ENVIRONMENTAL PRODUCT DECLARATION

as per *ISO 14025* and *EN 15804+A2*

Owner of the Declaration	BEVER Gesellschaft für Befestigungsteile Verbindungselemente mbH
Publisher	Institut Bauen und Umwelt e.V. (IBU)
Programme holder	Institut Bauen und Umwelt e.V. (IBU)
Declaration number	EPD-BEV-20250657-IBC1-EN
Issue date	30.03.2026
Valid to	29.03.2031

air layer anchor

Bever GmbH

Institut Bauen und Umwelt e.V.

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ECO PLATFORM EPD VERIFIED

1. General Information

Bever GmbH

Programme holder

IBU – Institut Bauen und Umwelt e.V.
Hegelplatz 1
10117 Berlin
Germany

Declaration number

EPD-BEV-20250657-IBC1-EN

This declaration is based on the product category rules:

Structural steels, 01.08.2021
(PCR checked and approved by the SVR)

Issue date

30.03.2026

Valid to

29.03.2031

Dipl.-Ing. Hans Peters
(Chairman of Institut Bauen und Umwelt e.V.)

Florian Pronold
(Managing Director Institut Bauen und Umwelt e.V.)

air layer anchor

Owner of the declaration

BEVER Gesellschaft für Befestigungsteile Verbindungselemente mbH
Auf dem Niedern Bruch 12
57399 Kirchhundem- Würdinghausen
Germany

Declared product / declared unit

1 kg air layer anchor from BEVER

Scope:

This EPD is an average EPD and relates to a declared unit of 1 kilogram of BEVER air-layer anchors, which are manufactured at the production site of BEVER Gesellschaft für Befestigungsteile Verbindungselemente GmbH in Kirchhundem (Germany). Data collection was carried out on a plant-specific basis using current data from the year 2024 (Jan–Dec).
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+A2. In the following, the standard will be simplified as *EN 15804*.

Verification

The standard EN 15804 serves as the core PCR
Independent verification of the declaration and data according to ISO 14025:2011
☐ internally ☒ externally

Dr. Martina Bender,
(Independent verifier)

2. Product

2.1 Product description/Product definition

BEVER air gap anchors form part of a fixing and connection system for double-skin masonry in new builds and renovation projects. The masonry consists of a load-bearing inner wall and a facing course made of, for example, clinker bricks.
The function of the air gap anchors in double-skin external wall constructions is to absorb compressive and tensile loads resulting from wind loads.
The air gap anchors are permanently fixed to the load-bearing rear wall or, where possible, embedded in the mortar joints of the rear wall.
Air gap anchors are typically used for facing brick widths of 90 mm – 115 mm and can bridge shell spacings (insulation or air gap) of up to 400 mm.
The products declared here are anchors manufactured from stainless steel wire or stainless steel strip.
Anchoring using dowels is not covered by this product declaration.
The air gap anchors are anchored in / to both masonry shells.
In the case of wire anchors, a 'rib' is provided for anchoring in the mortar joint of the facing masonry. The wave ensures the necessary force-fit connection between the anchor and the mortar. Anchoring in the rear wall is carried out using a dowel matched to the masonry. If the anchor can be inserted into the standard mortar joint of the rear wall,
a 25 mm long 90° bend is manufactured at the factory.
The air gap anchors, which are made from stainless steel strip, must be inserted on both sides into the standard or thin-bed joint of the rear wall or the facing wall. To this end, the anchors are shaped or punched in different ways to ensure the force-fit connection between the anchor and the thin-bed mortar.
The following products form part of the BEVER product portfolio for air gap anchors and are included in this average EPD.
Anchor dowel type ZV - Welle / 5
Anchor dowel type ZV - Welle
Aerated concrete - air gap anchor
Screw-in anchor for timber substrates
Anchor dowel Welle
Anchor dowel PU - Welle
Air gap anchor Well - L
Element fastener
Block fastener
Anchor pin
Composite bracket
Prefab anchor
Multi air gap anchor
Multi Plus air gap anchor
Anchor type ZM
Air gap anchor type DUO

2.2 Application

BEVER air-layer anchors are used to absorb the tensile and compressive stresses caused by wind loads acting on double-skin masonry. The anchors are installed either in or against the load-bearing rear wall and in the mortar joints of the facing wall
.
Air gap anchors involve a surface-based anchoring system; this means that the required number of air gap anchors per square metre must be distributed as evenly as possible across the surface
.
The maximum anchor spacing between anchors, as specified by standards, must be observed.
In sensitive areas, such as building corners, wall openings or expansion joints, additional anchors are installed in a linear arrangement.
The number of air gap anchors per m² is determined by the building height and wind zone of the construction project.

2.3 Technical Data

Es gelten die physikalischen und mechanischen Eigenschaften nach *EN 10088-3* - nichtrostende Edelstähle für die Güten*1.4301, 1.4401/ 1.4404 und 1.4362.*

Constructional data

Name	Value	Unit
Density	7800	kg/m^3
Modulus of elasticity min	193,000	N/mm²
Thermal conductivity min	15	W/(mK)
Melting point min	1390	°C
Yield strength minimum approx. min	200	N/mm²
Minimum tensile strength	500	N/mm²
Minimum elongation	30	%
Tensile strength min.	500	N/mm²

The technical specifications of the raw materials used comply with the relevant standards. The transformation of the raw materials during the production process into air gap anchors does not result in any significant changes to the specified technical specifications.
For the placing of the product on the market in the EU/EFTA (with the exception of Switzerland), Regulation (EU) No 305/2011 (CPR) applies.
The products require a Declaration of Performance in accordance with EN 845-1 – Specifications for complementary components for masonry – Part 1: Wall anchors, tie bars and supports and brackets, and the CE marking.
The relevant approvals and the respective national regulations apply to their use.

2.4 Delivery status

The dimensions as supplied are:
Wire diameter 4 mm, length up to 600 mm
Strip thickness up to 0.8 mm, width up to 30 mm, length up to 600 mm

2.5 Base materials/Ancillary materials

BEVER air-layer anchors are manufactured from stainless steel wire and stainless steel strip. Stainless steel wire 1.4362 Duplex and stainless steel strip 1.4401 are used. At around 85%, stainless steel wire accounts for the majority of the material used in the manufacturing process (bending and rolling); the remaining 15% consists of stainless steel strip.

The product/at least one component contains substances from the *ECHA list* (*candidate list*) of substances of very high concern (SVHC) that are subject to authorization. (June 27, 2018) above 0.1% by weight: no.

The product/at least one component contains other CMR substances of category 1A or 1B that are not on the candidate list, above 0.1% by weight in at least one component: no.

Biocidal products have been added to this construction product or it has been treated with biocidal products (it is therefore a treated article within the meaning of the Biocidal Products Regulation) (EU No. 528/2012): no

2.6 Manufacture

Once all raw materials and components have been sourced, all the necessary materials are transported to the factory premises for temporary storage and processing.
The air gap anchors are then manufactured at the BEVER factory.
All components for the finished air gap anchors are transported to the factory in Kirchhundem, where they are received, stored and, as required, processed into the respective air gap anchor variant, packaged and prepared for dispatch.
The air gap anchors are connecting elements in double-shell masonry (clinker facade). The function of the anchors is to absorb compressive and tensile loads resulting from wind loads. The two masonry shells are erected at a distance from one another; the gap between the shells is usually filled with insulation.
In the production of the air gap anchors, wire bending machines, thread rolling machines and punching machines are used. After production, none of the anchors are reworked or cleaned, e.g. degreased or similar.

The following describes the production process for air-layer anchors at the plant, organised according to the defined cluster groups.
Cluster 1: Threading machine
These anchors are made from stainless steel wire. The wire is fed into the machine and straightened. In the subsequent production process, a thread is rolled onto the wire and a shaft is bent.
Cluster 2: Bending
The anchors are made of stainless steel wire. The wire is fed into the machine and straightened. The wire is then bent into the desired shape.
Cluster 3: Punching
The anchors are made of stainless steel strip. The stainless steel strip is fed into the machine and the component is punched using a tool.
Cluster 4: Punching and bending
These anchors are two-part and consist of a strip section (punched) and a wire section (bent).
The dowel and screw-in anchors are manufactured from stainless steel wire
. Once the wire has been threaded into the production machine and the settings have been checked, production begins. The thread and the shaft applied to the other end of the anchor are produced in a single work cycle.

The Well-L anchors, element ties and block ties are manufactured from stainless steel wire. Once the machine settings have been adjusted and checked, the wire is shaped into its final form by a wire bending machine.
The resulting metal offcuts and punching waste are collected in containers and stored, then collected by a scrap dealer and sent for recycling.

2.7 Environment and health during manufacturing

Throughout the entire manufacturing process, no health and safety measures beyond the standard occupational health and safety measures for commercial enterprises are required.
Compliance with environmental, health and safety measures is ensured by trained and qualified staff.
All types of waste, such as steel, wood (wooden pallets) and packaging materials, which are generated upon delivery of the raw materials or as surplus material during production, are sorted by type and recycled.

2.8 Product processing/Installation

The installation of air gap anchors must be carried out by trained personnel.
The specifications set out in the manufacturer's installation instructions, the General Building Approvals or relevant standards must be adhered to.
For dowel anchors, a hole is drilled, the wire anchor is and the wire is driven in using the enclosed driving sleeve with hammer blows
.
Other air gap anchors, such as the Multi and Multi-Plus or the L and Well-L anchors, are simply placed into the mortar bed; no further tools are required.
Installation is not included in the EPD.

2.9 Packaging

The air-layer anchors are packed in cardboard boxes.
They are shipped either directly in outer cartons or as palletised goods on Euro pallets.
PE stretch film and PE strapping bands are used to secure the load during transport.
The packaging material is easy to separate and can be collected by type and sent to the local recycling provider.

2.10 Condition of use

The material composition of BEVER air gap anchors remains unchanged throughout their service life.

2.11 Environment and health during use

The processing or installation of air gap anchors does not give rise to any health or environmental risks.
No special measures to protect the environment are required.
Based on current knowledge, risks to air and soil can be ruled out provided the

products described are used as intended and in accordance with best practice.

2.12 Reference service life

The reference service life could not be determined in accordance with ISO 15686. According to the service lives of building components for life-cycle analyses under the German Sustainable Building Assessment System (BBSR 2017), the service life of steel components such as air gap anchors is at least 50 years.
All air gap anchors are installed in double-shell masonry and are therefore completely isolated from the environment and protected from external influences. Direct weathering cannot occur.
As the mortar joints are not 'watertight' under driving rain, the mortar may be washed out, potentially placing a load on the air gap anchor. For this reason, all air gap anchors installed here are manufactured from a material grade specified in the approval or standard. In Germany, this is A4 stainless steel, CRC Class 3 (Resistance Class 3).
Accordingly, the products – made of stainless steel – are protected against external influences once installed. They exhibit only minimal weathering per year.

2.13 Extraordinary effects

Fire

The products in question, BEVER air gap anchors, are manufactured from stainless steel and are classified as a non-combustible building material in Class A according to *DIN 4102-1.*

Fire protection

Name	Value
Building material class	A

Water

No water-polluting ingredients are washed out.

Mechanical destruction

In the event of mechanical destruction, all substances remain in a bound state. Mechanical destruction has no significant impact on the environment.

2.14 Re-use phase

During dismantling, the air-layer anchors become deformed and cannot be reused. No additional sharp edges are created during dismantling that would make the process more difficult.
All steel components can be recycled as scrap and reused.

2.15 Disposal

The waste code, in accordance with the Waste Catalogue Regulation (AVV), is 17 04 05 – iron and steel.

2.16 Further information

Technical documents and further information on the BEVER air-layer anchors are available to view or download online at:
www.bever.de
/downloads.

3. LCA: Calculation rules

3.1 Declared Unit

The declared unit is 1 kg of BEVER air-layer anchoring material.
The corresponding conversion factor for the required declared unit of 1 t, as specified in the PCR, is provided.
To calculate the average, data was collected from all product variants that form part of the air layer anchor product portfolio (see Section 2.1), and averages were calculated based on net production in 2024.

Declared unit and mass reference

Name	Value	Unit
Density	-	kg/m^3
Declared unit	1	kg
conversion factor from kg to t	0,001	t

All products within the air-layer anchor product range are made from the same base materials, namely stainless steel wire or strip. Due to the cluster structure, there are four different production lines through which the various variants of the air-layer anchors pass (threading machine, bending, punching and bending).

3.2 System boundary

The life cycle assessment considers the system boundaries "cradle to factory gate – with options" (A1–A3 + C + D) and follows the modular structure set out in *EN 15804.*

The life cycle assessment takes the following modules into account:

A1: Raw material extraction and processing: This includes all inputs, base materials and precursors for the production of the air gap anchors, the stainless steel strip or wire that BEVER uses in production.
A2: Transport to the manufacturer: Transport of the precursors (here primarily stainless steel products) to the BEVER plant.

A3: Manufacturing processes and costs at the plant: all raw materials and intermediate products required for the production of air gap anchors are received at the plant, prepared and, depending on the product, brought into their final form through the four processing steps of threading, bending, punching or punching and bending. In this process, wire bending machines, thread rolling machines and punching machines are used. Also part of Module A3 is the disposal of packaging.

C1: Dismantling/Demolition: For the dismantling process, a comparable demolition process was modelled using ökobaudat.
Excavators, demolition grapples and sorting grapples are used. The shredding of scrap was not taken into account in this case, as the wall connectors and connection anchors are of a manageable size. The sorting of material components is an integral part of the demolition on site. A collection rate of 90% is assumed. The remaining 10% is transported to the nearest construction waste collector

and disposed of (landfill) in accordance with standard practice. Neither processing costs nor material credits are allocated here, as the end of waste status is achieved is reached upon handover to the landfill.

C2: Transport to waste management: 90% of the scrap from Module C1 is transported to a recycling centre or scrap dealer;
a default distance of 60 km is assumed here.
A standard 40-tonne lorry from ecoinvent is used for modelling.
C3: Waste management for reuse, recovery and/or recycling: A realistic, albeit optimistic, assumption is made that 95% of the scrap content of the air-layer anchors is sent for recycling.
For the quantities of stainless steel kept in the cycle, corresponding credits are allocated in Module D.

C4: Disposal: The defined steel scrap or recycling loss of 5% is modelled as a landfill process, as is the 10% residual scrap from the collection rate in C1.

D: Reuse, recovery or recycling potential as net flows and credits or debits: Substitution effects arise to the same extent as the total quantity of recycled steel scrap (recycled scrap quantities from C3); steel from this product system in Module D can accordingly replace an equivalent quantity of primary steel in another/hypothetical product /subsequent system, thereby saving the same quantity of primary steel produced.

3.3 Estimates and assumptions

Energy and resource consumption during production, as well as the quantities of purchased inputs, packaging and transport routes, were recorded directly using the data collection tables provided by BEVER. This primary data is complete, consistent and represents a representative survey year.
The disposal of packaging was carried out in Module A3.
All reusable packaging, pallets and other tertiary packaging are excluded from disposal in A3, as they are not disposed of at the end of their life cycle.
For the production of intermediate products such as sheet metal, standard data sets from the ecoinvent3.11 database. Additional information from the manufacturer, data sheets and standard market assumptions were also used to select the most appropriate data set possible.
For the forming processes from steel to steel wire, for example, additional costs corresponding to the standard data sets were added.
Offcuts from BEVER's own plant are sent to the local scrap dealer; they consist of 100% secondary material and cease to be waste upon handover to the scrap dealer; processing costs and material credits are therefore outside the system boundary and are accounted for as a cut-off. No credits are allocated in Module D .
For demolition in Module C1, a standard demolition process from an ökobaudat dataset for façade clinker was used. The sorting of the metal fraction from the scrap recycling volume was modelled as a power-based process based on the energy data of a magnetic separation system.
In Module C1, a collection rate of 90% is assumed; the assumed 10% material losses on site are sent to landfill. Of the 90% scrap, 95% can be processed for high-quality recycling in Module C3; the remaining 5% of this material stream is modelled in C4 as a landfill process, in the same way as the material losses in Module C1.

3.4 Cut-off criteria

All relevant data, i.e. all raw materials used in production as well as the energy and resources used in production, were extracted using a data collection sheet following a prior comprehensive survey of the company's operational data for the life cycle assessment. For the inputs and outputs considered, the actual transport distances were used or estimated using documented rules. Material and energy flows with a share of < 1% were not included.
This means that the sum of the neglected processes is less than 5 % of the impact categories. The costs for the provision of infrastructure (machinery, buildings, etc.) for the entire foreground system were not taken into account.
The disposal of packaging is covered in Module A3, and is additionally documented as technical scenario information in accordance with the PCR in Chapter 4 of this EPD.
The disposal of reusable and tertiary packaging is not included in the assessment.

3.5 Background data

Background data for modelling and missing inventories of intermediate products are based on the LCIA database *ecoinvent* *3.11*. Modelling and impact assessment are carried out using the SimaPro software (version *10.2.0.1)*.

3.6 Data quality

The life cycle assessment is based on plant-specific data collection, including all energy sources and operating resources for one year (the period under consideration being January to December 2024).
The collected data was checked for representativeness in relation to previous years. Datasets for background data are based on the ecoinvent 3.11 database. Missing specific data on intermediate products (such as the manufacture of stainless steel strips) was modelled on the basis of generic data sets from ecoinvent 3.11, taking into account country-specific conditions. As not all relevant process steps are covered here, these were therefore modelled using supplementary secondary data.
The data quality of all emission factors used in terms of DQ Geo, Tech and Time can be classified as good for primary data and as moderate for secondary data.
The most recent data sets from the ecoinvent database were always used.
It should be noted that primary data for sub-components such as steel strips could not be obtained from suppliers. The basis of the modelling in A1 relies on secondary data, the evaluation of data sheets, general market-standard processes and assumptions made by the life cycle assessor regarding production processes.
Accordingly, the assessment of the technical

data quality for the upstream processes is mostly rated as medium.
The extent to which this has a concrete impact on the overall result
cannot be determined quantitatively; the data sets were compiled with the utmost care and in line with reality.

3.7 Period under review

The quantities of raw materials and energy used, as well as the amounts of waste and all other data collected, relate to the year 2024 (January to December).

3.8 Geographic Representativeness

Land or region, in which the declared product system is manufactured, used or handled at the end of the product´s lifespan: Germany

3.9 Allocation

All energy consumption and material flows for the product could be allocated on the basis of measured production data or on a mass basis.

A net flow calculation was carried out
for the proportion of secondary materials used in production (stainless steel scrap). In Module D, the proper disposal of steel scrap generates substitution effects for high-quality material recycling.
The emission factor for the electricity mix in A1-A3 is 0.821 kgCO2e/kWh.

3.10 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. In principle, a comparison or evaluation of EPD data is only possible if all the data sets to be compared have been prepared in accordance with EN 15804 and the building context or product-specific
performance characteristics are taken into account. The ecoinvent 3.11 background database was used, along with the EF3.1 Method (adapted) V1.03 evaluation method.

4. LCA: Scenarios and additional technical information

Characteristic product properties of biogenic carbon

The product contains less than 5% biogenic carbon in proportion to the total mass of the product, which is why this information is not included in this EPD.

The use of packaging material has been accounted for in relation to the
declared product; the disposal of
the packaging material is recorded in Module A3. For reusable packaging such as pallets, crown stands and squared timber, emissions have not been reported in Module A3.
In accordance with the packaging quantities specified in A3, the following quantities of biogenic carbon are sequestered.Cardboard packaging (0.016 kg/unit): 0.030 kg CO2/kg
Note: 1 kg of biogenic carbon is equivalent to 44/12 kg of CO_2.

The reference service life could not be determined in accordance with
ISO 15686. The service life
is taken from Table *BBSR 2017*,
Service lives of building components for life cycle assessments according to the Sustainable Building Assessment System (BNB).

Reference service life

Name	Value	Unit
Reference service life (according to BBSR)	50	a

End of life (C1 - C4)

Name	Value	Unit
Separately collected stainless steel scrap RER	0.673	kg
Separately collected stainless steel scrap IND	0.327	kg
For recycling stainless steel scrap RER (95%)	0.640	kg
For recycling stainless steel scrap IND (95%)	0.310	kg
Construction waste Stainless steel scrap RER (5% recycling loss)	0.034	kg
Construction waste Stainless steel scrap IND (5% recycling loss)	0.016	kg

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

Name	Value	Unit
Net stainless steel scrap RER at EoL	0.502	kg
Net stainless steel scrap IND at EoL	0.258	kg

This scenario assumes a collection rate of 90% and a recycling rate of 95%.

5. LCA: Results

The following table summarizes the results of the life cycle assessment. The results of the impact assessment do not allow any conclusions to be drawn about endpoints of the impact categories, exceedances of threshold values, safety margins, or risks. Long-term emissions >100 years are not considered in the impact assessment. The impact assessment is based on *EN 15804*, in accordance with *SimaPro* 10.2.0.1.

DESCRIPTION OF THE SYSTEM BOUNDARY (X = INCLUDED IN LCA; MND = MODULE OR INDICATOR 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	MND	MND	MND	MND	MNR	MNR	MNR	MND	MND	X	X	X	X	X

RESULTS OF THE LCA - ENVIRONMENTAL IMPACT according to EN 15804+A2: 1 kg air layer anchor from BEVER

Parameter	Unit	A1-A3	C1	C2	C3	C4	D
Global Warming Potential total (GWP-total)	kg CO_2 eq	4.07E+00	3.11E-01	5.5E-03	1.02E-03	4.52E-04	-1.85E+00
Global Warming Potential fossil fuels (GWP-fossil)	kg CO_2 eq	4.03E+00	3.11E-01	5.5E-03	1.02E-03	4.51E-04	-1.85E+00
Global Warming Potential biogenic (GWP-biogenic)	kg CO_2 eq	3.56E-02	3.11E-05	1.18E-06	1.2E-07	9.03E-08	-9.48E-04
Global Warming Potential luluc (GWP-luluc)	kg CO_2 eq	2.95E-03	3.18E-05	2.05E-06	9.97E-08	1.57E-07	-8.23E-04
Depletion potential of the stratospheric ozone layer (ODP)	kg CFC11 eq	4.27E-08	4.59E-09	1.25E-10	1.29E-11	9.92E-12	-9.85E-09
Acidification potential of land and water (AP)	mol H^+ eq	1.78E-02	8.54E-04	1.34E-05	2.65E-06	2.08E-06	-7.54E-03
Eutrophication potential aquatic freshwater (EP-freshwater)	kg P eq	2.51E-03	9.99E-06	4.02E-07	5.34E-07	3.19E-08	-1.26E-03
Eutrophication potential aquatic marine (EP-marine)	kg N eq	4.15E-03	3.3E-04	3.51E-06	6.89E-07	8.14E-07	-1.67E-03
Eutrophication potential terrestrial (EP-terrestrial)	mol N eq	3.93E-02	3.62E-03	3.8E-05	6.74E-06	8.88E-06	-1.79E-02
Formation potential of tropospheric ozone photochemical oxidants (POCP)	kg NMVOC eq	1.36E-02	1.46E-03	2.23E-05	1.89E-06	3.12E-06	-5.99E-03
Abiotic depletion potential for non fossil resources (ADPE)	kg Sb eq	2.59E-05	1.13E-07	1.6E-08	8.09E-10	1.48E-09	-1.68E-05
Abiotic depletion potential for fossil resources (ADPF)	MJ	5.13E+01	4.02E+00	8.34E-02	1.22E-02	6.51E-03	-1.93E+01
Water use (WDP)	m^3 world eq deprived	7.58E-01	8.62E-03	3.79E-04	1.4E-05	2.7E-05	-4.18E-01

RESULTS OF THE LCA - INDICATORS TO DESCRIBE RESOURCE USE according to EN 15804+A2: 1 kg air layer anchor from BEVER

Parameter	Unit	A1-A3	C1	C2	C3	C4	D
Renewable primary energy as energy carrier (PERE)	MJ	6.22E+00	2.54E-02	1.29E-03	9.6E-05	1.08E-04	-2.16E+00
Renewable primary energy resources as material utilization (PERM)	MJ	0	0	0	0	0	0
Total use of renewable primary energy resources (PERT)	MJ	6.22E+00	2.54E-02	1.29E-03	9.6E-05	1.08E-04	-2.16E+00
Non renewable primary energy as energy carrier (PENRE)	MJ	5.46E+01	4.27E+00	8.87E-02	1.31E-02	6.93E-03	-2.05E+01
Non renewable primary energy as material utilization (PENRM)	MJ	0	0	0	0	0	0
Total use of non renewable primary energy resources (PENRT)	MJ	5.46E+01	4.27E+00	8.87E-02	1.31E-02	6.93E-03	-2.05E+01
Use of secondary material (SM)	kg	2.06E-01	0	0	0	0	7.6E-01
Use of renewable secondary fuels (RSF)	MJ	0	0	0	0	0	0
Use of non renewable secondary fuels (NRSF)	MJ	0	0	0	0	0	0
Use of net fresh water (FW)	m^3	3.01E-02	2.85E-04	1.16E-05	1.9E-06	8.59E-07	-1.22E-02

RESULTS OF THE LCA – WASTE CATEGORIES AND OUTPUT FLOWS according to EN 15804+A2: 1 kg air layer anchor from BEVER

Parameter	Unit	A1-A3	C1	C2	C3	C4	D
Hazardous waste disposed (HWD)	kg	2.96E-04	2.8E-05	5.55E-07	6.41E-08	4.4E-08	-1.68E-04
Non hazardous waste disposed (NHWD)	kg	6.17E-01	3.52E-03	7.19E-03	2.2E-05	4.05E-04	-1.33E-01
Radioactive waste disposed (RWD)	kg	9.66E-05	4.23E-07	2.29E-08	8.87E-09	1.99E-09	-1.65E-05
Components for re-use (CRU)	kg	0	0	0	0	0	0
Materials for recycling (MFR)	kg	0	0	0	8.55E-01	0	0
Materials for energy recovery (MER)	kg	0	0	0	0	0	0
Exported electrical energy (EEE)	MJ	0	0	0	0	0	0
Exported thermal energy (EET)	MJ	0	0	0	0	0	0

RESULTS OF THE LCA – additional impact categories according to EN 15804+A2-optional: 1 kg air layer anchor from BEVER

Parameter	Unit	A1-A3	C1	C2	C3	C4	D
Incidence of disease due to PM emissions (PM)	Disease	2.89E-07	2.07E-08	5.45E-10	9.23E-12	4.45E-11	-1.49E-07

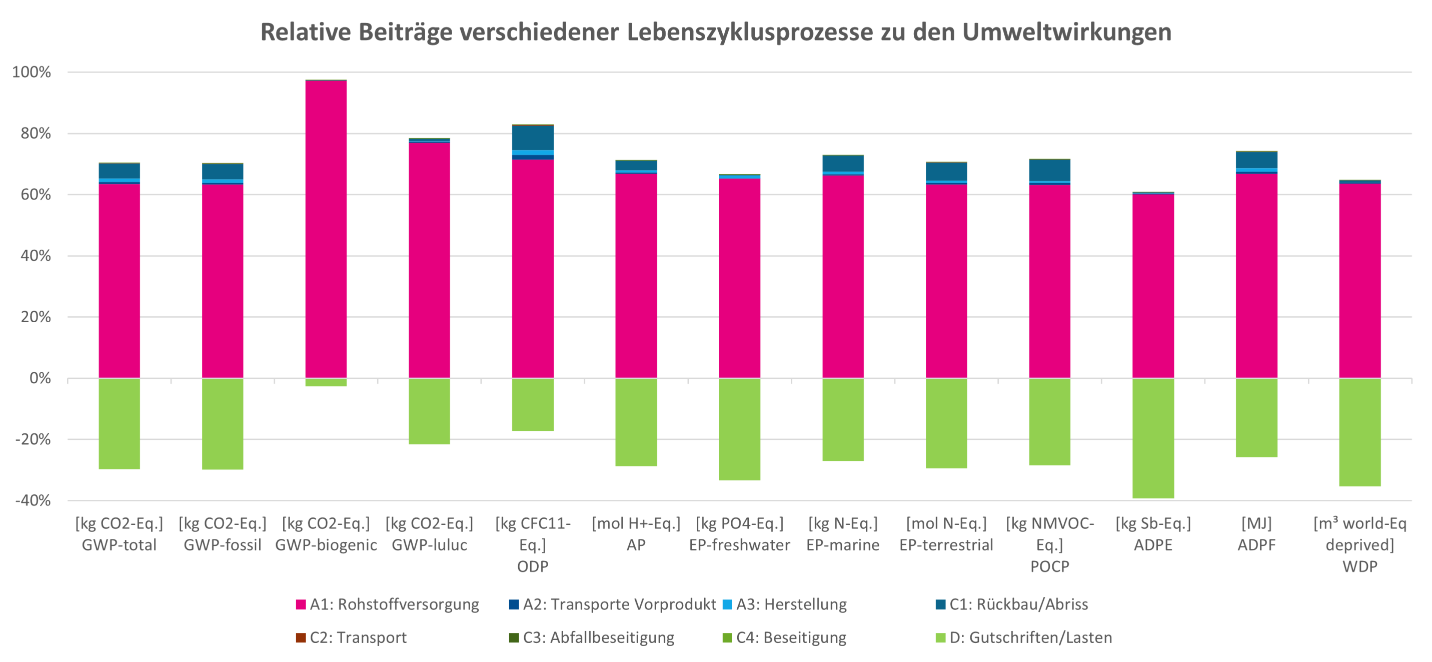
	incidence						
Human exposure efficiency relative to U235 (IR)	kBq U235 eq	3.77E-01	1.72E-03	9.33E-05	3.01E-05	8.05E-06	-6.46E-02
Comparative toxic unit for ecosystems (ETP-fw)	CTUe	4.54E+01	4.2E-01	1.91E-02	2.88E-03	1.68E-03	-2.31E+01
Comparative toxic unit for humans (carcinogenic) (HTP-c)	CTUh	4.62E-09	1.85E-10	9.08E-13	8.07E-14	1.15E-13	-2.44E-09
Comparative toxic unit for humans (noncarcinogenic) (HTP-nc)	CTUh	4.27E-08	7.12E-10	5.34E-11	5.1E-12	4.53E-12	-1.61E-08
Soil quality index (SQP)	SQP	2.18E+01	2.76E-01	8.38E-02	1.18E-03	4.86E-03	-6.13E+00

Disclaimer 1 – for the indicator “Potential Human exposure efficiency relative to U235”. This impact category deals mainly with the eventual impact of low-dose ionizing radiation on human health of the nuclear fuel cycle. It does not consider effects due to possible nuclear accidents, occupational exposure or radioactive waste disposal in underground facilities. Potential ionizing radiation from the soil, radon and from some construction materials is also not measured by this indicator.

Disclaimer 2 – for the indicators “abiotic depletion potential for non-fossil resources”, “abiotic depletion potential for fossil resources”, “water (user) deprivation potential, deprivation-weighted water consumption”, “potential comparative toxic unit for ecosystems”, “potential comparative toxic unit for humans – cancerogenic”, “Potential comparative toxic unit for humans - not cancerogenic”, “potential soil quality index”. The results of this environmental impact indicator shall be used with care as the uncertainties on these results are high as there is limited experience with the indicator.

6. LCA: Interpretation

The following figure shows the relative contributions of different life cycle phases in the form of a dominance analysis for each impact category.



A large proportion of the emissions within the individual impact categories arise during the manufacturing phase (A1–A3). The main drivers of this are, in particular, the production
of raw materials in the intermediate products. The manufacturing emissions
are very low in Fig. Relative contributions of various life-cycle processes to environmental impacts,
as for (stainless) steel processing companies, the upstream chain
of stainless steel production typically carries particular weight.
In terms of total GWP, emissions from the manufacturing phase of the intermediate products account for 97% of the total emissions across the entire value chain.
Across all impact categories, this figure is at least 96%.
The emissions profile in the LCA of
air-layer anchors is correspondingly clear.
A large proportion of the emissions within the individual impact categories arise during the manufacturing phase (A1–A3). The main drivers for this are, in particular, the production
of raw materials in the precursors. The manufacturing emissions
are very low in Fig. Relative contributions of various life cycle processes to environmental impacts,
as the upstream chain
of stainless steel production typically carries particular weight for companies processing (stainless) steel.
In terms of total GWP, emissions from the manufacturing phase of the intermediate products account for 97% of the
As the individual components are always made of steel or stainless steel
and the forming processes have similar
emission profiles, the overall result is influenced more by the quantity of material used in the individual product types than the specific emissions of each individual EF. The differences contribute less to an additional effect than the sheer quantities of material themselves.
Compared to the raw material supply (A1), the contributions to the environmental impacts on GWP from the transport of pre-products (A2) within the manufacturing phase are very low and their significance in terms of GWP impact is just as negligible
as that of the production phase itself.

Within the cradle-to-gate system boundary (A1-A3), the primary energy demand from non-renewable energy sources is 90 % and that from renewable energy sources is accordingly 10 %. The PERT and PENRT values for module A1 also show the same ratio. The largest contributors here are also (stainless) steel production in the upstream chains. Within the manufacturing phase (A1-A3), the highest contribution to non-renewable primary energy demand (PENRT) comes from raw materials (A1) (just under 97%); the share of energy demand from manufacturing and transport is negligible.
When considering the total renewable primary energy requirement (PERT), the picture is the same as for PENRT. Here, however, the energy requirement from raw materials has an even more dominant effect (> 99 %).
With regard to fluctuations in the average, the above statement applies here as well. The fluctuations per unit, calculated proportionally based on net production, range from 0.010 to 0.117 kg/unit, with an average of 0.035 kg/unit. Accordingly, the min/max GWP results show a variation by a factor of 0.27 to 3.35 and thus significantly more variance than for the wall connectors. However, as calculations here were also based on the declared unit of 1 kg, the fluctuations only affect the result insofar as representativeness must be assumed for the survey year 2024.
In addition, for air-layer anchors, clusters were used and individual data points were collected in each case, which form the average. Here, the processing steps in the factory differ by machine and energy consumption according to the production types: bending (34% of the total net average), threading machine (51%), punching (14%) and punching & bending (< 1%). For the GWP, these clusters fluctuate around the model between 0.98 and 1.63. However, the two clusters that contribute the largest share both have a factor of 0.98 and are thus very close to the average. Overall, the analysis shows that there is a certain variation exists in the cluster comparison, but that this is, as expected, small in relation to the average product. As the majority of emissions occur in the upstream chains and comparable materials are used across all product groups, the variation does not have a decisive impact on the results, and the calculated average provides a good guide for the product range of air-layer anchors as a whole, and also specifically for the bending and threading machine types. Punching and punching & bending have a higher, specific emissions profile; however, with a 15 % share of the average, their influence is quite minimal.

7. Requisite evidence

No external evidence is required for this environmental product declaration in accordance with PCR Part B.

8. References

Standards

EN 845
DIN EN 845-1:2016-12: Specifications for supplementary components for masonry - Part 1: Wall anchors, tension ties, supports, and brackets.

DIN 4102
DIN 4102-1:1998-05: Fire behavior of building materials and components - Part 1: Building materials; terms, requirements, and tests.

ISO 9001
DIN EN ISO 9001:2015: Quality management systems - Requirements.

EN 10088
DIN EN 10088-3:2024-04: Stainless steels - Part 3: Technical delivery conditions for semi-finished products, bars, wire rod, drawn wire, profiles and bright steel products made of corrosion-resistant steels for general use.

ISO 14001
DIN EN ISO 14001:2015: Environmental management systems – Requirements with guidance for use.

ISO 14025
DIN EN ISO 14025: 2011-10: Environmental labels and declarations – Type III environmental declarations – Principles and procedures.

ISO 14040
DIN EN ISO 14040:2021-02: Environmental management - Life cycle assessment - Principles and framework (ISO 14040:2006 + Amd1:2020).

ISO 14044
DIN EN ISO 14044:2021-02: Environmental management - Life cycle assessment - Requirements and guidance (ISO 14044:2006 + Amd1:2017 + Amd 2:2020).

EN 15804
DIN EN 15804:2022-03: Sustainability of buildings - Environmental product declarations - Basic rules for the product category construction products.

ISO 50001
DIN EN ISO 50001:2011: Energy management systems - Requirements with guidance for use.

Further reading

AVV
Ordinance on the European Waste Catalog (Waste Catalog Ordinance – AVV), construction

and demolition waste (including excavation from contaminated sites).

BBSR 2017
Federal Institute for Research on Building, Urban Planning, and Spatial Development (BBSR): Service life of building components. Service lives of building components for life cycle analyses according to the Sustainable Building Assessment System (BNB), in: Federal Ministry for the Environment, Nature Conservation, Building and Nuclear Safety (ed.), 2017.

BEVER
BEVER Gesellschaft für Befestigungsteile Verbindungselemente GmbH: https://www.bever.de/.

CPR
Regulation (EU) No. 305/2011: Regulation of the European Parliament and of the Council of March 9, 2011, laying down harmonized conditions for the marketing of construction products and repealing Council Directive 89/106/EEC (EU Construction Products Regulation), in: Official Journal of the European Union L 88/5, April 2011.

ECHA list
European Chemical Agency (ECHA): CMR substances from Annex VI of the CLP Regulation that have been registered in accordance with REACH and/or notified in accordance with CLP.

Ecoinvent 3.11
ecoinvent V 3.11 (2025): Eco-inventory database version 3.10 of the Swiss Center for Eco-inventories, Dübendorf.www.ecoinvent.ch.

IBU 2022
Institut Bauen und Umwelt e.V. (publisher): The creation of environmental product declarations (EPD). General EPD program guide of the Institute for Construction and Environment (IBU), version 2.1, 2022.

Candidate list
European Chemical Agency (ECHA): Candidate List of Substances of Very High Concern for Authorization, in:https://echa.europa.eu/candidate-list-table, 2020.

PCR Part A
Institut Bauen und Umwelt e.V. (publisher): Product category rules for building-related products and services. Part A: Calculation rules for the life cycle assessment and requirements for the project report, version 1.4, 2022.

PCR Part B
Institut Bauen und Umwelt e.V. (ed.): PCR guidance texts for building-related products and services. Part B: Requirements for EPDs for structural steels, version v6 dated August 1, 2024.

SimaPro
Prè Sustainability: SimaPro Version 10.2.0.1, 2025.

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