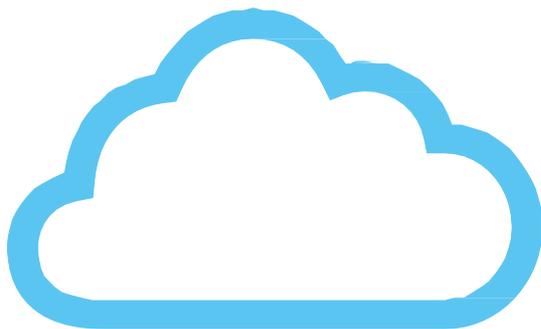


## Short report

# Product Carbon Footprint Single wall insert «BKD150- K/70»

**UGA SYSTEM-TECHNIK GmbH  
& Co. KG**



## Imprint

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# 1 Notes on communication

Life cycle assessments (LCAs) involve, among other things, two challenges that must be taken into account when communicating the results from this report:

- *Natural uncertainties*: Unlike financial accounting, the accounting of CO<sub>2</sub> or other environmental impacts is subject to statistical uncertainties. Results must therefore be considered based on the significance of uncertainties. myclimate integrates an uncertainty calculation for this purpose.
- *Data gaps*: Missing data are compensated as well as possible with well-founded estimates. Nevertheless, it may happen that these estimates are not accurate in individual cases, which leads to further uncertainties.

Due to these characteristics, communicating the results becomes demanding. myclimate therefore stipulates that the communication of results to the outside must be coordinated. myclimate supports customers in appropriate communication, e.g. by preparing summary factsheets.

Especially for LCAs whose results are communicated externally, myclimate recommends the entry of an external review by a third-party company, which critically assesses the study in accordance with the ISO 14040/44 standard.

Thanks to myclimate's many years of experience in this field, correct and appropriate communication is ensured. This prevents unnecessary vulnerability or false conclusions from arising and protects the credibility of the partners and the project.

Since both the processes in the production of products and the scientific knowledge about the environmental impacts and the underlying processes in modeling are constantly evolving, the validity of a PCF is limited to a maximum of five years. The PCF, as the basis for label issuance, must therefore be renewed regularly. We recommend a review of the PCF after three years.

The impact category climate change examined here is only one indicator among many and does not reflect the total environmental impacts of the product on the environment. Depending on the product and project objective, the selection of impact categories is made individually and in consultation with the company.

Important: This document is formatted in English notation; for numbers, thousands are separated by a comma and decimals by a period.

## 2 Project overview

The company UGA SYSTEM-TECHNIK GmbH & Co. & Co. KG (hereinafter referred to as UGA) specializes in the production of gas- and watertight building entries and distributes them worldwide. UGA is committed to proactively promoting and communicating social and ecological changes as part of its corporate responsibility.

For this reason, UGA approached myclimate to calculate the CO<sub>2</sub> footprint of the single wall insert “BKD150-K/70”. Two variants are compared: one made from primary material and one whose ABS content consists of 100% recycled material.

## 3 Objective and scope of investigation

### 3.1 Objective

With the help of a Product Carbon Footprint (PCF), all greenhouse gas emissions (GWP) relevant to climate change that occur during the different life cycle phases of both single wall insert variants “BKD150-K/70” are evaluated.

### 3.2 Functional unit

As the functional unit, “1 piece single wall insert BKD150-K/70” with a weight of 0.62 kg/piece (including proportional packaging) is chosen. This corresponds to the average weight of a produced single wall insert “BKD150-K/70”.

### 3.3 System boundaries

The system boundaries include, according to cradle-to-grave, all processes of the product from cradle to grave; raw material extraction, manufacturing, packaging of the finished product, transport, distribution, and disposal in the respective life cycle phases are considered. The raw material packaging and the use phase are excluded from this study, as there is no representative data on the packaging of raw materials. The use phase of the sealing “BKD150-K/70” is considered not relevant, as no energy, maintenance, or replacement of components is required over the entire life cycle.

There are no direct emissions at UGA, so no production phase is shown; the processing of (manufacturing) raw materials is included in the material phase.

The geographical scope is Europe. The reference year chosen was 2022/2023.

### 3.4 Data basis

The material consumption data, as well as information on means of transport and distances, come directly from UGA. No data could be provided for the disposal of the single wall insert “BKD150-K/70”, so for this phase, average values fromecoinvent, literature data, or justified assumptions<sup>1</sup> are used.

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<sup>1</sup> Circular Economy Report shows: There are advances in recycling, but also hurdles (19.03.24)

The data was collected by UGA on 27.10.2023 using primary / plant data and made available to myclimate. The data quality of the primary data used is therefore precise and can be rated as good and representative.

Every emissions balance is only a model of reality and therefore subject to uncertainties. These are greater or smaller depending on the quality of the data basis and the methods chosen. Due to uncertainties in modeling the material ABS, an uncertainty of 50% was taken into account in the corresponding model.

### 3.5 Methods and databases

The accounting was carried out in accordance with internationally recognized standards: ISO 14040<sup>2</sup>, ISO 14044<sup>3</sup> and ISO 14067<sup>4</sup> and based on ISO 14026<sup>5</sup>. An external review of this study is being carried out by Fabian Elsener from Carbotech AG in Zurich<sup>6</sup>.

The inventory and impact assessment were carried out using the LCA software SimaPro V 9.6.0.1 (SimaPro 2024) (modeling, calculation, and evaluation). ecoinvent 3.9.1 (ecoinvent, 2022) was used as the database basis.

The datasets for modeling are selected according to the current state of the art for the region of raw materials or production, complete and representative.

Materials and waste that are recycled or otherwise reused were assigned to the new system according to the so-called cut-off approach. This means that the environmental impact of the recycling process is attributed to the recycled material. Only the impacts incurred during transport to the recycling company are attributed to the original material.

## 4 Material balance

The table below lists the data used for the calculation for the production of a single wall insert "BKD150-K/70".

Components	Quantity	Transport distance	Means of transport
<b>Material components (net)</b>			
ABS	0.49 kg	1200 km	Truck 16-32t
TPE	0.13 kg	1200 km	Truck 16-32t
<b>Packaging finished product</b>			
Carton (cardboard)	0.102 kg	110 km	Truck 16-32t
Pallets (wood)	0.153 kg	10 km	Truck 7.5-16t
Strap/stretch film (plastic)	0.007 kg	100 km	Truck 16-32t

<sup>2</sup> DIN EN ISO 14040, Environmental management – Life cycle assessment – Principles and framework. ([link](#))

<sup>3</sup> DIN EN ISO 14044, Environmental management – Life cycle assessment – Requirements and guidelines. ([link](#))

<sup>4</sup> DIN EN ISO 14067, Greenhouse gases – Carbon footprint of products – Requirements and guidelines for quantification. ([link](#))

<sup>5</sup> DIN EN ISO 14026, Environmental labels and declarations – Principles, requirements and guidelines for the communication of footprint information ([link](#))

<sup>6</sup> The external review was carried out for the report dated 18.12.2024. In the report dated 14.05.2025, only spelling corrections were made. These have no impact on the calculations or results.

Distribution			
Germany (average transport distance)	-	457 km	Truck 16-32t & < 3.5t
EU (average transport distance)	-	1000 km	Truck 16-32t
Production waste 0.64 %			

In cases where no exact information on the means of transport or transport distance could be provided, the calculations used the standard distances specified in the ecoinvent database. At EoL, a truck 16-32 t was used as the means of transport.

Transport from the production sites to customers in Germany and Europe is carried out exclusively by truck and car.

No more detailed data are available for TPE; in the balance, the emission factor of styrene was used as a proxy.

The transport distance to waste incineration plants was estimated at 30 km, and to recycling centers at 50 km.

It is assumed that the resulting waste during the processing of raw materials is disposed of in waste incineration plants (MVAs). The packaging of the single wall insert can be recycled, and the disposal of the single wall insert after its use is – due to lack of data – based on country-specific waste and recycling data from ecoinvent.

## 5 Impact assessment

Within the scope of this study, the contribution to climate warming due to the release of climate-relevant gases is calculated. The so-called greenhouse potential according to IPCC (IPCC, 2021), based on a period of 100 years, serves as an indicator for this. The relevant greenhouse gases are carbon dioxide (CO<sub>2</sub>), methane (CH<sub>4</sub>), nitrous oxide (N<sub>2</sub>O), hydrofluorocarbons, perfluorocarbons, sulfur hexafluoride (SF<sub>6</sub>), and nitrogen trifluoride (NF<sub>3</sub>).

Due to their different physical properties, these gases also have a different influence on the climate, which is why the resulting emissions are converted into so-called CO<sub>2</sub> equivalents (CO<sub>2</sub>e). These quantify how much a certain amount of a greenhouse gas contributes to global warming compared to the same amount of CO<sub>2</sub>. For example, the CO<sub>2</sub> equivalent for nitrous oxide over a period of 100 years is 265, i.e., one ton of nitrous oxide has the same influence on the greenhouse effect as 265 tons of

## 6 Evaluation

The total emissions for a single wall insert "BKD 150-K/70" over the entire defined life cycle (cradle-to-gate + distribution + EoL) without recycled content amount to **4.56 kg CO<sub>2</sub>e/product**. In comparison, the CO<sub>2</sub> footprint for the product with 100% recycled ABS is **2.63 kg CO<sub>2</sub>e/product** and is thus 42% lower. Figure 1 shows the results of the different life phases of the single wall insert, divided into the recycled and virgin variants (the error indicators represent the uncertainty resulting from modeling without primary data for the ABS variants).



Figure 1: CO<sub>2</sub> total emissions "BKD 150-K/70"

It is clearly evident that material production (raw material procurement, processing, and delivery) accounts for more than 50% of the total emissions in both cases. These are mainly influenced by the plastic blends used for the production of the parts of the single wall insert (frame, cover, sealing). The main focus of the comparison is on this phase of material production. A significant difference is evident here: 3.42 kg CO<sub>2</sub>e for the conventional and 1.50 kg CO<sub>2</sub>e for the single wall insert made from 100% recycled ABS.

For recycled acrylonitrile butadiene styrene (ABS), a recycling process for polyethylene was used as a reference, which shows comparable emission values from studies on ABS recycling<sup>7</sup> when comparing the emission ratios of primary produced ABS to recycled ABS. The resulting high uncertainty is indicated in the evaluation by the error indicators.

The slightly higher value for disposal of 0.68 kg CO<sub>2</sub>e is due to the high carbon content of the thermoplastics used, which is released during incineration. Improved recycling or the reuse of the thermoplastic components of the single wall insert at the end of its service life could further reduce these emissions. In addition, companies, including UGA, typically have little influence over how their products are disposed of in the case of post-consumer waste.

Transport and packaging play a minor role with 0.30 kg CO<sub>2</sub>e and 0.16 kg CO<sub>2</sub>e respectively; nevertheless: the less packaging used per unit, the lower the emissions. Elaborate individual packaging in retail has a noticeable, though not decisive, impact on total emissions.

<sup>7</sup> See Campolina, Juliana & Sigrist, Carolina & Faulstich de Paiva, Jane & Nunes, Andréa & Moris, Virgínia. (2017). A study on the environmental aspects of WEEE plastic recycling in a Brazilian company. The International Journal of Life Cycle Assessment. 22. 10.1007/s11367-017-1282-2 ([link](#)); see bage plastics GmbH (2021). Sustainable, recycled granules by bage plastics with excellent carbon footprint ([link](#))(Retrieved 18.12.2024)

## 7 Conclusion

The life cycle phases of raw material provision and disposal are the main drivers of the total CO<sub>2</sub> emissions of a single wall insert “BKD 150-K/70”.

The energy-intensive fossil raw materials styrene and acrylonitrile butadiene styrene have a major impact in the raw material provision phase.

Recycled plastics (styrene and acrylonitrile butadiene styrene), and the possibility of reusing “BKD 150-K/70” components at the end of their life cycle, can significantly contribute to reducing total emissions. A pure separation of the single wall insert components is essential for high-quality recycling of secondary materials.

The study is largely based on database values; for a more precise analysis with fewer uncertainties, primary data on plastic production is required.

## 8 Sources

DIN EN ISO 14040	DIN EN ISO 14044:2021-02: Environmental management - Life cycle assessment - Principles and framework (ISO 14040:2006 + Amd 1:2020); German version EN ISO 14040:2006 + A1:2020
DIN EN ISO 14044	DIN EN ISO 14044:2021-02: Environmental management - Life cycle assessment - Requirements and guidelines (ISO 14044:2006 + Amd 1:2017 + Amd 2:2020); German version EN ISO 14044:2006 + A1:2018 + A2:2020
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IPCC. (2021).	Intergovernmental Panel on Climate Change 2021: The Physical Science Basis. Contribution of Working Group I to the Sixth Assessment Report of the Intergovernmental Panel on Climate Change. Cambridge University Press, Cambridge, United Kingdom and New York, US.