natural gas (DE).**

[1] Value correction factor 70.2% according to metal specific data set, 60% according to standard data set for other materials.

The values in module “D” result from recycling of the packaging material in module A5 and from deconstruction at the end of service life.

Since only one scenario is used, the results are shown in the summary table.

Imprint

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