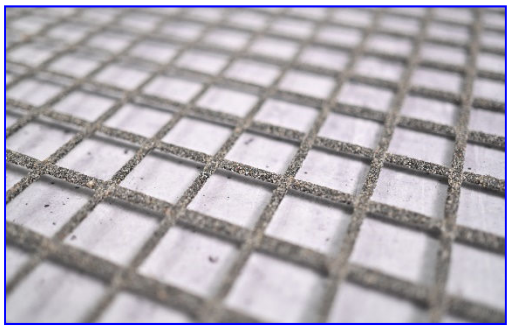
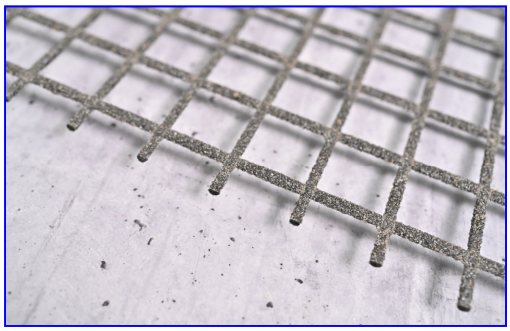
Environmental Product Declaration (EPD)

Declaration Code: EPD-SAC-GB-65.0





solidian·kelteks

solidian GmbH

ECO PLATFORM EPD VERIFIED

reinforcing and fastening systems

solidian ANTICRACK

EPD © ift Rosenheim

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-SAC-GB-65.0

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	solidian GmbH Sigmaringer Straße 150 D-72458 Albstadt www.solidian-kelteks.com		
Declaration code	EPD-SAC-GB-65.0		
Designation of declared product	solidian ANTICRACK		
Scope	Corrosion-resistant composite reinforcement grid and bars for permanent reinforcement of concrete as an alternative to conventional and stainless steel reinforcement.		
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 "PCR Teil B Bewehrungs- und Befestigungssysteme“ PCR-BS-3.0:2023.		
Validity	Publication date: 06.03.2025	Last revision: 13.03.2025	Valid until 06.03.2030
	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 solidian GmbH and the generic data from the ”LCA for Experts 10“ database. LCA calculations were carried out for the included “cradle to gate 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	Prof. Dr.-Ing. Eric Brehm External verifier

1 General product information

Product definition

The EPD relates to the product group reinforcing and fastening systems and applies to:

1 kg of solidian ANTICRACK
made by solidian GmbH

The declared unit is obtained as follows:

Assessed product	Declared unit	Density
solidian ANTICRACK Q85-CCE-21 (Q85-C-EP-s21)	1 kg	1,640 ± 60 kg/m³

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 during production are allocated proportionately to the declared unit. The reference period is the year 2023.

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

- **solidian Anticrack Q43-CCE-21 (Q43-C-EP-s21)**
- solidian Anticrack Q47-CCE-38 (Q47-C-EP-s38)
- solidian Anticrack Q85-CCE-21 (Q85-C-EP-s21)
- solidian Anticrack Q95-CCE-38 (Q95-C-EP-s38)

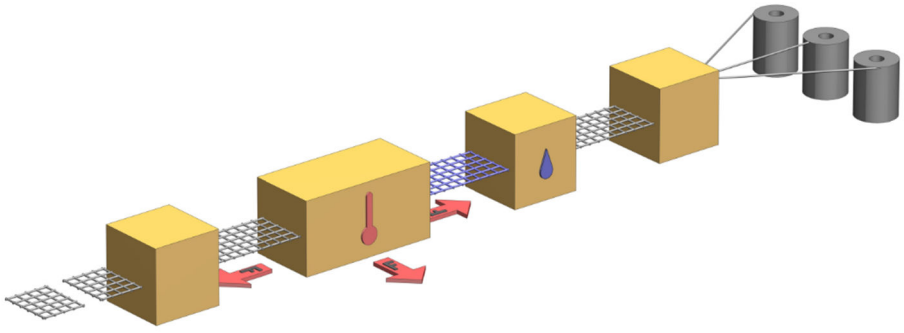
Note: The conversion table (Table 5) must be used for the products solidian Anticrack Q47-CCE-38 (Q47-C-EP-s38), Q85-CCE-21 (Q85-C-EP-s21) and Q95-CCE-38 (Q95-C-EP-s38).

Product description

solidian ANTICRACK are bi-directional reinforcement grids made of media-resistant, carbon fibre-reinforced plastic, which ensure durable reinforcement and secure connection of concrete components thanks to their high bonding properties. Based on the building authority-approved 'solidian GRID' carbon fibre reinforcement grids, solidian ANTICRACK are provided with an additional sand coating. The combination of diffusion-tight and alkali-resistant epoxy resins (E) and particularly resistant carbon fibres (C) in the longitudinal and transverse directions makes solidian ANTICRACK a sustainable replacement for conventional or stainless reinforcing steel. Available in the variants Q43, Q47, Q85 and Q95, the finely graded portfolio allows a precise product selection that avoids unnecessary overdimensioning and efficiently conserves material resources.
Due to their basic properties, solidian ANTICRACKs are predestined for use as load-bearing reinforcement in new construction and in the repair of bridge structures, maritime applications, concrete slabs, e.g. industrial

floors or car park slabs, tunnelling as well as waterproof structures and LAU systems.
They are convincing wherever high loads act on concrete components, components are permanently exposed to aggressive environmental influences such as de-icing salts and there are high demands on the limitation of crack widths. The sanded surface optimises the limitation and distribution of cracks and enables installation close to the surface, which not only reduces crack widths but also provides greater protection against surface spalling.
Planning, dimensioning and execution are always carried out in accordance with the DAfStb guideline ‘Concrete components with non-metallic reinforcement’, as well as other DAfStb guidelines and reinforced concrete standards, whereby adjustments must be made for fibre composite plastic reinforcement. Accordingly, the respective national standards and regulations must be taken into account during planning, design and execution.
The packaging and delivery of solidian ANTICRACK reinforcement grids is customised according to the order. Depending on the quantity, the grids are packed flat on wooden pallets or rolled in wooden or steel frames and additionally protected from dirt and damage with cardboard or plastic film. The packaging size is optimally adapted to the ordered quantity and length of the grilles in order to minimise the amount of material used for packaging and conserve resources.

Product manufacture



Description of the process steps:
1. production of raw textile from carbon fibres
2. impregnation of raw textile and sand application
3. hardening
4. cutting and formatting

Scope

solidian ANTICRACK is a reinforcement mesh made of media-resistant, carbon fibre-reinforced plastic that impresses with its high bonding properties. It is a particularly durable and sustainable concrete reinforcement and is suitable for a wide range of applications - both indoors and outdoors. Examples of applications include bridges, multi-storey car parks

and floor slabs, industrial floors in the vicinity of acidic manufacturing processes, airfields, buildings and facilities in maritime environments, hydraulic structures, tunnels, infrastructure and earthworks, agricultural buildings, façade elements, sandwich walls as well as WU and LAU components - both in new construction and in repair work.

Additional information

Bulk density: 1.64 ±0.06 g/cm.

solidian ANTICRACK is corrosion-free and resistant to the effects of chloride. The chemical resistance of the carbon fibre reinforcement has been confirmed according to the exposure classes according to EN 206 up to and including XD3, XS3 and XA3. In addition, the short-term tensile strength of the solidian ANTICRACK grids has significantly higher values than conventional or stainless steel reinforcement. Detailed information on the technical properties can be found on the data sheets at www.solidian-kelteks.com.

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 4th November 2024).

All relevant safety data sheets are available from solidian GmbH

3 Construction process stage

Processing recommendations, installation

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

4 Use stage

Emissions to the environment

No emissions to indoor air, water or soil are known.

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 manufacturer an optional service life of 100 years is specified for solidian ANTICRACK made by solidian 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: No factors known that may have a negative effect on the service life.

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 solidian ANTICRACK 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 subsequent utilisation are shown according to the market situation. Certain parts of carbon and polypropylene fibres are recycled. Epoxy resin components and quartz sand are landfilled.

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 solidian ANTICRACK, serving as the basis. The LCAs 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 2023 fiscal year. These were recorded at the plant in 72458 Albstadt and for the raw textile at the plant of the subsidiary Kelteks d.o.o in 47000 Karlovac (Croatia) and originate partly from business records and partly from direct readings. Primary data was collected for energy, water and packaging expenses from the company's own data management system and through specific measurements.

The generic data come from the “LCA for Experts 10” professional and building materials databases. The last update of both databases was in 2024. 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, production and end-of-life stage of solidian ANTICRACK.

Additional data for the production of the raw textile at the plant of the subsidiary Kelteks d.o.o. 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 raw materials, ancillary materials and packagings were taken into consideration.
The following assumption was made for the means of transport:

- Truck, more than 32 t gross weight / 24.7 t payload, Euro 6, freight, 85 % capacity utilisation

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 %.

The following processes were neglected.

- Auxiliary and operating materials
- Production-related waste

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 solidian ANTICRACK. The “Product stage” (A1 - A3), “Construction process stage” (A4 - 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 recycled and recovered during the product stage (rejects) the components are shredded if necessary and then sorted into their single constituents. This is done using various process engineering systems such as air classifiers.
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 production was based on the current market-specific situation. At the same time, a recycling potential was taken into account that reflects the economic value of the product after reprocessing (recyclate).
The system boundary of the recycled material was drawn at collection.

Secondary material

The use of secondary materials in Module A3 was analysed at solidian GmbH. Secondary materials are not used.

Inputs

The LCA includes the following production-relevant inputs per 1 kg of solidian ANTICRACK:

Energy
Thermal energy from natural gas in Germany' is used as the input material for gas. The German electricity mix is used for the electricity mix at the plant. Electricity grid mix (RER) is used for the electricity mix for raw textile production in Karlovac.

Water
The individual production process steps result in a water consumption of 1.34 litres per kg.
The freshwater consumption shown in chapter 6.3 is caused (among other things) by the process chain of the preliminary products.

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

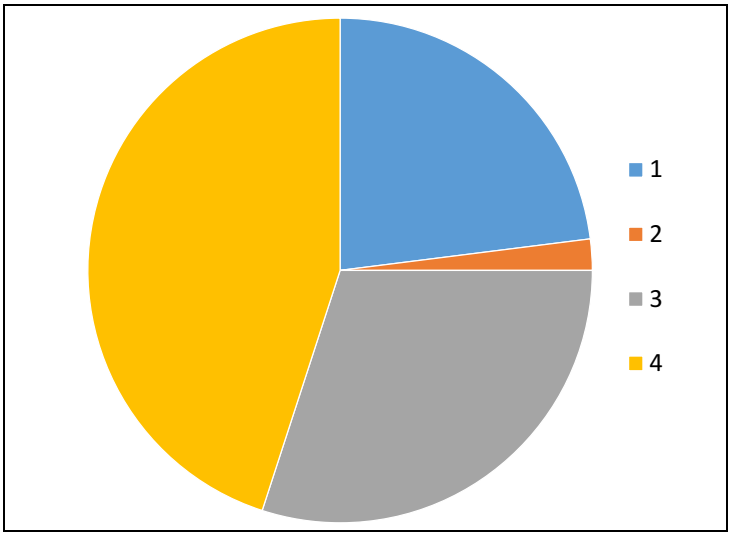


Figure 1: Percentage of individual materials per declared unit

No.	Material	Mass in %
1	Carbon fibre	23
2	Polypropylene fibre	2
3	epoxy resin	30
4	silica sand	45

Table 2: Percentage of individual materials

Ancillary materials and consumables
Ancillary materials and consumables were treated as an excluded process in accordance with the 1 % rule.

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

No.	Material	Mass in g
1	Cardboard	31
2	PE film	0,1
3	Screws	1.0

Table 3: Weight in g of packaging per declared unit

Biogenic carbon content
Only the biogenic carbon content of the associated packaging is specified, as the total mass of substances containing biogenic carbon is less than 5 % of the total mass of the product and associated packaging. In accordance with EN 16449, packaging produces the following amounts of biogenic carbon :

No.	Component	Content in g C per m²
1	Associated packaging	31

Table 4: Biogenic carbon content of packaging at gate

Outputs

The LCA includes the following production-relevant outputs per 1 kg of solidian ANTICRACK:

Waste
Waste was treated as an excluded process in accordance with the 1 % rule.

Waste water
The manufacture does not produce any waste water.

6.3 Impact assessment

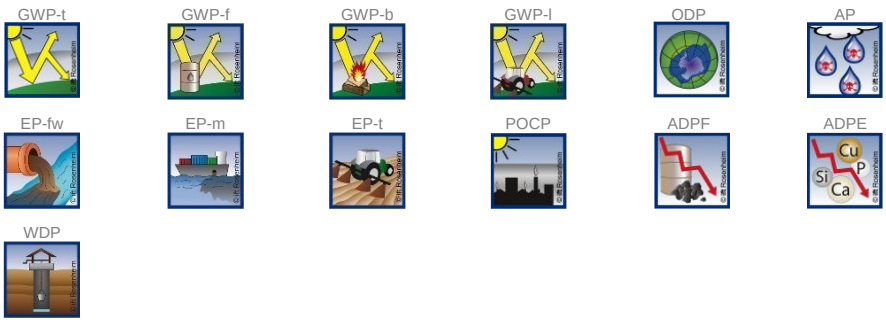
Goal

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

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:

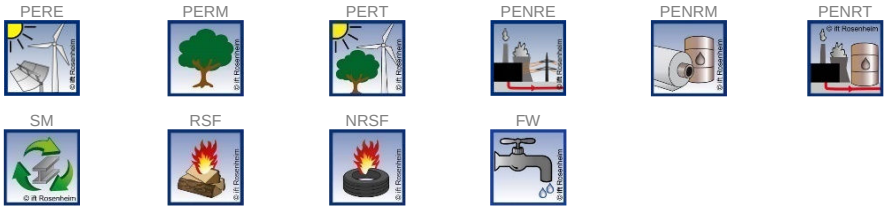
- Climate change – total (GWP-t)
- Climate change – fossil (GWP-f)
- Climate change – biogenic (GWP-b)
- Climate change - land use and land use change (GWP-l)
- Ozone depletion (ODP)
- Acidification (AP)
- Eutrophication aquatic freshwater (EP-fw)
- Eutrophication aquatic marine (EP-m)
- Eutrophication 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)

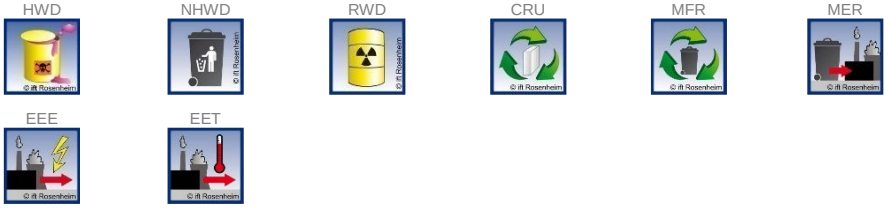


Waste

The waste generate during the production of 1 kg of solidian ANTICRACK 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)



Results per 1 kg of solidian ANTICRACK Q85-CCE-21 (Q85-C-EP-s21)																
	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.	**1.08E+01**	ND	**4.43E-02**	ND	ND	ND	ND	ND	ND	ND	ND	**2.75E-04**	**8.46E-03**	**4.02E-02**	**1.13E-02**	**-3.55E-02**
GWP-f	kg CO_2 eq.	**1.07E+01**	ND	**1.49E-03**	ND	ND	ND	ND	ND	ND	ND	ND	**2.77E-04**	**8.54E-03**	**3.98E-02**	**1.13E-02**	**-3.54E-02**
GWP-b	kg CO_2 eq.	**1.08E-01**	ND	**4.29E-02**	ND	ND	ND	ND	ND	ND	ND	ND	**-7.77E-06**	**-2.46E-04**	**3.58E-04**	**-7.74E-05**	**-1.45E-04**
GWP-l	kg CO_2 eq.	**2.60E-03**	ND	**7.82E-07**	ND	ND	ND	ND	ND	ND	ND	ND	**5.18E-06**	**1.60E-04**	**6.05E-06**	**6.76E-05**	**-3.79E-06**
ODP	kg CFC-11 eq.	**6.79E-11**	ND	**1.03E-14**	ND	ND	ND	ND	ND	ND	ND	ND	**6.30E-17**	**1.94E-15**	**9.03E-13**	**3.07E-14**	**-1.73E-13**
AP	mol H^+ eq.	**1.78E-02**	ND	**1.41E-05**	ND	ND	ND	ND	ND	ND	ND	ND	**3.62E-06**	**1.10E-05**	**7.67E-05**	**8.00E-05**	**-5.54E-05**
EP-fw	kg P eq.	**2.55E-05**	ND	**2.65E-09**	ND	ND	ND	ND	ND	ND	ND	ND	**7.27E-10**	**2.24E-08**	**1.66E-07**	**2.57E-08**	**-5.00E-08**
EP-m	kg N eq.	**6.34E-03**	ND	**4.75E-06**	ND	ND	ND	ND	ND	ND	ND	ND	**1.64E-06**	**3.96E-06**	**1.92E-05**	**2.06E-05**	**-1.75E-05**
EP-t	mol N eq.	**6.64E-02**	ND	**6.52E-05**	ND	ND	ND	ND	ND	ND	ND	ND	**1.81E-05**	**4.81E-05**	**2.01E-04**	**2.27E-04**	**-1.88E-04**
POCP	kg NMVOC eq.	**1.81E-02**	ND	**1.24E-05**	ND	ND	ND	ND	ND	ND	ND	ND	**4.95E-06**	**1.04E-05**	**5.07E-05**	**6.31E-05**	**-6.91E-05**
ADPF*²	MJ	**1.94E+02**	ND	**1.44E-02**	ND	ND	ND	ND	ND	ND	ND	ND	**3.51E-03**	**1.08E-01**	**8.33E-01**	**1.49E-01**	**-9.55E-01**
ADPE*²	kg Sb eq.	**1.48E-06**	ND	**8.84E-11**	ND	ND	ND	ND	ND	ND	ND	ND	**4.57E-11**	**1.41E-09**	**7.44E-09**	**7.32E-10**	**-2.73E-09**
WDP*²	m^3 world eq. deprived	**9.28E-01**	ND	**5.44E-03**	ND	ND	ND	ND	ND	ND	ND	ND	**1.90E-06**	**5.87E-05**	**1.08E-02**	**1.29E-03**	**-5.08E-03**
Use of resources																	
PERE	MJ	**3.88E+01**	ND	**5.01E-01**	ND	ND	ND	ND	ND	ND	ND	ND	**3.81E-04**	**1.18E-02**	**6.03E-01**	**2.60E-02**	**-1.16E-01**
PERM	MJ	**4.96E-01**	ND	**-4.96E-01**	ND	ND	ND	ND	ND	ND	ND	ND	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**
PERT	MJ	**3.88E+01**	ND	**5.00E-03**	ND	ND	ND	ND	ND	ND	ND	ND	**3.81E-04**	**1.18E-02**	**6.03E-01**	**2.60E-02**	**-1.16E-01**
PENRE	MJ	**1.94E+02**	ND	**4.06E-01**	ND	ND	ND	ND	ND	ND	ND	ND	**3.51E-03**	**1.08E-01**	**4.44E-01**	**1.49E-01**	**-9.55E-01**
PENRM	MJ	**3.92E-01**	ND	**-2.05E-03**	ND	ND	ND	ND	ND	ND	ND	ND	**0.00**	**0.00**	**-0.39**	**0.00**	**0.00**
PENRT	MJ	**1.94E+02**	ND	**1.44E-02**	ND	ND	ND	ND	ND	ND	ND	ND	**3.51E-03**	**1.08E-01**	**8.33E-01**	**1.49E-01**	**-9.55E-01**
SM	kg	**0.00**	ND	**0.00**	ND	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	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	ND	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**
FW	m^3	**4.04E-02**	ND	**1.28E-04**	ND	ND	ND	ND	ND	ND	ND	ND	**3.62E-07**	**1.12E-05**	**4.60E-04**	**3.93E-05**	**-1.59E-04**
Waste categories																	
HWD	kg	**4.14E-08**	ND	**1.16E-11**	ND	ND	ND	ND	ND	ND	ND	ND	**1.50E-13**	**4.62E-12**	**1.20E-09**	**3.73E-11**	**-2.46E-10**
NHWD	kg	**2.09E-01**	ND	**9.30E-04**	ND	ND	ND	ND	ND	ND	ND	ND	**5.82E-07**	**1.79E-05**	**6.89E-04**	**7.54E-01**	**-3.80E-04**
RWD	kg	**7.95E-03**	ND	**4.45E-07**	ND	ND	ND	ND	ND	ND	ND	ND	**4.74E-09**	**1.46E-07**	**1.33E-04**	**1.54E-06**	**-2.53E-05**
Output material flows																	
CRU	kg	**0.00**	ND	**0.00**	ND	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	ND	**0.00**	**0.00**	**0.00**	**0.00**	**2.47E-01**
MER	kg	**0.00**	ND	**0.00**	ND	ND	ND	ND	ND	ND	ND	ND	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**
EEE	MJ	**2.67E-02**	ND	**5.66E-02**	ND	ND	ND	ND	ND	ND	ND	ND	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**
EET	MJ	**4.75E-02**	ND	**1.32E-01**	ND	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 – Nicht betrachtet

Conversion of other variants

For the solidian ANTICRACK Q85-CCE-21 (Q85-C-EP-s21) marked in yellow, the respective environmental impacts per 1 kg were calculated. For all other listed solidian ANTICRACK (CCE) products, the values in the results table of the declared product solidian ANTICRACK Q85-CCE-21 (Q85-C-EP-s21) must be calculated using the percentages in the following table to calculate the results of the environmental impact categories.

Indikator	solidian ANTICRACK Q85-CCE-21 (Q85-C-EP-s21)	solidian ANTICRACK Q95-CCE-38 (Q95-C-EP-s38)	solidian ANTICRACK Q47-CCE-38 (Q47-C-EP-s38)	solidian ANTICRACK Q43-CCE-21 (Q43-C-EP-s21)
	A1-A3 in %	A1-A3 in %	A1-A3 in %	A1-A3 in %
GWP-t – global warming potential - total	**100**	116,35	110,54	100,27
GWP-f – global warming potential fossil fuels	**100**	116,41	110,33	100,11
GWP-b – global warming potential - biogenic	**100**	110,12	131,23	116,08
GWP-l – global warming potential - land use and land use change	**100**	112,75	110,39	96,40
ODP – ozone depletion potential	**100**	114,55	114,94	107,03
AP - acidification potential	**100**	120,45	103,58	92,10
EP-fw - eutrophication potential - aquatic freshwater	**100**	110,12	118,71	101,53
EP-m - eutrophication potential - aquatic marine	**100**	120,51	103,47	92,21
EP-t - feutrophication potential - terrestrial	**100**	120,30	103,76	92,47
POCP - photochemical ozone formation potential	**100**	119,68	104,39	92,40
ADPE*2 - abiotic depletion potential –minerals&metals	**100**	118,91	103,05	93,59
ADPF*2 - abiotic depletion potential – fossil resources	**100**	116,65	109,52	98,23
WDP*2 – Water (user) deprivation potential	**100**	123,29	97,41	86,32
PERT - total use of renewable primary energy resources	**100**	116,50	111,67	103,04
PENRT - total use of non-renewable primary energy resources	**100**	116,65	109,52	98,22

Tabelle 5: conversion table

6.4 Interpretation, LCA presentation and critical review

Evaluation

The environmental impacts of the declared product Solidian ANTICRACK are determined in almost all environmental categories by the carbon fibres and the epoxy resin. The carbon fibres used represent the largest share in many categories, particularly in the global warming potential (GWP), acidification potential (AP), as well as in the total primary and renewable energy demand (PENRT and PERT).

Electricity and natural gas consumption play a secondary role in the environmental impact. Other materials such as polypropylene and quartz sand have a comparatively smaller but still measurable impact in categories such as raw material scarcity and eutrophication. The environmental impacts caused by transport and packaging are marginal.
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.

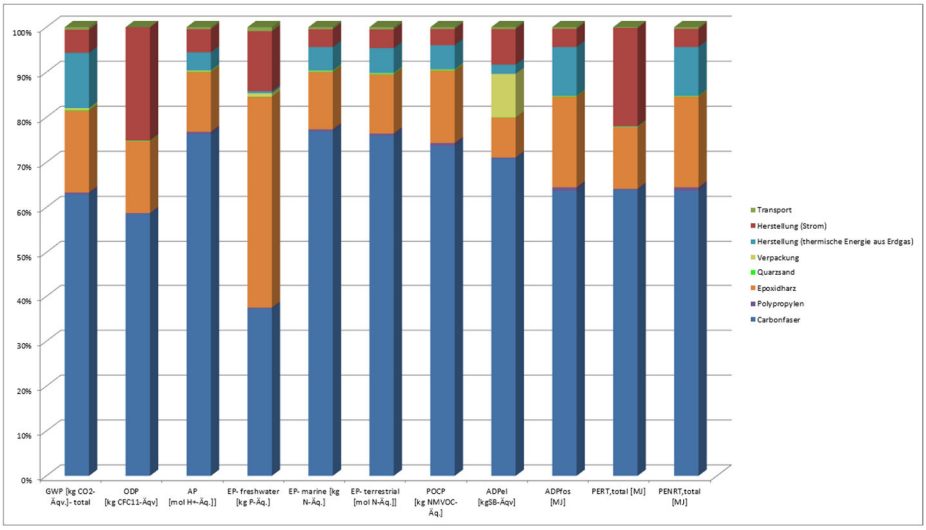


Figure 2: Percentage of the modules in selected environmental impact categories

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 and the report took place in the course of verification of the EPD and was carried out by Prof. Dr.-Ing. Eric Brehm, an external verifier.

7 General information regarding the EPD

Comparability

This EPD was prepared in accordance with DIN EN 15804 and is therefore only comparable to those EPDs that also comply with the requirements set out in DIN EN 15804.
Any comparison must refer to the building context and the same boundary conditions of the various life cycle stages.
For comparing EPDs of construction products, the rules set out in DIN EN 15804 (Clause 5.3) apply.

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 "PCR Teil B Bewehrungs- und Befestigungssysteme“ PCR-BS-3.0:2023.

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)] Prof. Dr.-Ing. Eric Brehm
[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	06.03.2025	External verification	Brechleiter	Brehm
2	13.03.2025	ed. changes	Brechleiter	-

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9 Annex

Description of life cycle scenarios for solidian ANTICRACK

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 6: Overview of applied life cycle stages

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

Modules A1-A3 are sufficiently described in the previous documentation; scenarios are not created for these modules. Manufacturer specifications were used for the scenarios.

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	Small lifting trolley / lifting platform	Small lifting platform/lifting trolley is required for the installation of the products

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 is sent for waste treatment in the construction / installation module. In accordance with the conservative approach, waste is exclusively thermally utilised or landfilled: Foils / protective covers, wood and cardboard in waste incineration plants. Credits from A5 are recognised in Module D. Credits from waste incineration plants: Electricity replaces RER Electricity grid mix 1kV-60kV; thermal energy replaces thermal energy from natural gas (RER).

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

C1 Deconstruction, demolition

No.	Scenario	Description
C1	Deconstruction	Deconstruction with excavator 100 % dismantling rate

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), diesel, 24 t payload, 50 % 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	• Carbon fibre 100 % recycled • Polypropylene fibre 100 % recycled • Epoxy resin components 100 % disposed* • Quartz sand 100 % disposed

Electricity consumption of incineration plant 0.5 MJ/kg.

As the products are placed on the European market, the disposal scenario is based on average European datasets.

**Note:*
In practice, thermal utilisation of the epoxy resin components is generally used.

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	1.00
Collection process, collected as mixed construction waste	kg	0.00
Recovery system, for reuse	kg	0.00
Recovery system, for recycling	kg	0.247
Recovery system, for energy recovery	kg	0.00
Disposal	kg	0.753

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” (RER).

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	• Recycled carbon fibres from C3 replace 60 % of carbon fibres • Recycled polypropylene fibres made from C3 replace 60 % polypropylene fibres

[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.

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