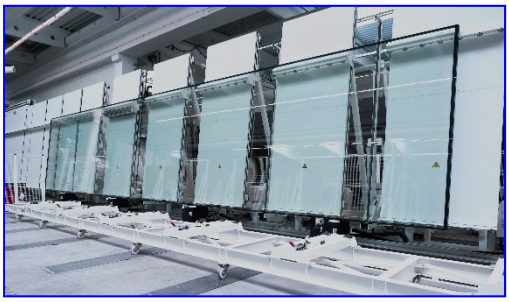
Environmental Product Declaration (EPD)

Declaration Code: EPD-SIG-GB-71.0

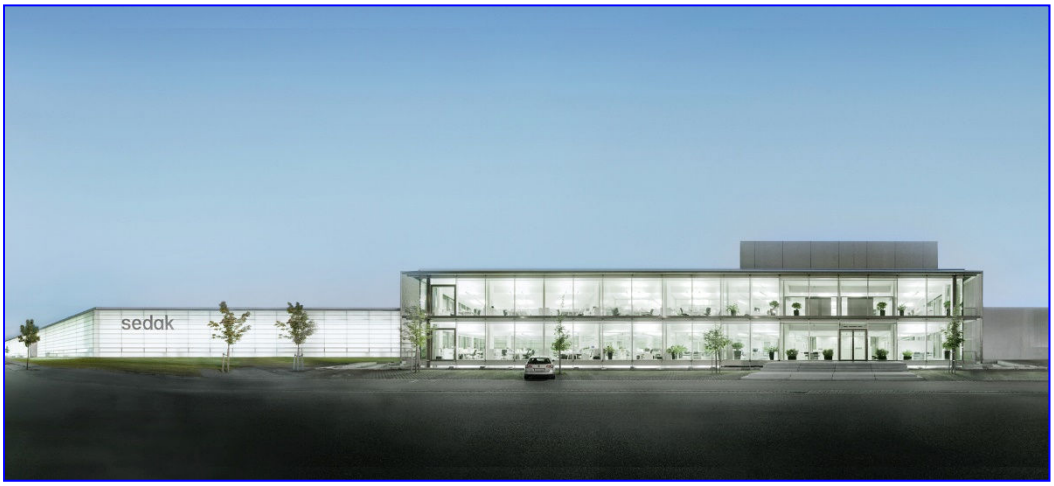


sedak

sedak GmbH & Co. KG

flat glass

sedak insulating glass (double or triple glazing) with sedak safety glass and single glazing



Basis:

DIN EN ISO 14025
EN 15804 + A2

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

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Environmental Product Declaration (EPD)

Declaration Code: EPD-SIG-GB-71.0

Programme operator	ift Rosenheim GmbH Theodor-Gietl-Straße 7-9 D-83026 Rosenheim
Practitioner of the LCA	ift Rosenheim GmbH Theodor-Gietl-Straße 7-9 D-83026 Rosenheim
Declaration holder	sedak GmbH & Co. KG Einsteinring 1 D-86368 Gersthofen www.sedak.com
Declaration code	EPD-SIG-GB-71.0
Designation of declared product	sedak insulating glass (double or triple glazing) with sedak safety glass and single glazing
Scope	sedak insulating glass is used in the construction and marine sectors.
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 EN 17074 “PCR for flat glass products”, “PCR Part A” PCR-A-1.0-2023 and “Flat glass in construction” PCR-FG-2.0:2021.
Validity	Publication date: 28.05.2024 / Last revision: 28.05.2024 / Valid until 28.05.2029 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 sedak GmbH & Co. KG and the generic data from the ”LCA for Experts 10“ database. LCA calculations were carried out for the included “cradle to grave” 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.

Christian Kehrer Head of Certification and Surveillance Body	Dr. Torsten Mielecke Chairman of Expert Committee ift-EPD and PCR	Benedikt Dellawalle Independent verifier

1 General product information

Product definition

The EPD relates to the product group flat glass and applies to:

1 m² of sedak insulating glass (double or triple glazing) with sedak safety glass and single glazing made by sedak GmbH & Co. KG

The declared unit is obtained as follows:

Assessed product	Declared unit	Grammage	Density
sedak double insulating glass (sedak ISO double)	1 m²	103,43 kg/m²	1,88 g/cm³
sedak insulating glass triple (sedak ISO triple)	1 m²	92,53 kg/m²	1,50 g/cm³

Table 1: Product groups

The following information is used to calculate the bulk density:

Assessed product	Structure	Total thickness of the structure
sedak ISO double	Laminated safety glass VSG 10-10* Space between panes 12 mm Laminated safety glass VSG 10-10* Layer 5 coated	55,04 mm
sedak ISO triple	Laminated safety glass VSG 10-10* Space between panes 12 mm Float glass 8 mm Space between panes 12 mm Float glass 8 mm Layer 7 coated	61,52 mm

* VSG with 2*10 mm float glass and one layer of 1.52 mm Sentryglas film; film density: 0.95 g/cm³ according to SDS

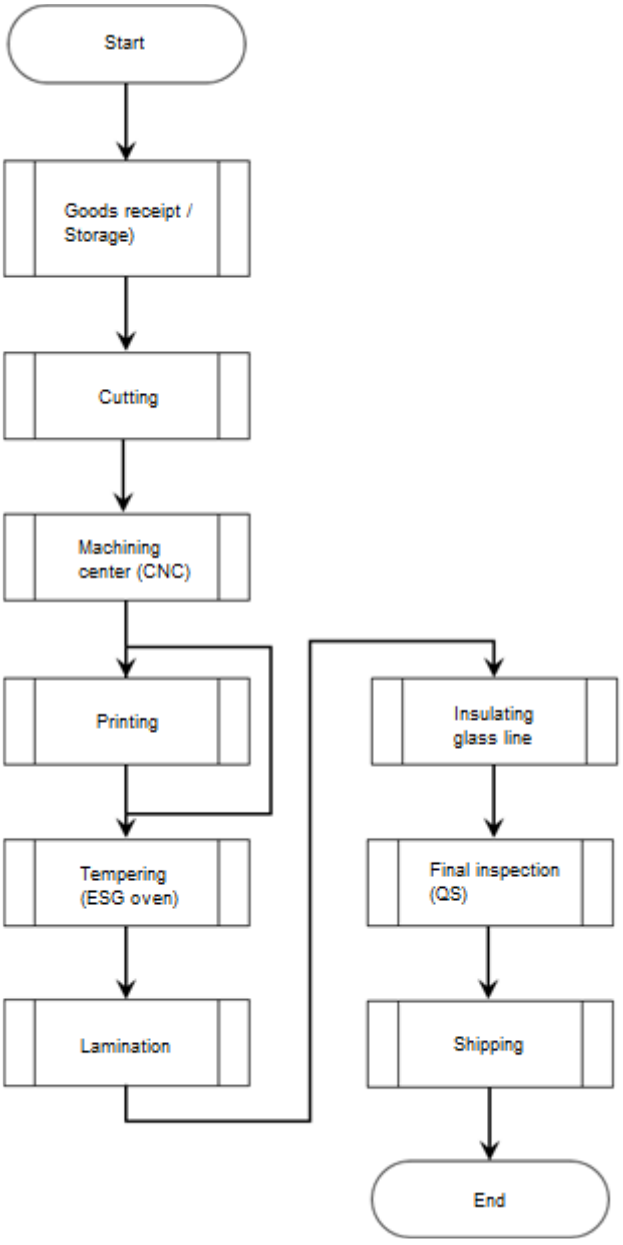
The average unit is declared as follows:
Directly used material flows are determined using the manufactured areas (m²) and assigned to the declared unit. All other inputs and outputs in the production are assigned to the declared unit in their entirety, because they cannot be related to the average size. In the case of thickness-dependent inputs and outputs, the thickness is taken into account in the allocation. The reference period refers to the period between 01.04.2022 and 30.03.2023.

Product description

sedak insulating glass consists of double or triple laminates in various thicknesses. Solar control/thermal insulation layers are used between the panes together with an argon gas filling.

For a detailed product description, please refer to the manufacturer's specifications or the product descriptions of the respective offer.

Product manufacture



Scope

sedak insulating glass is used in high-quality architectural applications such as façade glass, roof glass, etc. and in marine applications such as ships, yachts and pools.

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.

sedak insulating glass (double or triple glazing) with sedak safety glass and single glazing fulfill the following properties in accordance with EN 12795-5:2018-10:

Property	sedak ISO double	sedak ISO triple	Unit
	Performance/ class		
Resistance to sudden temperature changes and differences	40/40-40/40	40/40-40/40	
Resistance to wind, snow, permanent and/or live loads	45/45-45/45	45/45-45/45	
Thermal transmittance coefficient (U_g-value)	1.1	0.9	W/m²K)
Light transmission degree (τ_V)	0.65	0.61	
Degree of light reflec-tion outside (ρ_V)	0.20	0.24	
Total energy transmit-tance (g-Wert)	0.44	0.41	
Direct radiation emissivity (τ_e)	0.35	0.34	
ρ_e	0.23	0.22	
ultraviolet transmissivity (T_{UV})	0.00	0.00	
general color rendering inde (R_a)	93	94	
Shading Coefficient = g/0.87 (SC)	0.50	0.47	
b-factor (VDI 2078, g/0.80)	0.55	0.51	

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 09 August 2023).

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

3 Construction process stage

Processing recommendations, installation

Observe the instructions for mounting/installation, operation, maintenance and disassembly, provided by the manufacturer. See www.sedak.com

4 Use stage

Emissions to the environment

There are no known emissions to indoor air, water or soil. According to EN 17074, the consideration of VOC emissions in glass products is not relevant.

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 the “Cradle to grave” EPD and module D (A + B + C + D), a reference service life (RSL) shall be stated .
According to the EN17074, a service life of 30 years is specified for sedak insulating glass (double or triple glazing) with sedak safety glass and single glazingsedak GmbH & Co. KG

The service life is dependent on the characteristics of the product and the in-use conditions.

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 sedak insulating glass (double or triple glazing) with sedak safety glass and single glazing 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.

In this EPD, the modules of reuse are shown in accordance with EN 17074 or based on EN 17213 (market situation).
Glass is recycled to a certain extent. Plastics are thermally recycled.

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 sedak insulating glass (double or triple glazing) with sedak safety glass and single glazing, 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 originates exclusively from the period under review between 01.04.2022 and 30.03.2023. They were collected on-site at the plant located in Gersthofen 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 five 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 sedak insulating glass (double or triple glazing) with sedak safety glass and single glazing.
Additional specific data for the manufacturing process and the coating process of the float glass at the upstream supplier were taken into account. No other additional data from upstream suppliers or other locations was taken into account.

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 pre-products were taken into consideration as a function of 100% of the mass of the products.

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 scenario as provided by the manufacturer:

- Transport to collection point using 40 t truck (Euro 0-6 mix), diesel, 27 t payload, 50% capacity used, Transport km per waste material recorded individually.

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 sedak insulating glass (double or triple glazing) with sedak safety glass and single glazing. The “Product stage” (A1 - A3), “Construction process stage” (A4 - A5), “Use stage” (B1 - B7), “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:
Data was collected on a product-specific basis along the production line.

Allocations for reuse, recycling and recovery

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 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 .
The system boundary set for the recycled material refers to collection.

Secondary material

The use of secondary material by sedak GmbH & Co. KG was considered in module A3. Secondary material was not used.

Inputs

The LCA includes the following production-relevant inputs per 1 m² of sedak insulating glass (double or triple glazing) with sedak safety glass and single glazing:

Energy
Natural gas mix (DE)” is assumed for the natural gas input material and ‘LPG (DE)’ for the liquid gas input material. The German electricity mix is used for the electricity mix at the plant, and electricity from the company's own PV system is also used via “Electricity from photovoltaics (DE)”.
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
The individual production process steps result in a water consumption of 517.8 l (sedak ISO double) or 564.5 l (sedak ISO triple) per m² element). The consumption of freshwater specified in Section 6.3 originates (among others) from the process chain of the pre-products.

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

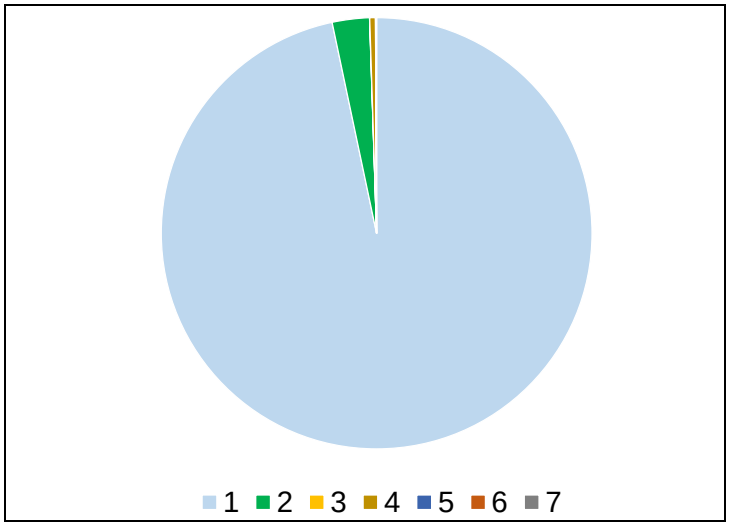


Figure 1: Percentage representation of the individual materials per declared unit (sedak ISO double)

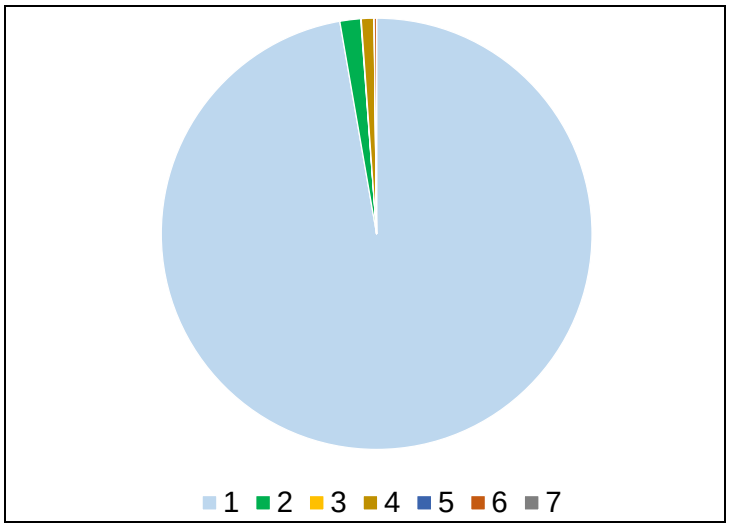


Figure 2: Percentage representation of the individual materials per declared unit (sedak ISO triple)

No.	Material	Mass in %	
		sedak ISO double	sedak ISO triple
1	Flat glass	96.68%	97.27%
2	Sentryglas foil	2.79%	1.56%
3	Argon	< 1 %	< 1 %
4	Silicone	< 1 %	< 1 %
5	Butyl	< 1 %	< 1 %
6	Foam spacer (Edgetech)	< 1 %	< 1 %
7	Coating (metals and metal oxides)	< 1 %	< 1 %

Table 2: Percentage of individual materials per declared unit

Ancillary materials and consumables
There are 2.86 kg (sedak ISO double) and 1.76 kg (sedak ISO triple) of ancillary and consumables used.

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

No.	Material	Mass in g	
		sedak ISO double	sedak ISO triple
1	Reusable steel frame	13.101,0	11.720,3
2	Upholstery material	8.0	8.0
3	Foil cover	26.3	26.8
4	Distance holders	50.0	50.0

Table 3: Weight in g of packaging per declared unit

Biogenic carbon content
The biogenic carbon content is negligible and not specified as the total mass of substances containing biogenic carbon is less than 5% of the total mass of the product and associated packaging, and the mass of substances containing biogenic carbon in the packaging is less than 5% of the total mass of the packaging.

Outputs

The LCA includes the following production-relevant outputs per 1 m² of sedak insulating glass (double or triple glazing) with sedak safety glass and single glazing:

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

Waste water
The manufacture produces 518.2 l (sedak ISO double) or 564.9 l (sedak ISO triple) of waste water..

6.3 Impact assessment

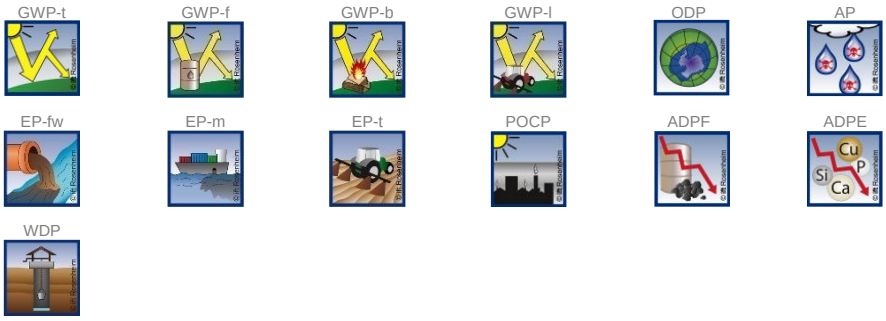
Goal

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)

SM 
RSF 
NRSF 
FW 

Waste

The waste generate during the production of 1 m² of sedak insulating glass (double or triple glazing) with sedak safety glass and single glazing 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)

HWD 
NHWD 
RWD 
CRU 
MFR 
MER 
EEE 
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 

	Unit	A1-A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
Results per 1 m² of sedak insulating glass double																
Core indicators																
GWP-t	kg CO_2 eq.	320,79	2,95	0,16	0,00	3,73E-03	0,00	0,00	0,00	0,00	0,00	0,00	0,26	4,27	1,06	-15,80
GWP-f	kg CO_2 eq.	315,29	2,95	8,88E-02	0,00	3,70E-03	0,00	0,00	0,00	0,00	0,00	0,00	0,26	4,24	1,09	-15,70
GWP-b	kg CO_2 eq.	4,72	-1,08E-02	6,91E-02	0,00	2,25E-05	0,00	0,00	0,00	0,00	0,00	0,00	-9,59E-04	3,32E-02	-3,61E-02	-4,55E-02
GWP-l	kg CO_2 eq.	0,12	1,76E-02	2,30E-06	0,00	2,83E-07	0,00	0,00	0,00	0,00	0,00	0,00	1,56E-03	3,12E-04	3,38E-03	-2,25E-03
ODP	kg CFC-11 eq.	9,58E-09	5,14E-13	4,49E-14	0,00	4,90E-15	0,00	0,00	0,00	0,00	0,00	0,00	4,56E-14	5,18E-11	2,77E-12	-4,57E-11
AP	mol H^+ eq.	0,76	2,97E-03	3,73E-05	0,00	3,80E-06	0,00	0,00	0,00	0,00	0,00	0,00	2,64E-04	3,56E-03	7,71E-03	-9,72E-02
EP-fw	kg P eq.	1,19E-03	6,84E-06	1,18E-08	0,00	7,80E-09	0,00	0,00	0,00	0,00	0,00	0,00	6,07E-07	1,13E-05	2,19E-06	-1,22E-05
EP-m	kg N eq.	0,17	1,04E-03	1,09E-05	0,00	1,30E-06	0,00	0,00	0,00	0,00	0,00	0,00	9,22E-05	1,15E-03	1,99E-03	-2,84E-02
EP-t	mol N eq.	2,33	1,23E-02	1,73E-04	0,00	1,36E-05	0,00	0,00	0,00	0,00	0,00	0,00	1,09E-03	1,30E-02	2,19E-02	-0,32
POCP	kg NMVOC eq.	0,47	2,60E-03	2,89E-05	0,00	6,30E-06	0,00	0,00	0,00	0,00	0,00	0,00	2,30E-04	2,81E-03	6,01E-03	-5,67E-02
ADPF*²	MJ	4277,70	39,80	6,76E-02	0,00	0,11	0,00	0,00	0,00	0,00	0,00	0,00	3,53	27,10	14,50	-240,00
ADPE*²	kg Sb eq.	1,14E-04	2,08E-07	3,46E-10	0,00	1,07E-10	0,00	0,00	0,00	0,00	0,00	0,00	1,84E-08	3,45E-07	5,01E-08	-4,88E-07
WDP*²	m^3 world eq. de-prived	4,40	1,53E-02	1,68E-02	0,00	2,85E-04	0,00	0,00	0,00	0,00	0,00	0,00	1,36E-03	0,29	0,12	-0,86
Use of resources																
PERE	MJ	2524,72	2,58	0,74	0,00	2,55E-03	0,00	0,00	0,00	0,00	0,00	0,00	0,23	25,10	2,36	-28,30
PERM	MJ	0,72	0,00	-0,72	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00
PERT	MJ	2525,44	2,58	2,21E-02	0,00	2,55E-03	0,00	0,00	0,00	0,00	0,00	0,00	0,23	25,10	2,36	-28,30
PENRE	MJ	4207,10	39,90	0,70	0,00	0,11	0,00	0,00	0,00	0,00	0,00	0,00	3,53	48,09	63,48	-241,00
PENRM	MJ	70,60	0,00	-0,63	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	-20,99	-48,98	0,00
PENRT	MJ	4277,70	39,90	6,76E-02	0,00	0,11	0,00	0,00	0,00	0,00	0,00	0,00	3,53	27,10	14,50	-241,00
SM	kg	33,80	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00
RSF	MJ	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00
NRSF	MJ	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00
FW	m^3	0,66	2,35E-03	4,00E-04	0,00	2,22E-04	0,00	0,00	0,00	0,00	0,00	0,00	2,08E-04	1,44E-02	3,66E-03	-3,09E-02
Waste categories																
HWD	kg	1,07E-04	1,07E-10	-5,59E-13	0,00	1,37E-11	0,00	0,00	0,00	0,00	0,00	0,00	9,47E-12	-5,17E-09	3,15E-10	-2,72E-08
NHWD	kg	14,31	5,81E-03	1,01E-02	0,00	9,50E-05	0,00	0,00	0,00	0,00	0,00	0,00	5,15E-04	7,45E-02	72,50	-1,96
RWD	kg	0,19	4,17E-05	2,27E-06	0,00	2,68E-07	0,00	0,00	0,00	0,00	0,00	0,00	3,70E-06	2,60E-03	1,65E-04	-6,10E-03
Output material flows																
CRU	kg	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00
MFR	kg	54,74	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	30,00	0,00	0,00
MER	kg	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00
EEE	MJ	10,65	0,00	0,22	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	3,95	0,00	0,00
EET	MJ	24,14	0,00	0,52	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	9,05	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

	Results per 1 m² of sedak insulating glass double															
	Unit	**A1-A3**	**A4**	**A5**	**B1**	**B2**	**B3**	**B4**	**B5**	**B6**	**B7**	**C1**	**C2**	**C3**	**C4**	**D**
Additional environmental impact indicators																
PM	Disease incidence	1,30E-05	1,94E-08	2,92E-10	0,00	2,64E-11	0,00	3,14E-07	0,00	0,00	0,00	0,00	1,72E-09	2,64E-08	9,49E-08	-5,64E-07
IRP*[1]	kBq U235 eq.	20,94	4,29E-03	2,39E-04	0,00	2,82E-05	0,00	0,63	0,00	0,00	0,00	0,00	3,81E-04	0,28	1,91E-02	-0,96
ETP-fw*[2]	CTUe	9885,00	29,60	2,34E-02	0,00	4,10E-02	0,00	237,91	0,00	0,00	0,00	0,00	2,63	11,10	7,90	-269,00
HTP-c*[2]	CTUh	2,30E-05	5,91E-10	1,94E-12	0,00	1,19E-12	0,00	5,61E-07	0,00	0,00	0,00	0,00	5,24E-11	5,40E-10	1,22E-09	-1,80E-09
HTP-nc*[2]	CTUh	2,73E-03	2,97E-08	1,40E-10	0,00	5,73E-11	0,00	6,64E-05	0,00	0,00	0,00	0,00	2,64E-09	1,16E-08	1,34E-07	-1,51E-07
SQP*[2]	Dimensionless.	1589,40	14,10	2,11E-02	0,00	1,82E-03	0,00	50,32	0,00	0,00	0,00	0,00	1,25	17,50	3,52	-20,10

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

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

	Results per 1 m² of sedak insulating glass triple															
	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.	261,55	2,64	0,16	0,00	3,73E-03	0,00	0,00	0,00	0,00	0,00	0,00	0,23	3,44	0,94	-14,00
GWP-f	kg CO_2 eq.	257,05	2,64	9,00E-02	0,00	3,70E-03	0,00	0,00	0,00	0,00	0,00	0,00	0,23	3,41	0,97	-14,00
GWP-b	kg CO_2 eq.	4,28	-9,68E-03	6,91E-02	0,00	2,25E-05	0,00	0,00	0,00	0,00	0,00	0,00	-8,58E-04	2,97E-02	-3,23E-02	-3,94E-02
GWP-l	kg CO_2 eq.	0,10	1,57E-02	2,33E-06	0,00	2,83E-07	0,00	0,00	0,00	0,00	0,00	0,00	1,39E-03	2,77E-04	3,02E-03	-2,01E-03
ODP	kg CFC-11 eq.	7,18E-09	4,60E-13	4,53E-14	0,00	4,90E-15	0,00	0,00	0,00	0,00	0,00	0,00	4,08E-14	4,63E-11	2,47E-12	-3,90E-11
AP	mol H^+ eq.	0,65	2,66E-03	3,75E-05	0,00	3,80E-06	0,00	0,00	0,00	0,00	0,00	0,00	2,36E-04	3,07E-03	6,90E-03	-8,73E-02
EP-fw	kg P eq.	1,01E-03	6,12E-06	1,19E-08	0,00	7,80E-09	0,00	0,00	0,00	0,00	0,00	0,00	5,43E-07	1,01E-05	1,96E-06	-1,05E-05
EP-m	kg N eq.	0,14	9,30E-04	1,10E-05	0,00	1,30E-06	0,00	0,00	0,00	0,00	0,00	0,00	8,25E-05	9,98E-04	1,78E-03	-2,55E-02
EP-t	mol N eq.	1,96	1,10E-02	1,74E-04	0,00	1,36E-05	0,00	0,00	0,00	0,00	0,00	0,00	9,73E-04	1,11E-02	1,96E-02	-0,29
POCP	kg NMVOC eq.	0,40	2,32E-03	2,91E-05	0,00	6,30E-06	0,00	0,00	0,00	0,00	0,00	0,00	2,06E-04	2,42E-03	5,38E-03	-5,09E-02
ADPF*²	MJ	3431,80	35,60	6,82E-02	0,00	0,11	0,00	0,00	0,00	0,00	0,00	0,00	3,16	24,10	12,90	-214,00
ADPE*²	kg Sb eq.	1,86E-04	1,86E-07	3,49E-10	0,00	1,07E-10	0,00	0,00	0,00	0,00	0,00	0,00	1,65E-08	3,08E-07	4,48E-08	-4,24E-07
WDP*²	m^3 world eq. de-prived	4,05	1,37E-02	1,69E-02	0,00	2,85E-04	0,00	0,00	0,00	0,00	0,00	0,00	1,21E-03	0,22	0,11	-0,77
Use of resources																
PERE	MJ	1914,34	2,30	0,74	0,00	2,55E-03	0,00	0,00	0,00	0,00	0,00	0,00	0,20	22,40	2,11	-24,40
PERM	MJ	0,72	0,00	-0,72	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00
PERT	MJ	1915,06	2,30	2,23E-02	0,00	2,55E-03	0,00	0,00	0,00	0,00	0,00	0,00	0,20	22,40	2,11	-24,40
PENRE	MJ	3380,02	35,70	0,71	0,00	0,11	0,00	0,00	0,00	0,00	0,00	0,00	3,16	39,44	48,79	-214,00
PENRM	MJ	51,78	0,00	-0,64	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	-15,34	-35,79	0,00
PENRT	MJ	3431,80	35,70	6,83E-02	0,00	0,11	0,00	0,00	0,00	0,00	0,00	0,00	3,16	24,10	13,00	-214,00
SM	kg	29,10	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00
RSF	MJ	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00
NRSF	MJ	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00
FW	m^3	0,52	2,10E-03	4,03E-04	0,00	2,22E-04	0,00	0,00	0,00	0,00	0,00	0,00	1,86E-04	1,19E-02	3,27E-03	-2,75E-02
Waste categories																
HWD	kg	1,06E-04	9,55E-11	-5,71E-13	0,00	1,37E-11	0,00	0,00	0,00	0,00	0,00	0,00	8,47E-12	-4,62E-09	2,82E-10	-2,43E-08
NHWD	kg	14,10	5,20E-03	1,03E-02	0,00	9,50E-05	0,00	0,00	0,00	0,00	0,00	0,00	4,61E-04	5,84E-02	64,80	-1,76
RWD	kg	0,14	3,73E-05	2,29E-06	0,00	2,68E-07	0,00	0,00	0,00	0,00	0,00	0,00	3,31E-06	2,33E-03	1,48E-04	-5,39E-03
Output material flows																
CRU	kg	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00
MFR	kg	43,13	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	27,00	0,00	0,00
MER	kg	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00
EEE	MJ	9,28	0,00	0,23	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	2,88	0,00	0,00
EET	MJ	21,03	0,00	0,52	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	6,61	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

	Results per 1 m² of sedak insulating glass triple															
	Unit	**A1-A3**	**A4**	**A5**	**B1**	**B2**	**B3**	**B4**	**B5**	**B6**	**B7**	**C1**	**C2**	**C3**	**C4**	**D**
Additional environmental impact indicators																
PM	Disease incidence	1,12E-05	1,74E-08	2,95E-10	0,00	2,64E-11	0,00	0,00	0,00	0,00	0,00	0,00	1,54E-09	2,30E-08	8,48E-08	-5,07E-07
IRP*[1]	kBq U235 eq.	16,34	3,84E-03	2,42E-04	0,00	2,82E-05	0,00	0,00	0,00	0,00	0,00	0,00	3,41E-04	0,25	1,71E-02	-0,85
ETP-fw*[2]	CTUe	8457,60	26,50	2,36E-02	0,00	4,10E-02	0,00	0,00	0,00	0,00	0,00	0,00	2,35	9,94	7,07	-242,00
HTP-c*[2]	CTUh	1,99E-05	5,29E-10	1,96E-12	0,00	1,19E-12	0,00	0,00	0,00	0,00	0,00	0,00	4,69E-11	4,79E-10	1,09E-09	-1,59E-09
HTP-nc*[2]	CTUh	2,36E-03	2,66E-08	1,42E-10	0,00	5,73E-11	0,00	0,00	0,00	0,00	0,00	0,00	2,36E-09	1,01E-08	1,20E-07	-1,35E-07
SQP*[2]	Dimensionless.	1394,30	12,70	2,13E-02	0,00	1,82E-03	0,00	0,00	0,00	0,00	0,00	0,00	1,12	15,60	3,15	-17,40

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

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 of

- sedak insulating glass double
- sedak insulating glass triple

differ noticeably from one another. The differences lie primarily in the combination of different individual components, in particular individual float glass panes and laminated safety glass. As a result, the quantities of float glass and sentry glass lamination film used vary. This also results in different product weights. In particular, the different glass thicknesses and the different total number of panes used per product group would lead one to expect this. The different structure of the two insulating glass units and, in particular, the lower amount of glass used in sedak triple insulating glass compared to sedak double insulating glass result in lower environmental impacts for triple glazing than for double glazing.

In the area of production, the environmental impacts for all sedak insulating glass units included in the assessment are mainly caused by the use of float glass and its upstream chains. Due to the internal further processing into toughened safety glass (concerns panes in laminated safety glass) by means of thermal treatment, a relevant proportion of the environmental impact is still attributable to the electricity requirement. The use of Sentryglas film accounts for a marginal share of the environmental impact. For the use phase, an identical amount of environmental impact is attributable exclusively to cleaning during the 30-year service life and does not represent a significant proportion of the total environmental impact.

In scenario C4, only marginal expenses for physical pre-treatment and landfill operation are to be expected, as all product groups are predominantly inert materials for landfilling.
For glass recycling (downcycling to container glass), 5.7 % (double) or 6.3 % (triple) of the environmental impacts of the core indicators occurring in the life cycle without WDP in scenario D can be credited per sedak of insulating glass. As plastic components are 100% thermally recycled according to the worst-case approach, no credits are generated here through material recycling.
The charts below show the distribution of the main environmental impacts.

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

Charts

The following charts show the B modules related to the specified RSL.

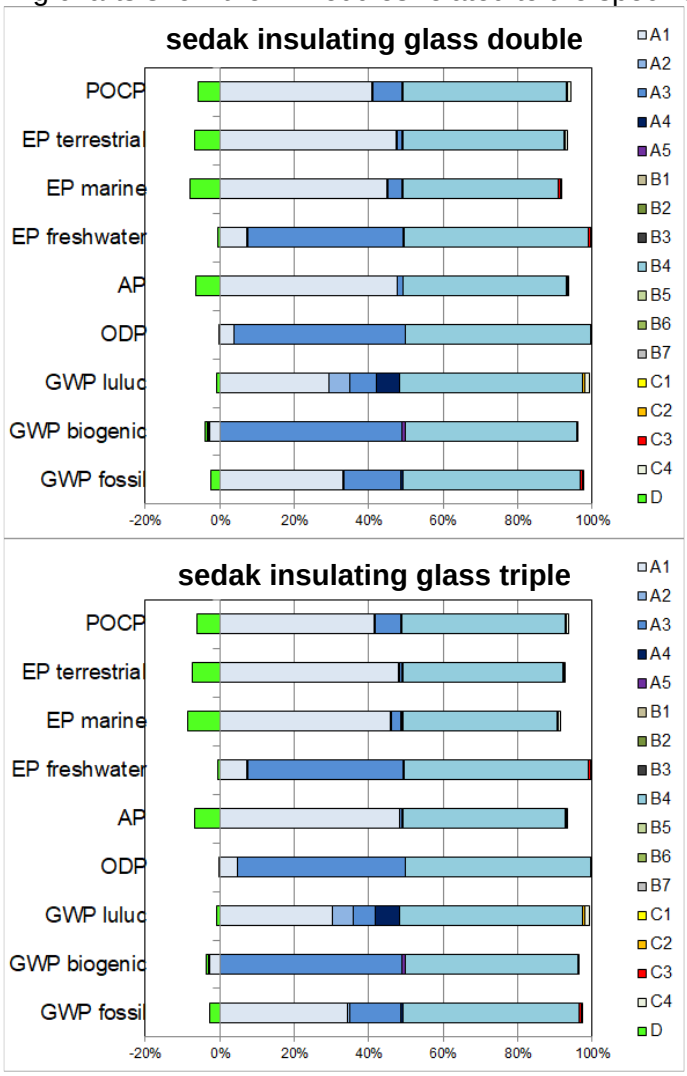


Figure 3: Percentage of the modules in selected environmental impact categories

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 Benedikt Dellawalle; M.Sc, an independent ift 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, “Flat glass in construction” PCR-FG-2.0:2021 and EN 17074 “PCR for flat glass products”.

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 X internal external
Independent verifier: [b)] Benedikt Dellawalle
[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	28.05.2024	Internal verification	Pscherer	Dellawalle

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9 Annex

Description of life cycle scenarios for sedak insulating glass (double or triple glazing) with sedak safety glass and single glazing

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 4: 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 manufacturers' specifications and the research project “EPDs for transparent building elements” and the standards EN 17074 and EN 17213 (adapted).

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

A4 Transport

No.	Scenario	Description
A4	Large-scale project	40 t truck (Euro 0-6 mix), diesel, 27 t payload, 100% capacity used, about 150 km to site and empty return, total of 300 km.

[1] capacity used: used loading capacity of truck

A4 Transport to the construction site	Transport weight [kg/m²]	Density [kg/m³]	Volume capacity utilisation factor[2]
sedak ISO double	116,62	1.879,2	< 1
sedak ISO triple	104,33	1.504,1	< 1

[2] Volume capacity utilisation factor:
= 1 product completely fills packaging (without air inclusion)
< 1 packaging contains unused volume (e.g.: air, filling material
> 1 product is packed in compressed form

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

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 accordance with EN 17074, the glass products are supplied in their final configuration and ready for installation.

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.

Ancillary 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.

B1 Use (not relevant)

According to EN 17074, the use of glass products in buildings has no environmental impact.

B2 Cleaning, servicing and maintenance

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

B2.1 Cleaning

No.	Scenario	Description
B2.1	**Rarely manual**	**According to EN 17074: Manually with 0.2 l cleaning solution (0.2 l water with 0.01 l cleaner) per m², annually.**
Ancillary materials, consumables, use of energy and water, material losses and waste as well as transport distances during cleaning are negligible. Since only one scenario is used, the results are shown in the relevant summary table.		

B2.2 Servicing and maintenance

In accordance with EN 17074, glass products do not require any maintenance activities during their service life.

Current information can be found in the manufacturer's "*Instructions for installation, operation and maintenance*".

Auxiliary/operating materials, energy/water use, material losses and waste materials as well as transportation routes during maintenance can be neglected.

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

B3 Repair (not relevant)

In accordance with EN 17074, glass products do not require any repair activities during their service life.

Auxiliary/operating materials, energy/water consumption, waste materials, material losses and transportation routes during repair can be disregarded.

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

B4 Replacement

No	Scenario	Description
B4.1	**No replacement**	**A replacement is not planned according to EN 17074.**
B4.2	Normal and high demands as well as exceptional demands	One replacement over a 30-year period (RSL)*

*Assumptions for evaluation of possible environmental impacts; statements made do not constitute any guaranty or warranty of performance.

The statements made in this EPD are only informative to allow evaluation at the construction works level.

In accordance with EN 17074, glass products do not require replacement during their service life (30 years). With regard to the assumed building service life of 50 years, the one-off replacement is still taken into account.

For updated information refer to the respective instructions for assembly/installation, operation and maintenance from sedak GmbH & Co. KG

In scenario B4.2, environmental impacts arise from the manufacturing, construction and disposal phases. Auxiliary/operating materials, energy/water use, material losses, waste materials and transportation routes during replacement are taken into account.

In the following table, the results are based on one year, taking into account the RSL.

sedak insulating glass (double or triple glazing)				
B4 Exchange / Replacement	**Unit**	**B4.1**	B4.2	
			sedak ISO double	sedak ISO triple
Core indicators				
GWP-t	kg CO_2 eq.	**0,00**	10,46	8,50
GWP-f	kg CO_2 eq.	**0,00**	10,27	8,35
GWP-b	kg CO_2 eq.	**0,00**	0,16	0,14
GWP-l	kg CO_2 eq.	**0,00**	4,68E-03	4,11E-03
ODP	kg CFC-11 eq.	**0,00**	3,20E-10	2,40E-10
AP	mol H^+ eq.	**0,00**	2,25E-02	1,91E-02
EP-fw	kg P eq.	**0,00**	3,99E-05	3,40E-05
EP-m	kg N eq.	**0,00**	4,88E-03	4,06E-03
EP-t	mol N eq.	**0,00**	6,84E-02	5,73E-02
POCP	kg NMVOC eq.	**0,00**	1,41E-02	1,18E-02
ADPF	MJ	**0,00**	137,42	109,79
ADPE	kg Sb eq.	**0,00**	3,80E-06	6,21E-06
WDP	m^3 world eq. deprived	**0,00**	0,13	0,12
Use of resources				
PERE	MJ	**0,00**	84,25	63,92
PERM	MJ	**0,00**	0,00	0,00
PERT	MJ	**0,00**	84,25	63,92
PENRE	MJ	**0,00**	137,39	109,79
PENRM	MJ	**0,00**	4,74E-16	0,00
PENRT	MJ	**0,00**	137,39	109,79
SM	kg	**0,00**	1,13	0,97
RSF	MJ	**0,00**	0,00	0,00
NRSF	MJ	**0,00**	0,00	0,00
FW	m^3	**0,00**	2,16E-02	1,71E-02
Waste categories				
HWD	kg	**0,00**	3,56E-06	3,53E-06
NHWD	kg	**0,00**	2,83	2,57
RWD	kg	**0,00**	6,11E-03	4,65E-03

Output material flows				
CRU	kg	**0,00**	0,00	0,00
MFR	kg	**0,00**	2,82	2,34
MER	kg	**0,00**	0,00	0,00
EEE	MJ	**0,00**	0,49	0,41
EET	MJ	**0,00**	1,12	0,94
Additional environmental impact indicators				
PM	Disease incidence	**0,00**	4,21E-07	3,62E-07
IRP	kBq U235 eq.	**0,00**	0,68	0,53
ETP-fw	CTUe	**0,00**	322,24	275,38
HTP-c	CTUh	**0,00**	7,68E-07	6,64E-07
HTP-nc	CTUh	**0,00**	9,10E-05	7,87E-05
SQP	Dimensionless	**0,00**	53,52	46,98

B5 Modification/refurbishment (not relevant)

In accordance with EN 17074, glass products do not require any midification/ refurbishment work during their service life.

For updated information refer to the respective instructions for assembly/installation, operation and maintenance from sedak GmbH & Co. KG

Ancillary materials, consumables, use of energy and water, material losses, waste as well as transport distances during replacement are negligible.

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

B6 Operational energy use (not relevant)

In accordance with EN 17074, no energy is consumed during standard use.

There is no transport consumption during energy use in buildings. Ancillary materials, consumables, waste materials and other scenarios are negligible.

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

B7 Operational water use (not relevant)

In accordance with EN 17074, no water is consumed during normal operation. Water consumption for cleaning is specified in module B2.1.

There is no transport consumption during water use in buildings. Ancillary materials, consumables, waste materials and other scenarios are negligible.

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

C1 Deconstruction, demolition

No.	Scenario	Description
C1	Deconstruction	**According to EN 17074 (9.8.4 Disposal phase (C1 to C4)):** • **Glass 30 % deconstruction, 70 % residues (landfill)** **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. In case of deviating consumption, the removal of the products forms part of the site management and is covered at the construction works level. Since only one scenario is used, the results are shown in the relevant summary table.		

C2 Transport

No.	Scenario	Description
C2	Transport	**Transport to collection point using 40 t truck (Euro 0-6 mix), diesel, 27 t payload, 50% capacity used, 100 km** (1)
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	**Proportion for the return of materials According to EN 17074*** • **Glass 100 % in melt** **In accordance with EN 17013** • **Plastics (Sentryglas film, sealants, spacers) 100 % thermal recycling** * worst case assumption
Electricity consumption of incineration plant 0.5 MJ/kg. As the products are placed on the german market, the disposal scenario is based on average german datasets. 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	
		sedak ISO double	sedak ISO triple
Collection process, collected separately	kg	31,0	27,7
Collection process, collected as mixed construction waste	kg	72,4	64,7
Recovery system, for reuse	kg	0,0	0,0
Recovery system, for recycling	kg	30,0	27,0
Recovery system, for energy recovery	kg	1,0	0,8
Disposal	kg	72,4	64,7

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 “disposed” (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
D	**Recycling potential**	**Glass fragments from C3 minus the fragments used in A3 replace 60% container glass;** **Credits from waste incineration plant: electricity replaces electricity mix (DE); thermal energy replaces thermal energy from natural gas (DE).**

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.

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Notes
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