# Environmental Product

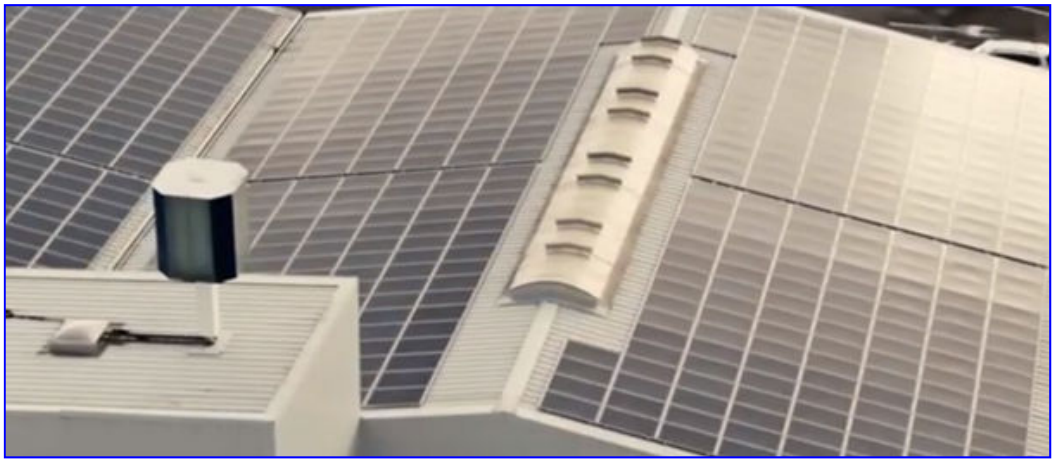
Declaration code EPD-MGK-GB-23.1


MAGNA GLASKERAMIK

**MAGNA Glaskeramik GmbH**

# glass ceramics

# MAGNA glass ceramics



**Basis:**

DIN EN ISO 14025
EN15804

Company EPD
**E**nvironmental
**P**roduct **D**eclaration

Publication date:
02.11.2022

Next revision:
02.11.2027

www.ift-rosenheim.de/
published EPDs

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Prüfung und Kalibrierung – EN ISO/IEC 17025
Inspektion – EN ISO/IEC 17020
Zertifizierung Produkte – EN ISO/IEC 17065
Zertifizierung Managementsysteme – EN ISO/IEC 17021

Notified Body **0757**
PÜZ-Stelle: **BAY 18**

DAkkS Deutsche Akkreditierungsstelle D-ZE-11349-01-00

# Environmental Product

## Declaration code EPD-MGK-GB-23.1

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|---|---|---|---|
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| **Declaration code** | EPD-MGK-GB-23.1 | | |
| **Designation of declared product** | MAGNA glass ceramics | | |
| **Scope** | Glass ceramics are used outdoors as facades, tombstones and sculptures, and indoors as interior walls, vanities, showers, furniture, floors, kitchen countertops, counters, elevators, steps and as design objects. | | |
| **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" (General guideline for preparation of Type III Environmental Product Declarations) applies. The declaration is based on PCR documents "PCR Part A" PCR-A-0.3:2018 and “Flat glass in building industry" PCR-FG-2.0:2021. | | |
| **Validity** | Publication date:<br>02.11.2022 | Last revision:<br>02.11.2022 | Next revision:<br>02.11.2027 |
| | 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. | | |
| **LCA Basis** | The LCA was prepared in accordance with DIN EN ISO 14040 and DIN EN ISO 14044. The data collected from production plant of the company MAGNA Glaskeramik GmbH were used as a data basis, as well as generic data from the database “GaBi 10". LCA calculations were carried out for the included “cradle to gate – with options” including all upstream chains (e.g. raw material extraction, etc.). | | |
| **Notes** | The ift-Guidance Sheet “Conditions and Guidance for the Use of ift Test Documents” applies.<br>The declaration holder assumes full liability for the underlying data, certificates and verifications. | | |

| | | |
|---|---|---|
| Christian Kehrer<br>Head of Certification and Surveillance Body | Dr. Torsten Mielecke<br>Chairman of Expert Committee<br>ift-EPD and PCR | Patrick Wortner<br>External verifier |

# 1 General Product Information

**Product definition**

The EPD belongs to the product group glass ceramics and applies to

**1 m² MAGNA glass ceramics**
**of company MAGNA Glaskeramik GmbH**

The functional unit is obtained by summing up:

| Assessed product | Glass thickness | Surface weight | Density |
|---|---|---|---|
| Glass ceramic plate raw, facade outside | 21-23 mm | 52.3 kg/m² | 2.48 g/cm³ |

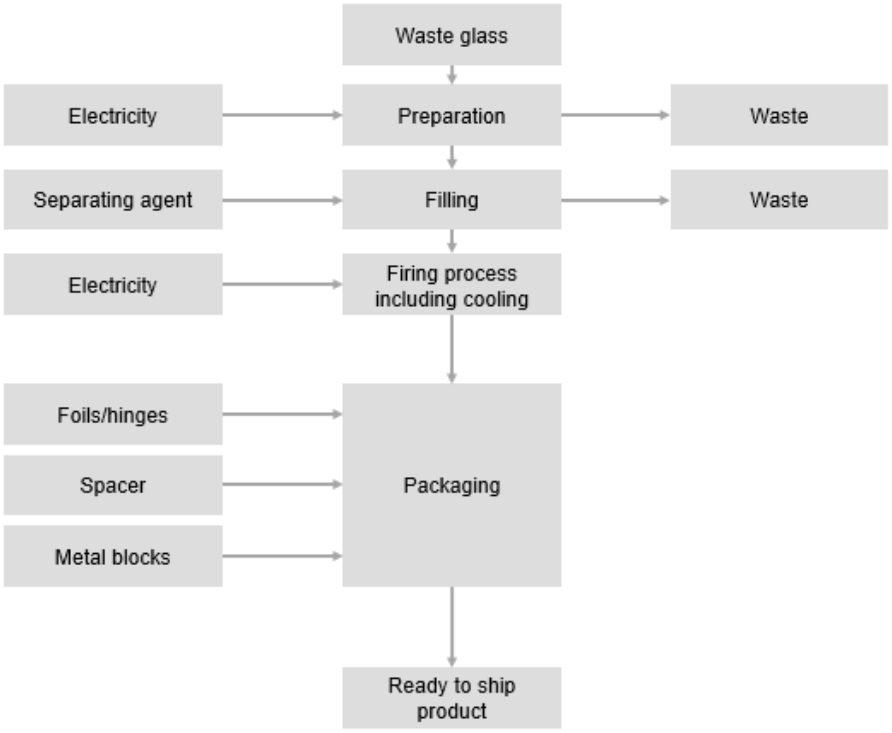
**Table 1** Product group

The average unit is declared as follows:
Directly used material flows are determined by means of manufactured quantities (pieces) and allocated to the declared unit. All other inputs and outputs in the production were scaled to the declared unit in their entirety since there is no typical functional unit due to the high number of variants. The reference period is the year 2020.

**Product description**

MAGNA glass ceramics is a design product made from 100% recycled glass bottles and is characterized by its unique optical properties. It can be cut into any curved shape using waterjet and CNC machining. Miter cuts and their bonding to veneers can also be produced without any problems. For special edge solutions, special thicknesses of up to 45 mm can be manufactured. Almost jointless bonding is also possible. Individual glass ceramic elements can be butted together with a minimal chamfer to form an almost invisible joint. Due to the application of a patinated surface (Mohs hardness 6), surfaces made of MAGNA glass ceramics are largely scratch-resistant.
For a detailed product description refer to the manufacturer specifications or the product specifications of the respective offer/quotation.

## Product manufacture




## Application

Glass ceramics are used outdoors as facades, tombstones and sculptures, and indoors as interior walls, vanities, showers, furniture, floors, kitchen countertops, counters, elevators, steps and design objects.

## Additional information

For additional verifications of applicability or conformity refer to the CE marking and the documents accompanying the product, if applicable.

MAGNA glass ceramics (area related mass: 52.3 kg/m²) meets the following building-physical performance characteristics:

flexural tensile strength
- Characteristic value approx. 35 MPa according to EAD 13-33-0030-06.01
- 5 % fractile approx. 22 MPa according to EAD 13-33-0030-06.01

Thermal expansion 20-100 ℃
- 7.22 (10-6/K) according to DIN EN 103

Water absorption
- < 0.1 Ma.-% according to DIN EN 99

chemical resistance
- Class AA according to DIN EN 122

Acid resistance
- Class AA according to DIN EN 122

Fire protection class
- Class A1 according to EN 13501-1

Further technical data can be found on the website (http://www.magna-glaskeramik.de/) of the declaration holder.

## 2 Materials used

**Primary materials**

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

**Declarable substances**

No substances according to REACH candidate list are included (declaration of 10.03.2022).

All relevant safety data sheets can be obtained from company MAGNA Glaskeramik GmbH.

## 3 Construction process stage

**Processing recommendations, installation**

Observe the instructions for assembly/installation, operation, maintenance and disassembly, provided by the manufacturer. For this, see www.magna-glaskeramik.de

## 4 Use stage

**Emissions to the environment**

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

**Reference service life (RSL)**

The RSL information was provided by the manufacturer. The RSL must be established under specified reference conditions of use and relate to the declared technical and functional performance of the product within the building. It must be determined according to all specific rules given in European product standards or, if none are available, according to a c-PCR. It must also take into account ISO 15686-1, -2, -7 and -8. If there is guidance on deriving RSLs from European Product Standards or a c-PCR, then such guidance must take precedence.
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 an EPD "cradle to factory gate with options", with modules C1-C4 and module D (A1-A3 + C + D and one or more additional modules from A4 to B7), the specification of a reference service life (RSL) is only possible if the reference service life conditions are specified.
Thereference service life (RSL) of MAGNA glass ceramics of company MAGNA Glaskeramik GmbH is not specified.

## 5 End-of-life stage

**Possible end-of-life stages**

MAGNA glass ceramics is fed to central collection points. There the products are usually shredded and sorted into their 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.

In this EPD, the modules of after-use are presented according to EN 17074.
Glass is recycled to certain parts. 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.

As a basis for this, a life cycle assessment was prepared for MAGNA glass ceramics. These LCAs are in conformity with the requirements set out in 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

**Aim**

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 specific data originate exclusively from the 2020 fiscal year. They were collected on-site at the plant located in Teutschenthal and originate 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 originate from the “GaBi 10” professional and building materials databases. The last update of both databases was in 2022. Data from before this date originate also from these databases and are not more than 5 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” for the development of life cycle assessments.

**Scope / system boundaries**

The system boundaries refer to the procurement of raw materials and purchased parts, the production and the after-use of MAGNA glass ceramics.

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 100% of the mass of the products.
The following assumption was made for the means of transport:

- Truck-trailer, more than 32 t total weight / 24.7 t payload, Euro 6, 85% capacity used.

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 calculation also includes material and energy flows that account for less than 1%.

## 6.2 Inventory analysis

**Aim**

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.

**Life cycle stages**

The complete life cycle of MAGNA glass ceramics is shown in the annex. The product stage "A1 – A3", recycling of the packaging materials in 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 as per DIN EN 15804:

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

**Allocation of co-products**

No allocations occur during production.

**Allocations for re-use, recycling and recovery**

If the products are reused/recycled and recovered during the product stage (rejects), the elements are shredded, if necessary and then sorted into their 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.

**Allocations beyond life cycle boundaries**

The use of recycled materials in the manufacturing process was based on the current market-specific situation. In parallel to this, a recycling potential was taken into consideration that reflects the economic value of the product after recycling (recyclate).
Secondary material designated as inputs to MAGNA glass ceramics is calculated as input without loads. No benefits are assigned to Module D, but consumption to Modules C3 and C4 (worst case consideration).
The system boundary set for the recycled material refers to collection.

**Secondary material**

The use of secondary material by MAGNA Glaskeramik GmbH was not considered in Module A3. Secondary material is used.

**Inputs**

The following manufacturing-related inputs were included in the LCA per 1 m² MAGNA glass ceramics:

**Energy**
For the electricity mix, the "Electricity Mix Germany" and "Electricity from Photovoltaics Germany" were assumed.

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

**Water**
There is no water consumption in the individual process steps for production.
The consumption of fresh water specified in Section 6.3 originates (among others) from the process chain of the pre-products.

**Raw material / pre-products**
The charts below show the share of raw materials/pre-products in percent.

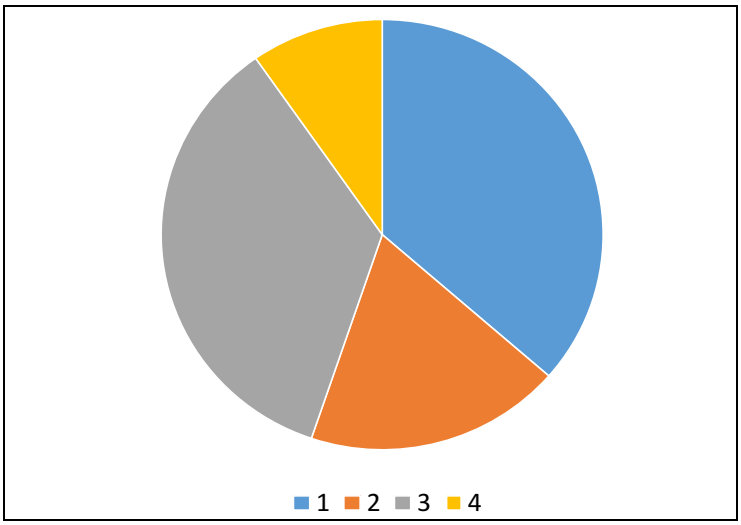



**Illustration 1** Percentage of individual materials per declared unit

| N° | Material | Mass in % |
|---|---|---|
| 1 | Bottle glass (waste glass) | 36.4 |
| 2 | Flat glass (waste glass) | 18.8 |
| 3 | Solar glass (waste glass) | 35.1 |
| 4 | TSG glass (waste glass) | 9.7 |

**Table 2** Percentage of individual materials per declared unit

**Ancillary materials and consumables**
71.4 g of ancillary materials and consumables are used.

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

| N° | Material | Mass in kg |
|---|---|---|
| 1 | PE film | 0.01 |
| 2 | Spacer | 0.02 |

**Table 3** Weight in kg of packaging per declared unit

**Biogenic carbon content**
Only the biogenic carbon content of the associated packaging is reported, as the total mass of biogenic carbon-containing materials is less than 5% of the total mass of the product and associated packaging. According to EN 16449, the following amounts of biogenic carbon are generated for packaging:

| N° | part | Content in kg C |
|---|---|---|
| 1 | In the corresponding packaging | 0.07 |

**Table 4** Biogenic carbon content of the packaging at the factory gate

**Outputs**

The following manufacturing-related outputs were included in the LCA per 1 m² MAGNA glass ceramics:

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

**Waste water**
No waste water is produced during the manufacturing process.

## 6.3 Impact assessment

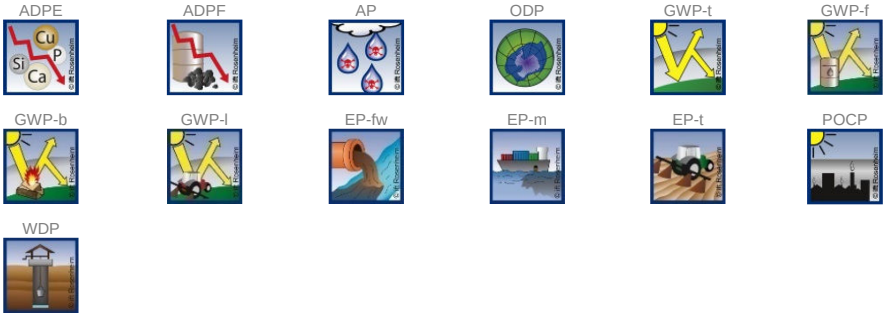
**Aim**

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

**Impact categories**

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

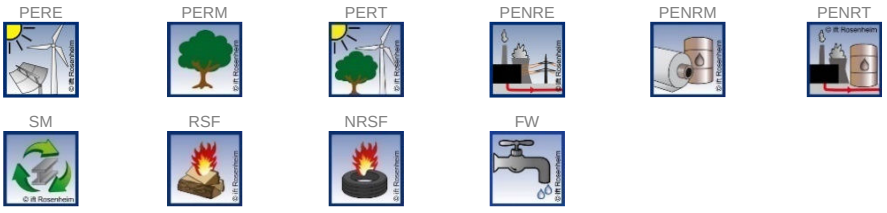
- Depletion of abiotic resources - minerals and metals;
- Depletion of abiotic resources - fossil fuels;
- Acidification;
- Ozone depletion;
- Climate change - total;
- Climate change - fossil;
- Climate change - biogenic;
- Climate change - land use and land use change;
- Eutrophication freshwater;
- Eutrophication salt water;
- Eutrophication land;
- Photochemical ozone creation;
- Water use.




**Resource management**

The models for impact assessment were applied as described in DIN EN 15804-A2.
The following resource use indicators are presented in the EPD:

- Renewable primary energy as energy source;
- Renewable primary energy for material use;
- Total use of renewable primary energy;
- Non-renewable primary energy as energy source;
- Renewable primary energy for material use;
- Total use of non-renewable primary energy;
- Use of secondary materials;
- Use of renewable secondary fuels;
- Use of non-renewable secondary fuels;
- Net use of freshwater resources.

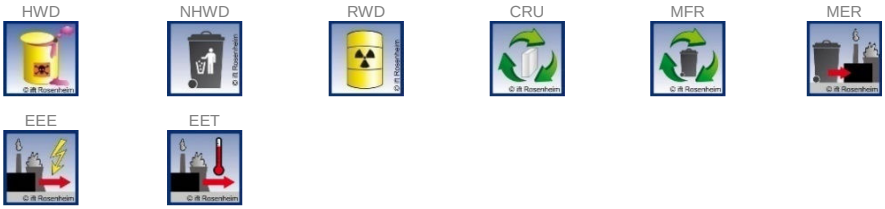


**Waste**

The waste generated during the production of 1 m² MAGNA glass ceramics 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 following waste categories and indicators for output closures are presented in the EPD:

- Disposed hazardous waste;
- Disposed non-hazardous waste;
- Radioactive waste disposed;
- Components for re-use;
- Materials for recycling;
- Materials for energy recovery;
- Exported electrical energy;
- Exported thermal energy.




**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:

- Fine dust missions;
- Ionizing radiation, human health;
- Ecotoxicity (freshwater);
- Human toxicity, carcinogenic effects;
- Human toxicity, non-carcinogenic effects;
- Impacts associated with land use/soil quality.

| Results per 1 m² MAGNA glass ceramics | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | **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. | 32.90 | ND | 6.59E-02 | ND | ND | ND | ND | ND | ND | ND | 0.00 | 0.104 | 5.35E-02 | 0.77 | -2.80E-02 |
| **GWP-f** | kg $CO_2$-eq. | 32.40 | ND | 3.83E-02 | ND | ND | ND | ND | ND | ND | ND | 0.00 | 0.103 | 5.30E-02 | 0.791 | -2.79E-02 |
| **GWP-b** | kg $CO_2$-eq. | 0.41 | ND | 2.76E-02 | ND | ND | ND | ND | ND | ND | ND | 0.00 | 5.13E-05 | 4.51E-04 | -0.23E-01 | -1.38E-04 |
| **GWP-l** | kg $CO_2$-eq. | 9.88E-02 | ND | 6.87E-07 | ND | ND | ND | ND | ND | ND | ND | 0.00 | 6.63E-04 | 7.55E-05 | 2.32E-03 | -1.91E-05 |
| **ODP** | kg CFC-11-eq. | 1.50E-11 | ND | 8.28E-18 | ND | ND | ND | ND | ND | ND | ND | 0.00 | 2.64E-17 | 1.27E-15 | 3.07E-15 | -3.14E-16 |
| **AP** | mol $H^+$-eq. | 5.73E-02 | ND | 1.16E-05 | ND | ND | ND | ND | ND | ND | ND | 0.00 | 9.18E-05 | 1.10E-04 | 5.63E-03 | -3.61E-05 |
| **EP-fw** | kg P-eq. | 1.59E-04 | ND | 1.36E-09 | ND | ND | ND | ND | ND | ND | ND | 0.00 | 2.12E-07 | 1.43E-07 | 1.33E-06 | -3.61E-08 |
| **EP-m** | kg N-eq. | 1.66E-02 | ND | 3.65E-06 | ND | ND | ND | ND | ND | ND | ND | 0.00 | 2.93E-05 | 2.62E-05 | 1.46E-03 | -1.03E-05 |
| **EP-t** | mol N-eq. | 0.17 | ND | 5.33E-05 | ND | ND | ND | ND | ND | ND | ND | 0.00 | 3.52E-04 | 2.75E-04 | 1.61E-02 | -1.10E-04 |
| **POCP** | kg NMVOC-eq. | 4.39E-02 | ND | 9.93E-06 | ND | ND | ND | ND | ND | ND | ND | 0.00 | 7.90E-05 | 7.10E-05 | 4.43E-03 | -2.89E-05 |
| **ADPF*²** | MJ | 1.28E-04 | ND | 1.26E-10 | ND | ND | ND | ND | ND | ND | ND | 0.00 | 1.37 | 1.56E-08 | 10.50 | -4.59E-09 |
| **ADPE*²** | kg Sb equivalent | 433.00 | ND | 1.36E-02 | ND | ND | ND | ND | ND | ND | ND | 0.00 | 8.98E-09 | 0.94 | 7.46E-08 | -0.48 |
| **WDP*²** | $m^3$ world-eq. deprived | 1.46 | ND | 6.97E-03 | ND | ND | ND | ND | ND | ND | ND | 0.00 | 4.01E-04 | 8.41E-03 | 8.49E-02 | -2.08E-03 |
| **Resource management** | | | | | | | | | | | | | | | | |
| **PERE** | MJ | 1,400.00 | ND | 2.62E-03 | ND | ND | ND | ND | ND | ND | ND | 0.00 | 7.94E-02 | 0.43 | 1.41 | -0.11 |
| **PERM** | MJ | 0.32 | ND | -0.32 | ND | ND | ND | ND | ND | ND | ND | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **PERT** | MJ | 1,400.00 | ND | 2.62E-03 | ND | ND | ND | ND | ND | ND | ND | 0.00 | 7.94E-02 | 0.43 | 1.41 | -0.11 |
| **PENRE** | MJ | 433.00 | ND | 1.36E-02 | ND | ND | ND | ND | ND | ND | ND | 0.00 | 1.37 | 0.94 | 10.50 | -0.48 |
| **PENRM** | MJ | 0.25 | ND | -0.25 | ND | ND | ND | ND | ND | ND | ND | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **PENRT** | MJ | 433.00 | ND | 1.36E-02 | ND | ND | ND | ND | ND | ND | ND | 0.00 | 1.37 | 0.94 | 10.50 | -0.48 |
| **SM** | kg | 52.30 | 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** | $m^3$ | 0.15 | ND | 1.64E-04 | ND | ND | ND | ND | ND | ND | ND | 0.00 | 7.6E-05 | 4.21E-04 | 2.59E-03 | -1.05E-04 |
| **Categories of waste** | | | | | | | | | | | | | | | | |
| **HWD** | kg | 5.41E-07 | ND | 2.49E-12 | ND | ND | ND | ND | ND | ND | ND | 0.00 | 5.72E-11 | 2.50E-10 | 1.11E-09 | -1.09E-10 |
| **NHWD** | kg | 0.60 | ND | 1.04E-03 | ND | ND | ND | ND | ND | ND | ND | 0.00 | 2.21E-04 | 6.69E-04 | 52.3 | -2.25E-04 |
| **RWD** | kg | 3.83E-02 | ND | 7.19E-07 | ND | ND | ND | ND | ND | ND | ND | 0.00 | 1.31E-06 | 1.40E-04 | 1.1E-04 | -3.45E-05 |
| **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 | 0.00 | ND | 0.00 | ND | ND | ND | ND | ND | ND | ND | 0.00 | 0.00 | 15.69 | 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 | 0.12 | ND | ND | ND | ND | ND | ND | ND | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **EET** | MJ | 0.00 | ND | 0.22 | ND | ND | ND | ND | ND | ND | ND | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |

**Key:**
**GWP-t** – global warming potential - total **GWP-f** – global warming potential fossil fuels **GWP-b** – global warming potential - biogenic **GWP-l** – global warming potential - land use and land use change **ODP** – ozone depletion potential **AP** - acidification potential **EP-fw** - eutrophication potential - aquatic freshwater **EP-m** - eutrophication potential - aquatic marine **EP-t** - feutrophication potential - terrestrial **POCP** - photochemical ozone formation potential **ADPF*²** - abiotic depletion potential – fossil resources **ADPE*²** - abiotic depletion potential – minerals&metals **WDP*²** – Water (user) deprivation potential **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 m² MAGNA glass ceramics | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | **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 potential **IRP*[1]** – ionizing radiation potential – human health **ETP-fw*[2]** - Eco-toxicity potential – freshwater **HTP-c*[2]** - Human toxicity potential – cancer effects **HTP-nc*[2]** - Human toxicity potential – non-cancer effects **SQP*[2]** – soil quality potential

**Disclaimers:**

*1 This impact category deals mainly with the eventual impact of low dose ionizing 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 ionizing radiation from the soil, from radon and from some construction 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**

As in the original EPD, the manufacturing process (electricity demand) almost alone dominates all environmental categories. Transport and packaging play only a very marginal role in the environmental impact.

Some LCA results differ considerably from the results presented in the EPD prepared five years ago. The reasons for this are that other, more suitable GaBi data sets were used, the background data in GaBi has changed and a new data collection of the more energy-efficient production was carried out by the declaration holder. In addition, the process steps of grinding the front and back of the glass ceramics were not considered in the EPD update.

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

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

**Diagram**

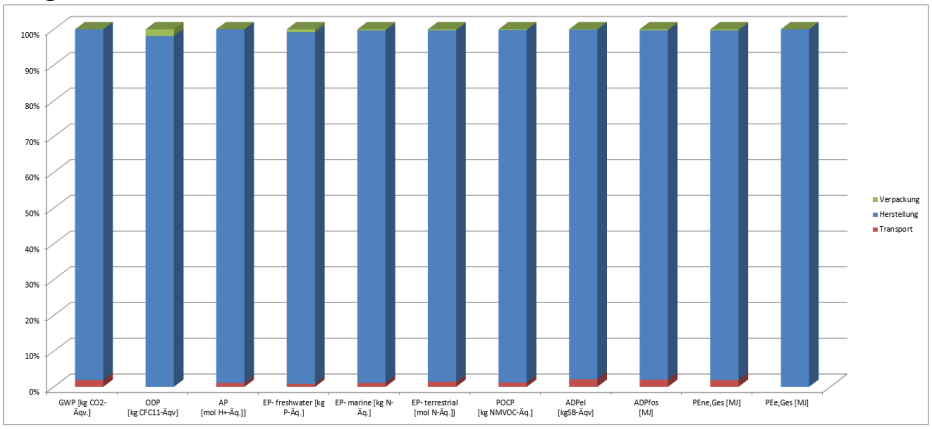



**Illustration 2** Percentage shares of packaging, production and transport in selected environmental impact indicators

**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 deposited with 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 the external auditor Patrick Wortner, MBA and Eng., Dipl.-Ing.

# 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.

This declaration is based on PCR documents "PCR Part A" PCR-A-0.3:2018 and “Flat glass in building industry" PCR-FG-2.0:2021.

| |
|---|
| The European standard EN 15804 serves as the core PCR [a)] |
| Independent verification of the Declaration and statement according to EN ISO 14025:2010<br>☐ internal ☒ external |
| Independent third party verifier: [b)]<br>Patrick Wortner |
| [a)] Product category rules<br>[b)] Optional for business-to-business communication Mandatory for business-to-consumer communication (see EN ISO 14025:2010, 9.4). |

**Revisions of this document**

| N° | Date | Note | Person in charge | Testing personnel |
|---|---|---|---|---|
| 1 | 02.11.2022 | External verification | Pscherer | Wortner |

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# 9 Annex

## Description of life cycle scenarios for MAGNA glass ceramics

| Product stage | | | Con-struction process stage | | Use stage | | | | | | | End-of-life stage | | | | Benefits and loads beyond system boundaries |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| A1 | A2 | A3 | A4 | A5 | B1 | B2 | B3 | B4 | B5 | B6 | B7 | C1 | C2 | C3 | C4 | D |
| Raw material supply | Transport | production | Transport | Construction/installation process | Use | maintenance | Repair | replacement | Refurbishment | Operational energy use | Operational water use | Deconstruction/demolition | Transport | Waste processing | Disposal | Reuse<br>Recovery<br>Recycling potential |
| ✓ | ✓ | ✓ | — | ✓ | — | — | — | — | — | — | — | ✓ | ✓ | ✓ | ✓ | ✓ |

The scenarios were based on information provided by the manufacturer and furthermore on the EN 17074 scenarios. (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**

| No. | Scenario | Description |
|---|---|---|
| **A5** | **Manual** | **According to standard EN 17074, the auxiliary elements necessary for the installation of glass/glass products in the building are not taken into account.** |

In case of deviating consumption during installation/assembly of the products which forms part of the site management, they are covered at the building level.

Ancillary materials, consumables, use of energy and water, other resource use, material losses, direct emissions as well as waste during construction / 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 in line with the conservative approach: Films / casings and carton in incineration plants. Benefits from A5 are specified in module D. Benefits from waste incineration: Benefits from waste incineration: electricity replaces electricity mix (EU 28); thermal energy replaces thermal energy from natural gas (EU 28).
Transport to the recycling plants is not taken into account.

Since this is a single scenario, the results are shown in the relevant summary table.

**C1 Deconstruction**

| No. | Scenario | Description |
|---|---|---|
| **C1** | **Deconstruction** | **Correspond to EN 17074 (9.8.4 end-of-life stage (C1 to C4)).**<br>• **Glass 100 % deconstruction**<br>**Further deconstruction rates are possible, give adequate reasons.** |

No relevant inputs or outputs apply to the scenario selected. The energy consumed for deconstruction is negligible. Any arising consumption is marginal.

Since this is a single scenario, the results are shown in the relevant summary table.

In case of deviating consumption the removal of the products forms part of site management and is covered at the building level.

**C2 Transport**

| No. | Scenario | Description |
|---|---|---|
| **C2** | **Transport** | **Transport to collection point with more than 32 t truck total weight (Euro 6), diesel, 24.7 t payload, 80 % capacity used, 15 km** |

Since this is a single scenario, the results are shown in the relevant summary table.

**C3 Waste management**

| No. | Scenario | Description |
|---|---|---|
| C3 | Disposal | 100 % for material recycling |

Electricity consumption of recycling plant: 0.5 MJ/m²

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

| C3.1 Disposal | Unit | C3 |
|---|---|---|
| Collection process, collected separately | kg | 15.69 |
| Collection process, collected as mixed construction waste | kg | 36.61 |
| Recovery system, for re-use | kg | 0.00 |
| Recovery system, for recycling | kg | 15.69 |
| Recovery system, for energy recovery | kg | 0.00 |
| Disposal | kg | 36.61 |

The 100% scenarios differ from the average current recovery (D3.1). The evaluation of each scenario is described in the background report.

Since this is a single scenario, 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 “disposed” (EU-28). |

The 100% scenarios differ from the average current recovery (D4.1). The evaluation of each scenario is described in the background report.

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 this is a single scenario, the results are shown in the summary table.

**D Benefits and loads from beyond the system boundaries**

| No. | Scenario | Description |
|---|---|---|
| D | Recycling potential | Benefits are not shown or indicated as 0.00 due to 100% secondary material. |

The values in module “D” result exclusively from the recycling of the packaging material in module A5.

The 100% scenarios differ from the average current recovery (D1). The evaluation of each scenario is described in the background report.

Since this is a single scenario, the results are shown in the summary table.

## Imprint

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**Layout**
ift Rosenheim GmbH – 2021

**Photographs (front page)**
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