ENVIRONMENTAL PRODUCT DECLARATION

as per *ISO 14025* and *EN 15804+A1*

Owner of the Declaration	Kaimann GmbH
Programme holder	Institut Bauen und Umwelt e.V. (IBU)
Publisher	Institut Bauen und Umwelt e.V. (IBU)
Declaration number	EPD-KAI-20210261-IBD1-EN
Issue date	08.10.2021
Valid to	07.10.2026

Kaiflex EF

Kaimann GmbH

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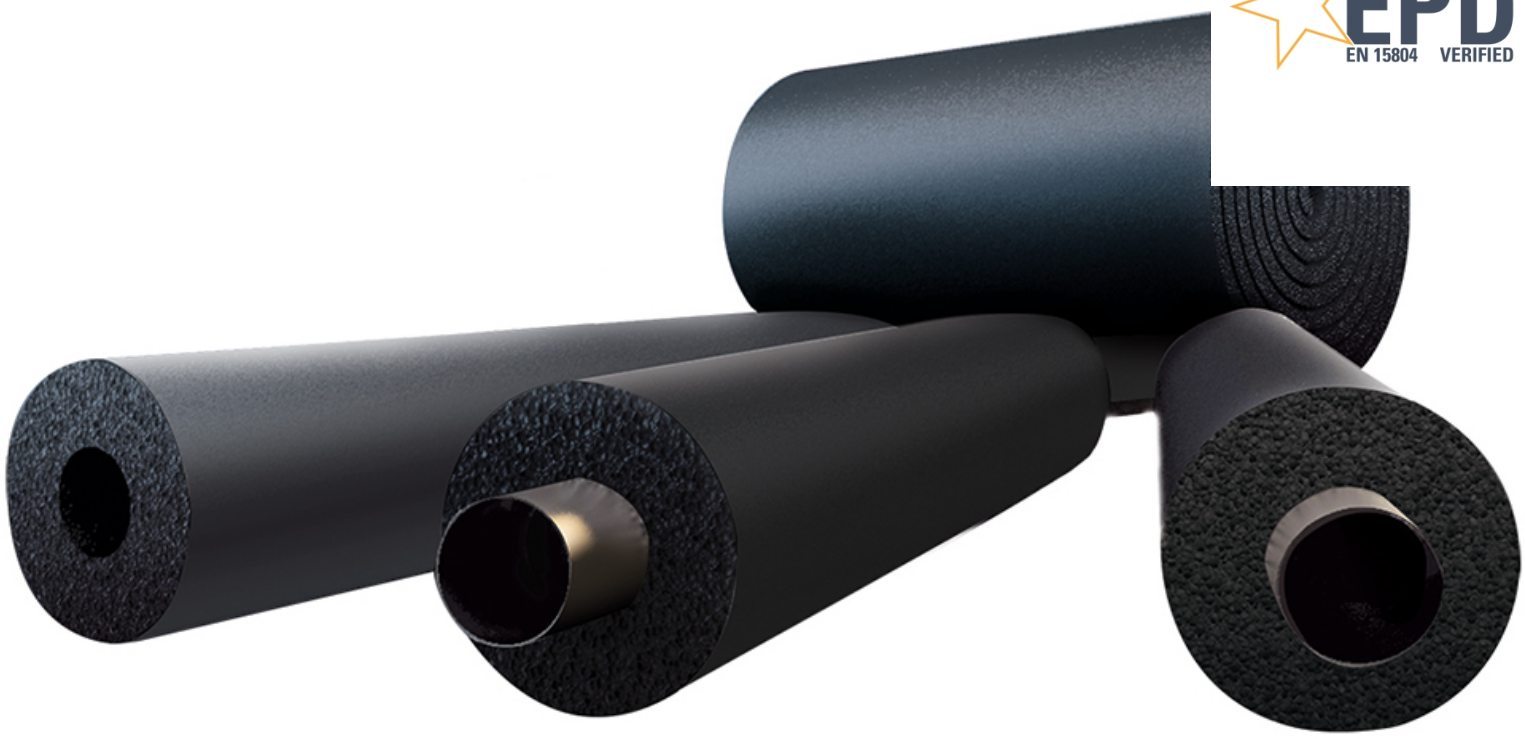


1. General Information

Kaimann GmbH	Kaiflex EF
Programme holder IBU – Institut Bauen und Umwelt e.V. Panoramastr. 1 10178 Berlin Germany	**Owner of the declaration** Kaimann GmbH Hansastraße 2-5 33161 Hövelhof
Declaration number EPD-KAI-20210261-IBD1-EN	**Declared product / declared unit** 1 m^3 insulation material Kaiflex EF
This declaration is based on the product category rules: Insulating materials made of foam plastics, 01.2019 (PCR checked and approved by the SVR)	**Scope:** Product line Kaiflex EF Thermal insulation material made of flexible elastomeric foam for technical building equipment and industrial installations. The EPD is performed in agreement with the demands of PCR Part A with reference to *EN 15804+A1:2013* and PCR Part B: Requirements on the EPD for insulating materials made of foam plastics. The EPD is based on the average Kaiflex EF production in Germany.
Issue date 08.10.2021	The owner of the declaration shall be liable for the underlying information and evidence; the IBU shall not be liable with respect to manufacturer information, life cycle assessment data and evidences. The EPD was created according to the specifications of *EN 15804+A1*. In the following, the standard will be simplified as *EN 15804*.
Valid to 07.10.2026	**Verification** The standard *EN 15804* serves as the core PCR Independent verification of the declaration and data according to *ISO 14025:2010* ☐ internally ☒ externally
 Dipl. Ing. Hans Peters (chairman of Institut Bauen und Umwelt e.V.)	
 Dr. Alexander Röder (Managing Director Institut Bauen und Umwelt e.V.))	 Matthias Klingler (Independent verifier)

2. Product

2.1 Product description/Product definition

Kaiflex EF is a flexible closed cell rubber insulation made of flexible elastomeric foam (FEF) that prevents condensation and reduces energy loss. By incorporating a water vapour barrier into the insulation cell structure Kaiflex EF can effectively eliminate water vapour migration and retain its performance over the entire system life. This EPD covers the Kaiflex EF product family including tubes and sheets.

For the placing on the market of the product in the European Union/European Trade Association (EU/EFTA) (with the exception of Switzerland) *Regulation (EU) No. 305/2011 (CPR)* applies. The product needs a declaration of performance taking into consideration *EN 14304:2009*, Thermal insulation products for building equipment and industrial installations - Factory made flexible elastomeric foam (FEF) products - Specification, and the CE-marking. For the application and use the respective national provisions apply.

2.2 Application

Kaiflex EF is used for air-conditioning, refrigeration, chilled water, heating and hot water pipes and air-distribution ductwork. In addition to preventing condensation and saving energy, Kaiflex EF also performs an acoustic function, absorbing sound and dampening duct wall vibration. With inherent anti-microbial resistance as standard, and a Class B fire rated, closed cell rubber that is completely dust and fibre free, Kaiflex EF can be used in any kind of public, commercial or industrial building without impacting on health or the quality of air. Outdoor application requires protection against UV-radiation.

2.3 Technical Data

Constructional data

Name	Value	Unit
Gross density	48.35	kg/m^3

Water vapour diffusion resistance factor acc. to EN 12088	μ ≥ 8000	-
Thermal conductivity	λϑ = 0.036 + 7.2 · 10E-5 ϑ + 1.2*10E-6*ϑ²	W/(mK)
Thermal conductivity at -10 °C	0.035	W/(mK)
Thermal conductivity at 0 °C	0.036	W/(mK)
Thermal conductivity at 10 °C	0.037	W/(mK)

Performance data of the product in accordance with the declaration of performance with respect to its essential characteristics according to *EN 14304* Thermal insulation products for building equipment and industrial installations - Factory made flexible elastomeric foam (FEF) products - Specification

2.4 Delivery status

Kaiflex EF is supplied in the shape of tubes and sheets:

- Tube dN = 6 - 50 mm
- Tube- Self-adhesive dN = 6 - 50 mm
- Tube continuous dN 6 - 50 mm
- Sheet continuous - roll ø 400 mm
- Sheet continuous - roll ø 530 mm
- Flat sheet (2.0 x 1.0 m) dN = 3 - 50 mm

The EPD is based on the average of these six different versions. Kalifex EF is typically packaged in containerboard boxes or polypropylene bags and delivered on EURO pallets. Some product varieties are wrapped in PE film before packaging.

2.5 Base materials/Ancillary materials

Kaiflex EF is based on synthetic rubber and consists of several components. The following table shows the components clustered into substance groups:

- Rubber and polymers: 27.6%
- Fillers and pigments: 21%
- Blowing agent: 13%
- Vulcanisation system, additives, plasticizer: 3.5%
- Flame retardant: 34.5%
- Stabilizer: 0.4%

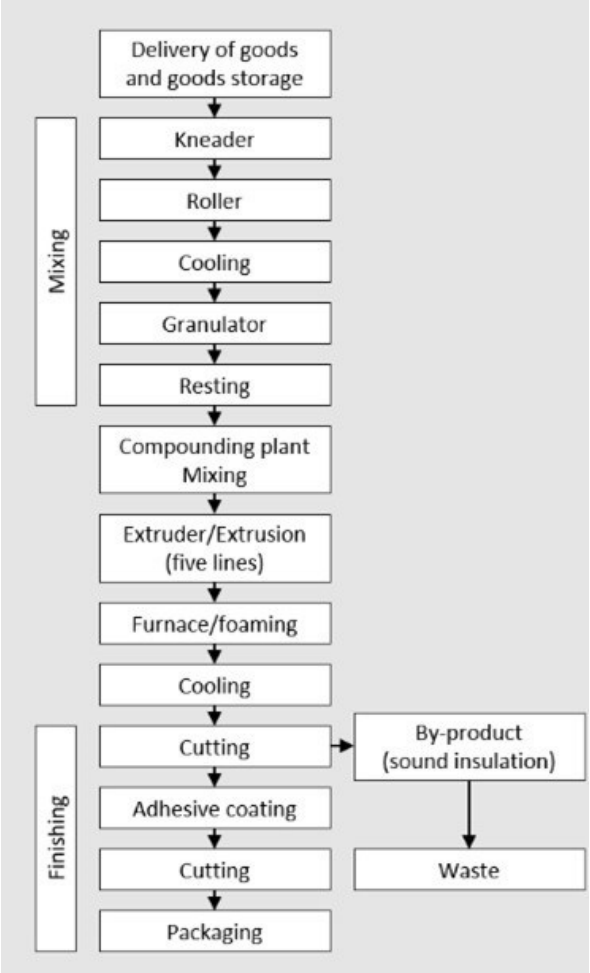
Rubber and polymer are the base material. Fillers and pigments are for firmness and colour. The blowing agent causes the volume increase and expansion process during the manufacture of the product. The vulcanisation system, additives, and plasticizer provide flexibility and workability. The flame retardants ensure the fire resistance of the end-product, and the adhesives and stabilizers are for processing and process control.

1) This product/article/at least one partial article contains substances listed in *the candidate list* (16.01.2020) exceeding 0.1 percentage by mass: **yes**, namely Azodicarbonamide with a percentage of 13% by mass.
2) This product/article/at least one partial article contains other carcinogenic, mutagenic, reprotoxic (CMR) substances in categories 1A or 1B which are not on *the candidate list*, exceeding 0.1 percentage by mass: **no**.
3) Biocide products were added to this construction product or it has been treated with biocide products (this then concerns a treated product as defined by the (EU*) Ordinance on Biocide Products No. 528/2012*): **no**.

2.6 Manufacture

Upon delivery, the raw materials are stored in a warehouse and used in the production shortly after. The first step in the production of Kaiflex EF is to mix the raw materials in a kneader and to roll out the resulting mixture which is then cut into sheets. The flat sheets are passed through an industrial cooler and cooled off. The cooled-off sheets are granulated and the granulates are temporarily stored at room temperature before entering the compounding plant.

In the next step, the different types of granulates enter the compounding plant for mixing. The resulting elastomer compound is pushed through extruders and carried on a conveyer belt through an industrial furnace for foaming. After foaming, the endless sheets are passed through an industrial cooler upon which a continuous longitudinal cut is applied to cut sheets into the right width. If applicable, the adhesive coating is applied on one side of the sheets. Finally, a traverse cut trims the continuous sheet into sheets of various sizes. For the packaging, cardboard, polyethene film, polypropylene film, and wooden pallets are used.



2.7 Environment and health during manufacturing

The manufacturer of Kaiflex EF complies with national manufacturing guidelines and regulations such as the German Energy Saving Regulation (*EnEV*) and the German Renewable Energy Act (*EEG*). In addition, KAIMANN's environmental management is certified in accordance with *ISO 9001/ISO 14001/ISO 50001*.

2.8 Product processing/Installation

The installation of Kaiflex EF requires basic tools such as cutters and scissors. No additional specific protection beyond normal protective clothes is required.

2.9 Packaging

Kaiflex EF is packaged in cardboard boxes with polypropylene and polyethene films in varying sizes. The boxes are placed on wooden EURO pallets.

2.10 Condition of use

Changes in materials composition of Kaiflex EF during the use phase only occur in case of extraordinary effects.

2.11 Environment and health during use

An odour should be considered normal. The odour will dissipate during use (about 4 weeks) because the cells are exchanged with the air.

2.12 Reference service life

Since the use stage (B1-B7) is not fully declared, the declaration of the reference service life is only voluntary.

2.13 Extraordinary effects

Fire

Kaiflex EF is designed to meet European fire regulations and is a self-extinguishing foam that will not drip or support flame spread. It can be safely used with confidence in public, commercial and industrial buildings.

Fire protection

Name	Value
Building material class	B (sheets) / BL (tubes)
Burning droplets	d0
Smoke gas development	s2

Water

Kaiflex foam-based insulating materials have a high water vapour transmission resistance and thus keep possible water vapour transmission to a minimum.

Mechanical destruction

Foam-based insulation materials have limited mechanical stability and low elastic modulus. Thus, it should be externally supported if subjected to greater mechanical loads.

2.14 Re-use phase

At the end of life, Kaiflex EF can be used for energy recovery in a waste incineration plant, as well as the plastic from packaging. The cardboard and wooden pallets from packaging can be re-used.

2.15 Disposal

Kaiflex EF is disposed of in accordance with local regulations governed by the *European Waste Catalogue 2014* (waste code: 07 wastes from organic chemical processes - 07 02 13 waste plastic).

2.16 Further information

Additional information about Kaiflex EF is available on https://kaimann.com/.

3. LCA: Calculation rules

3.1 Declared Unit

The declared unit is 1 m³ of the thermal insulation material for technical building equipment and industrial installations Kaiflex EF. The declared unit refers to the product as it leaves the factory gate. The gross density is the average density of all declared products, weighted by production volume.

Declared unit

Name	Value	Unit
Gross density	48.35	kg/m³
Conversion factor to 1 kg	0.020683	kg/m²
Declared unit	1	m³

3.2 System boundary

This EPD is a cradle-to-gate EPD with options. The system boundaries of the EPD follow the modular structure of *EN 15804* (according to *EN 15804*, section 6.2.1). Only the declaration of the product stage modules A1 to A3 is mandatory for compliance with *EN 15804*. The declaration of the modules of other life cycle stages is optional. Resources from the ecosphere and Technosphere enter the system on stage A1 and leave the system on stage C4. The following life cycle stages are considered:

Module A1: The system boundaries comprise raw material extraction and supply from cradle to factory gate and is represented through generic background data sets.

Module A2: The transport of the raw materials from the factory gate to the point of manufacturing is represented through generic background data sets. The transportation distances have been provided by the manufacturer.

Module A3: The manufacturing includes manufacturer-specific material and energy data which are represented through generic data sets. Machinery, as well as buildings to manufacturing the declared unit is neglected. On average, 0.46 kWh electricity and 2.65 kWh natural gas are required for the manufacturing of 1m³ Kaiflex EF. This data was provided by Kaimann GmbH. This module also includes packaging with plastics and cardboard and wooden pallets. The biogenic carbon stored is declared in the result section.

Module A4: The transport of Kaiflex EF from the factory gate to the site of assembly is represented through generic background data. The transportation

distances are based on the average transportation data provided by the manufacturer.

Module A5: The assembly can be done manually without the use of any electrical equipment. Only glue (Spezialkleber) is required for the assembly of Kaiflex EF. Packaging material from module A3 is disposed of here: Plastic packaging is incinerated, and cardboard and the wooden pallet are re-used.

Modules B1-B7: No resource use and impacts occur during the use phase of the products.

Modules C1&C3: Dismantling of Kaiflex EF is done manually without using any electrical equipment. No processing is required before disposal. Therefore, module C1 and C3 are disregarded.

Module C2: The products to be disposed of are transported to the waste treatment facility.

Module C4: The waste is treated according to the waste framework directive of the European Union.

Module D: Potential impacts and benefits from energy recovery and recycling are described.

3.3 Estimates and assumptions

The type of EPD is cradle to gate.

Module A2: Raw materials are transported to the manufacturer by road transport and shipping. Information on the transportation distances was provided by the manufacturer. For the calculation, the distances were weighted by the mass of the respective raw materials.

Module A3: No production waste is assumed during the production of Kaiflex. For further information, see chapter 5.4 Allocation.

Module A4: Kaiflex EF is distributed in Eastern Europe and Russia. The average transportation distance per declared unit was calculated based on the sales volume and average transportation distance per country where Kaiflex EF is distributed. Based on the sum product of sales volume multiplied by (with) the road transportation, the total transportation distances were calculated and divided by the total sales volume to calculate the average transportation distance per declared unit. As a result, the average road transportation distance per declared unit is 1405 kilometres by road. No loss during transportation is assumed.

Module A5:
Kaiflex EF is assembled by manual labour under use of adhesive. It is assumed that no further energy or materials are required in this module (apart from the manual labour and adhesive), and that consumers of Kaiflex EF order correct product sizes and thus avoid waste production during the assembly. The packaging materials are disposed of by re-using (cardboard and wooden pallet) and by incineration (polyethene and polypropylene).

Module C2: The average distance of disassembled Kaiflex EF to the point of disposal is assumed to be 75 kilometres covered by road.

Module C4: Kaiflex EF is incinerated.

3.4 Cut-off criteria

All material flows in module A1 are covered and almost all material and energy flows in module A3 are covered. Neglected material or energy flows have a mass or energy contribution of less than one percent per process and contribute to less than 5% of mass and energy flows of a module. Infrastructure such as office buildings and the manufacturing hall as well as the machinery required to produce Kaiflex EF have not been considered.

3.5 Background data

The LCA model underlying this EPD was created in *openLCA 1.10* developed by GreenDelta GmbH. As a background database *GaBi database* professional database (version from September 2019) by thinkstep AG was used and has been complemented by data sets from *GaBi database* extension databases as well as data sets from the *EuGeos database* version 2.1 by EuGeos Ltd.

3.6 Data quality

The life cycle inventory for the assessed product is based on an internal assessment of manufacturing and environmental data, assessment of LCA-relevant data for the supply chain and energy measurement within the factors. The required product flows for the creation of the product system were handed over to GreenDelta GmbH.
All data was scrutinised and found to be plausible and consistent and were therefore found to be representative.
Some of the background data sets are more than 10 years old but were used when no recent dataset was available. Datasets from the *GaBi database* are assumed to have a high quality.
There are no materials or processes that are left out because they are under the cut-off threshold.

3.7 Period under review

The production data refers to the average of the year 2020.

3.8 Allocation

During production, minimal material cut-offs (rate of cut-off to product: 1:300) from Kaiflex EF are collected, shredded, and pressed. The pressed material is sold as sound proofing material Kaisound. As Kaisound has a similar market value, physical allocation is used in this case and only input materials necessary for the production of the declared unit of Kaiflex EF are considered for the inventory.

3.9 Comparability

Basically, a comparison or an evaluation of EPD data is only possible if all the data sets to be compared were created according to *EN 15804* and the building context, respectively the product-specific characteristics of performance, are taken into account.

As a background database *GaBi database* professional database (version from September 2019) by thinkstep AG was used and has been complemented by data sets from *GaBi* extension *databases* as well as data sets from the *EuGeos database* version 2.1 by EuGeos Ltd

4. LCA: Scenarios and additional technical information

The following technical scenario information serves as a basis for the declared modules. All values refer to the declared unit of 1 m³.

Transport to the building site (A4)

Name	Value	Unit
Transport distance (road)	1262	km

Installation into the building (A5)

Name	Value	Unit
Auxiliary	1.6	kg
Water consumption	0	m^3
Other resources	0	kg
Electricity consumption	0	kWh
Other energy carriers	0	MJ
Material loss	0	kg
Output substances following waste treatment on site	16.5	kg
Dust in the air	0	kg
VOC in the air	0	kg

The 16.5 kg is the sum of all packaging materials per declared unit.

End of life (C1-C4)

Name	Value	Unit
Collected separately	49.95	kg
Collected as mixed construction waste	0	kg
Reuse	0	kg
Recycling	0	kg
Energy recovery	49.95	kg
Landfilling	0	kg

48.35 kg Kaiflex and 1.6 kg Kaiflex Spezialkleber are incinerated for energy recovery.

Reuse, recovery and/or recycling potentials (D), relevant scenario information

Module D includes the credits from the material re-use in module A5 and the credits of the incineration processes from A5 (packaging waste) and C4 at a waste incineration plant with an assumed efficiency of R1<0.6.

5. LCA: Results

The life cycle impact assessment method is based on *EN15804*. Energy indicators for resource use utilise the lower calorific value.

DESCRIPTION OF THE SYSTEM BOUNDARY (X = INCLUDED IN LCA; MND = MODULE NOT DECLARED; MNR = MODULE NOT RELEVANT)

PRODUCT STAGE			CONSTRUCTION PROCESS STAGE		USE STAGE							END OF LIFE STAGE				BENEFITS AND LOADS BEYOND THE SYSTEM BOUNDARIES
Raw material supply	Transport	Manufacturing	Transport from the gate to the site	Assembly	Use	Maintenance	Repair	Replacement	Refurbishment	Operational energy use	Operational water use	De-construction demolition	Transport	Waste processing	Disposal	Reuse-Recovery-Recycling-potential
A1	**A2**	**A3**	**A4**	**A5**	**B1**	**B2**	**B3**	**B4**	**B5**	**B6**	**B7**	**C1**	**C2**	**C3**	**C4**	**D**
X	X	X	X	X	MND	MND	MNR	MNR	MNR	MND	MND	MND	X	MND	X	X

RESULTS OF THE LCA - ENVIRONMENTAL IMPACT according to EN 15804+A1: 1 m³ Kaiflex EF

Parameter	Unit	A1	A2	A3	A4	A5	C2	C4	D
GWP	[kg CO_2-Eq.]	2.19E+2	4.76E+1	2.64E+1	7.16E+0	1.07E+1	6.12E-1	1.15E+2	-1.93E+2
ODP	[kg CFC11-Eq.]	4.36E-5	8.88E-6	2.23E-7	0.00E+0	6.19E-9	1.14E-7	2.18E-14	-1.75E-5
AP	[kg SO_2-Eq.]	1.38E+0	1.88E-1	8.69E-2	1.69E-2	3.64E-3	2.42E-3	2.04E-2	-1.02E+0
EP	[kg $(PO_4)^{3-}$-Eq.]	1.71E+0	4.44E-2	2.05E-2	4.39E-3	5.00E-4	5.70E-4	4.50E-3	-6.35E-1
POCP	[kg ethene-Eq.]	5.30E-2	7.85E-3	5.07E-3	3.30E-4	2.90E-4	1.00E-4	6.20E-4	-3.46E-2
ADPE	[kg Sb-Eq.]	2.12E-2	1.40E-4	9.33E-6	0.00E+0	1.32E-5	1.84E-6	2.57E-7	-8.28E-5
ADPF	[MJ]	3.97E+3	7.37E+2	3.19E+2	0.00E+0	4.27E+1	9.46E+0	2.20E+1	-2.59E+3

Caption	GWP = Global warming potential; ODP = Depletion potential of the stratospheric ozone layer; AP = Acidification potential of land and water; EP = Eutrophication potential; POCP = Formation potential of tropospheric ozone photochemical oxidants; ADPE = Abiotic depletion potential for non-fossil resources; ADPF = Abiotic depletion potential for fossil resources

RESULTS OF THE LCA - INDICATORS TO DESCRIBE RESOURCE USE according to EN 15804+A1: 1 m³ Kaiflex EF

Parameter	Unit	A1	A2	A3	A4	A5	C2	C4	D
PERE	[MJ]	2.37E+2	9.67E+0	2.79E+2	0.00E+0	5.40E+0	1.24E-1	5.49E+0	-9.22E+2
PERM	[MJ]	0.00E+0	0.00E+0	2.35E+2	0.00E+0	0.00E+0	0.00E+0	0.00E+0	-2.35E+2
PERT	[MJ]	2.37E+2	9.67E+0	5.13E+2	0.00E+0	5.40E+0	1.24E-1	5.49E+0	-1.16E+3
PENRE	[MJ]	2.05E+3	7.47E+2	2.24E+2	0.00E+0	1.58E+2	9.60E+0	2.14E+3	-4.20E+3
PENRM	[MJ]	2.12E+3	0.00E+0	1.16E+2	0.00E+0	-1.16E+2	0.00E+0	-2.12E+3	0.00E+0
PENRT	[MJ]	4.17E+3	7.47E+2	3.40E+2	0.00E+0	4.27E+1	9.60E+0	2.20E+1	-4.20E+3
SM	[kg]	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0
RSF	[MJ]	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0
NRSF	[MJ]	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0
FW	[m³]	4.83E+0	1.40E-1	7.24E-1	0.00E+0	4.84E-2	1.80E-3	3.01E-1	-3.19E+0

Caption	PERE = Use of renewable primary energy excluding renewable primary energy resources used as raw materials; PERM = Use of renewable primary energy resources used as raw materials; PERT = Total use of renewable primary energy resources; PENRE = Use of non-renewable primary energy excluding non-renewable primary energy resources used as raw materials; PENRM = Use of non-renewable primary energy resources used as raw materials; PENRT = Total use of non-renewable primary energy resources; SM = Use of secondary material; RSF = Use of renewable secondary fuels; NRSF = Use of non-renewable secondary fuels; FW = Use of net fresh water

RESULTS OF THE LCA – WASTE CATEGORIES AND OUTPUT FLOWS according to EN 15804+A1: 1 m³ Kaiflex EF

Parameter	Unit	A1	A2	A3	A4	A5	C2	C4	D
HWD	[kg]	3.08E-2	3.11E-13	9.50E-3	0.00E+0	8.27E-8	0.00E+0	7.32E-8	-1.70E-3
NHWD	[kg]	7.17E+1	6.08E-6	9.01E+0	0.00E+0	3.79E+0	0.00E+0	7.18E+0	-7.16E+0
RWD	[kg]	1.69E-2	3.47E-9	2.79E-3	0.00E+0	5.10E-4	0.00E+0	1.76E-3	-2.46E-3
CRU	[kg]	0.00E+0	0.00E+0	0.00E+0	0.00E+0	1.37E+1	0.00E+0	0.00E+0	0.00E+0
MFR	[kg]	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0
MER	[kg]	0.00E+0	0.00E+0	0.00E+0	0.00E+0	2.66E+0	0.00E+0	5.00E+1	0.00E+0
EEE	[MJ]	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0
EET	[MJ]	0.00E+0	0.00E+0	0.00E+0	0.00E+0	6.82E+1	0.00E+0	1.25E+3	0.00E+0

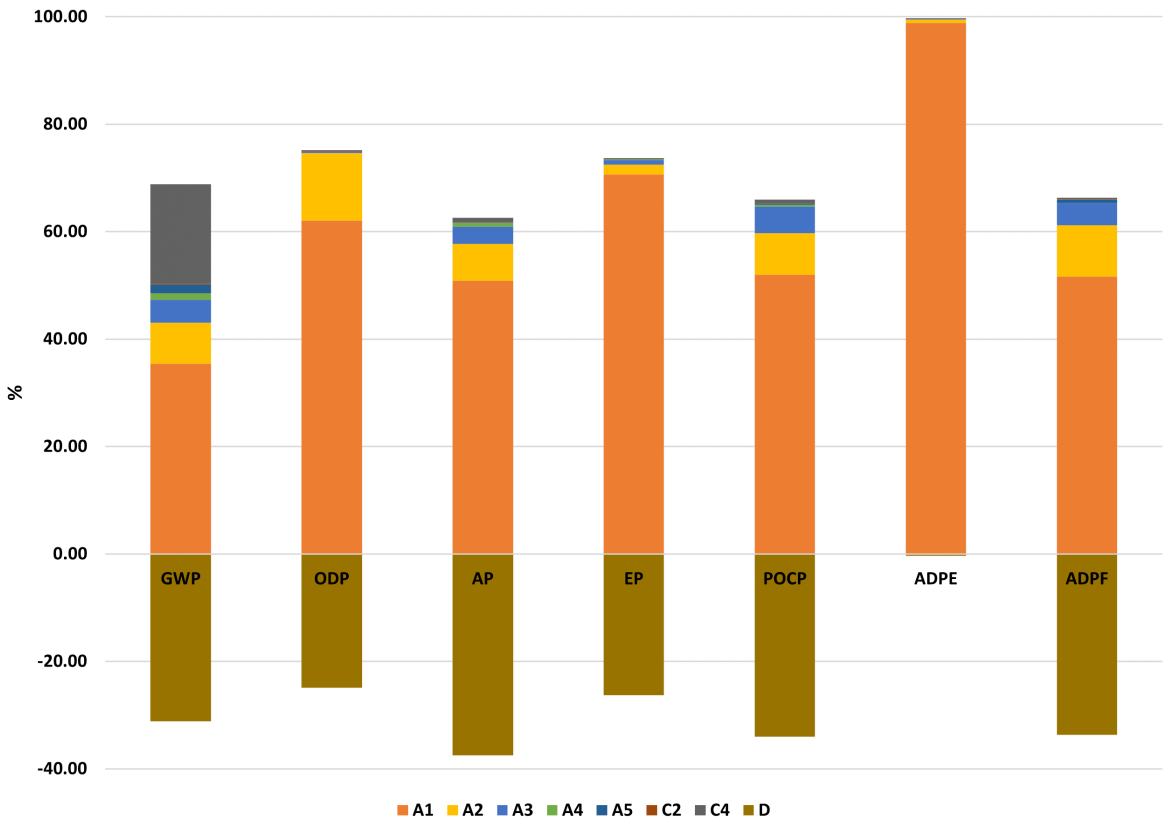
Caption	HWD = Hazardous waste disposed; NHWD = Non-hazardous waste disposed; RWD = Radioactive waste disposed; CRU = Components for re-use; MFR = Materials for recycling; MER = Materials for energy recovery; EEE = Exported electrical energy; EEE = Exported thermal energy

Additional Technical scenario:

Biogenic carbon is not included in the results. It enters the product system with wood and cardboard in modules A3 and is 'released' by being an avoided burden in module A5 (declared in module D) and has thus no net-effect on the overall results. The wooden pallet has approximately 23 kg biogenic CO_2, and the cardboard has 16 kg.

6. LCA: Interpretation

Environmental Impacts



All seven environmental impact categories are dominated by module A1 raw material supply. For six of them, the production of the blowing agent is the largest contributor.

Renewable primary energy as energy carrier (PERE)
This impact category is dominated by the modules A1 raw materials, and A3 manufacturing.

Renewable primary energy resources as material utilization (PERM)
The dominant modules are A3 manufacturing and the avoided burdens in module D.
Most of the renewable energy is stored in the wood of the EURO pallet and is 'released' in module D because of re-using.

Non-renewable primary energy as energy carrier (PENRE)
The dominant modules are A1 (energy use for the production of raw materials) and C4 as the Kaiflex EF gets incinerated here (so the A1 PENRM of the rubber is added to the C4 PENRE).

Non-renewable primary energy as material utilization (PENRM)
The dominant module is A1 raw material supply, where energy is stored in the product itself.

Use of net fresh water (FW)
This impact category is dominated by module A1 raw material supply.
The production of the blowing agent uses the most fresh water.

Hazardous waste disposed (HWD)
This impact category is dominated by modules A1 raw material supply and A3 manufacturing.
Most of the hazardous waste comes from the production of the blowing agent.

Non-hazardous waste disposed (NHWD)
This impact category is dominated by module A1 raw material supply.
Main contributors are the production of base materials and the flame-retardant.

Radioactive waste disposed (RWD)
This impact category is dominated by module A1 raw material supply.
Most radioactive waste stems from the production of base materials, and the blowing agent.

Conclusion
The production of the blowing agent is the largest contributor to the environmental impacts of Kaiflex EF.
The variability of LCIA results resulting from different product variants is very low, as inventory differences between product variants are minimal (different amounts of packaging material).

7. Requisite evidence

7.1 VOC emissions

The Volatile Organic Compound (VOC) emissions have been tested by *Eurofins Product Testing* A/S by using the Committee for health-related evaluation of building products/Deutsches Institut für Bautechnik (*AgBB/DIBt*) test method in 09.2013.

AgBB overview of results (28 days [µg/m³])

Name	Value	Unit
TVOC (C6 - C16)	<5	µg/m³
Sum SVOC (C16 - C22)	<5	µg/m³
R (dimensionless)	<1	-
VOC without NIK	<5	µg/m³
Carcinogenic Substances	<1	µg/m³

AgBB overview of results (3 days [µg/m³])

Name	Value	Unit
TVOC (C6 - C16)	<5	µg/m³
Sum SVOC (C16 - C22)	<5	µg/m³
R (dimensionless)	<1	-
VOC without NIK	<5	µg/m³
Carcinogenic Substances	<1	µg/m³

7.2 Leaching performance

The concentration of water-soluble chloride ions is 300 mg/kg according to internal measurements in compliance with *EN13468*.

8. References

Standards

EN 12088
EN 12088:2013, Thermal insulating products for building applications. Determination of long term water absorption by diffusion

EN 13468
EN 13468:2001, Thermal insulating products for building equipment and industrial installations - Determination of trace quantities of water soluble chloride, fluoride, silicate, and sodium ions and pH

EN 14304
EN 14304:2009+A1:2013, Thermal insulation products for building equipment and industrial installations - Factory made flexible elastomeric foam (FEF) products - Specification

EN 15804
EN 15804:2012+A1:2013, Nachhaltigkeit von Bauwerken – Umweltproduktdeklarationen – Grundregeln für die Produktkategorie Bauprodukte

ISO 9001
ISO 9001:2015, Quality management systems - Requirements

ISO 14001
ISO 14001:2015-0/, Environmental management systems - Requirements with guidance for use

ISO 14025
ISO 14025:2006, Environmental labels and declarations — Type III environmental declarations — Principles and procedures

ISO 50001
ISO 50001:2018-08, Energy management systems - Requirements with guidance for use

Further References

AGBB/DIBt
Deusches Institut für Bautechnik 2018: Anforderungen an die Innenraumluftqualität in Gebäuden: Gesundheitliche Bewertung der Emissionen von flüchtigen organischen Verbindungen (VVOC, VOC und SVOC) aus Bauprodukten

Energy Saving Ordinance (EnEV)
The German regulation Energy Saving Ordinance prescribes standard constructional requirements for the efficient operating energy demand of building or construction projects, valid until 31.10.2020 and is now aggregated into German law Gebäudeenergiegesetz (GEG).

EuGeos database
LCA database by EuGeos Limited

European waste catalogue 2014
COMMISSION DECISION amending Decision 2000/532/EC on the list of waste pursuant to Directive 2008/98/EC of the European Parliament and of the Council

GABi database
LCA database SP 39. thinkstep AG. Echterdingen 2019

General Instructions for the IBU EPD programme
General Instructions for the EPD programme of Institut Bauen und Umwelt e.V, Version 2.0

openLCA 1.10
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PCR Part A
PCR Part A Version 2.0.1, Calculation Rules for the Life Cycle Assessment and Requirements on the Project Report

PCR Part B
PCR Part B Version 1.7, Requirements on the EPD for insulating materials made of foam plastics

REACH 2006
REGULATION (EC) No 1907/2006 OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL concerning the Registration, Evaluation, Authorisation and Restriction of Chemicals (REACH)

Regulation (EU) No 305/2011 (construction products)
Regulation (EU) No 305/2011 laying down harmonised conditions for the marketing of construction products and repealing Council Directive 84/106/EEC (09.03.2011)

Regulation (EU) No 528/2012 (biocide products)
Regulation (EU) No 528/2012 concerning the making available on the market and use of biocidal products (22.05.2012)

Renewable Energy Sources Act (EEG 2021)
The Renewable Energy Sources Act (EEG 2021) is series of German laws to encourage the generation of renewable electricity, current version from 27.07.2021, https://www.gesetze-im-internet.de/eeg_2014/index.html

SVHC 2019
Candidate List of substances of very high concern for Authorisation (SVHC), European Chemicals Agency, Helsinki, Finland

Publisher
Institut Bauen und Umwelt e.V.
Panoramastr. 1
10178 Berlin
Germany

Tel +49 (0)30 3087748- 0
Fax +49 (0)30 3087748- 29
Mail info@ibu-epd.com
Web **www.ibu-epd.com**

Programme holder
Institut Bauen und Umwelt e.V.
Panoramastr 1
10178 Berlin
Germany

Tel +49 (0)30 - 3087748- 0
Fax +49 (0)30 – 3087748 - 29
Mail info@ibu-epd.com
Web **www.ibu-epd.com**

GreenDelta

Author of the Life Cycle Assessment
GreenDelta GmbH
Kaiserdamm 13
14057 Berlin
Germany

Tel +49 30 6292 4320
Fax -
Mail gd@greendelta.com
Web **https://www.greendelta.com**

Owner of the Declaration
Kaimann GmbH
Hansastraße 2-5
33161 Hövelhof
Germany

Tel +49 5257 98 50 - 0
Fax +49 5257 98 50 590
Mail info@kaimann.de
Web **https://www.kaimann.com**