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Institut Bauen und Umwelt e.V.

ECO PLATFORM EPD VERIFIED

Owner of declaration:	Krinner Schraubfundamente GmbH
Programme operator:	Institut Bauen und Umwelt e.V. (IBU)
Publisher:	EPD Danmark
Declaration No.:	EPD-KRI-20230308-IBC2-EN
Registration number:	MD-25067-EN
Issued:	11-09-2023
Valid to:	10-09-2028
Danish market	Scenario based modules may differ from Danish conditions

3rd PARTY **VERIFIED**

EPD

VERIFIED ENVIRONMENTAL PRODUCT DECLARATION | **ISO 14025** & **EN 15804**

1. General Information

KRINNER Schraubfundamente

Programme holder

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

Declaration number

EPD-KRI-20230308-IBC2-EN

This declaration is based on the product category rules:

Structural steels, 01/08/2021
(PCR checked and approved by the SVR)

Issue date

11/09/2023

Valid to

10/09/2028

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

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

KRINNER Ground Screws

Owner of the declaration

Krinner Schraubfundamente GmbH
Passauer Str. 55
94342 Straßkirchen
Germany

Declared product / declared unit

1 kg ground screws (with the exception of the U-, small G- and K-series) manufactured by KRINNER Schraubfundamente GmbH

Scope:

This document is an average EPD for Krinner ground screws (except U-, small G- and K-series) manufactured in Germany by KRINNER Schraubfundamente GmbH. The declared unit refers to the average production of 1 kg Krinner ground screws. The data collection was carried out on a factory-specific basis with current annual data from 2021.
The owner of the Declaration is responsible for the data on which it is based and verification thereof.
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 evidence. This EPD was drawn up in accordance with the specifications of the EN 15804+A2. This standard is referred to as EN 15804 hereinafter.
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

Matthias Klingler,
(Independent verifier)

2. Product

2.1 Product description/Product definition

Krinner ground screws are tapered steel piles that are inserted into the ground in a rotating manner and can be used to transfer axial tensile and compressive forces into the subsoil. The ground screws partly replace solid foundations and basically ensure the load transfer of the structure into the subsoil. For example, the ground screws in the V-series consist of a 2.0-metre-long base element with a drill point and a top plate as well as any necessary extension elements. The individual sections can be coupled together by means of a plug-in connection and thus extended to the required length. Depending on the type, they have different construction lengths and diameters. The ground screws are driven into the ground to the required depth by means of an excavator, for example.

The ground screws are made of steel and are hot-dip galvanised.

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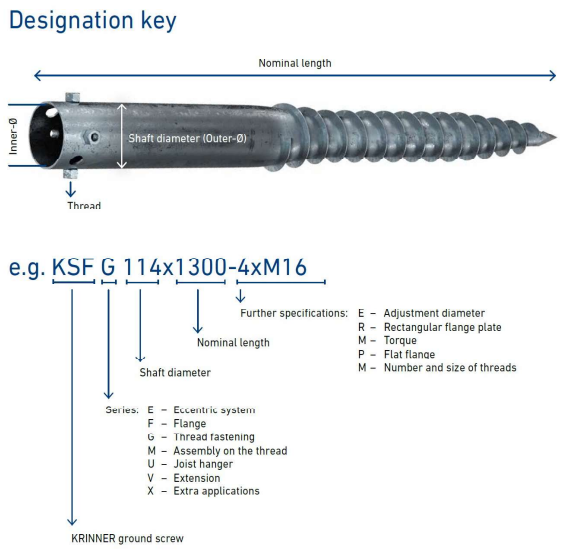


Fig. 1: All Krinner ground screws are made entirely of steel and are hot-dip galvanised.

Use of the product is subject to the respective national specifications at the place of use; in Germany, for example, the MVV TB and the technical specifications based on these guidelines.

2.2 Application

KRINNER ground screws are used for buildings and other ordinary load-bearing structures according to Eurocode 0, such as: residential buildings, kindergartens, schools, modular buildings, halls, tiny houses, garden houses, greenhouses, carports, tree houses, holiday homes, hotels, office buildings, workrooms etc., in timber and steel post-and-beam construction or lightweight steel construction, as well as for noise barriers, slope protection/securing, staircases, footbridges, containers, masts, signs, electric charging columns, fencing etc. Ground screws can also be used for solid buildings, e.g. as a support under the floor slab, depending on the required load-bearing capacity of the project-specific conditions.

E- Series
The ground screws in the E-series are optionally equipped with an eccentric set depending on the application. The eccentric allows fine adjustment for a perfect, vertical stand of the object to be erected. The system is particularly suitable for resonance- and vibration-resistant mounting of tubular posts and masts, for example.

F- Series
The ground screws in the F-series feature round or square flanges. The resulting fixation of the object to be supported provides improved stability and safety for large static loads.

G- Series
The ground screws in the G-series feature one, three or four threaded screws. They are therefore particularly suitable for fast vertical and permanent installation of poles and fence posts, for example.

M-series
The ground screws in the M-series have a centred M-thread, which enables the object to be supported to be screwed directly onto the ground screw. This makes it suitable for prefabricated garages and containers, for example.

U-series
The ground screws in the U-series are specially adapted to the common dimensions of wooden beams. They are particularly suitable for easy and fast fastening of horizontal and vertical timber in carport and wooden terrace construction, for example.

V-series
The ground screws in the V-series are extendable ground screws. Depending on the project, these ground screws can be extended and were thus specially developed for projects with high load-bearing requirements.

X-series
The ground screws in the X-series are customised for special applications. Depending on the requirements, the foundations are manufactured to fit precisely and individually.

2.3 Technical Data

The following technical data applies to Krinner ground screws. The test standard is EN 1090-2.

Technical construction data

Name	Value	Unit
Density	7850	kg/m^3
Modulus of elasticity	212000	N/mm^2
Coefficient of thermal expansion	11.1	$10^{-6}K^{-1}$
Thermal conductivity	54	W/(mK)
Melting point	1460	°C
Electrical conductivity at 20°C	0.15	$\Omega^{-1}m^{-1}$
Minimum yield strength (für Bleche)	-	N/mm^2
Minimum tensile strength (für Bleche)	-	N/mm^2
Minimum elongation (für Bleche)	26	%
Tensile strength	235	N/mm^2
Compressive strength	360	N/mm^2
Grade of material according to the delivery standards	10038	-

The products' performance values correspond with the Declaration of Performance in terms of their essential properties in accordance with DIN EN 1090-2:2018-09, Execution of steel structures and aluminium structures – Part 2: Technical requirements for steel structures.

2.4 Delivery status

Product size and weight on delivery:
Weight: 0.28 - 4.16 kg
Dimensions: 0.04 - 0.30 m

Accordingly, a declared unit of 1 kg at a dimension of 0.10 m is specified in this EPD.

2.5 Base materials/Ancillary materials

The most important components of Krinner ground screws are:
· Structural steel S235 and S355: 97%
Zinc: 3%

The product / At least one partial product contains substances from the ECHA list of candidates of Substances of Very High Concern (SVHC) (17.06.2022) exceeding 0.1% by mass: no

The product / At least one partial product contains other CMR substances in categories 1A or 1B which are not on the ECHA list, exceeding 0.1% by mass in at least one partial product: no

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) Regulation on Biocide Products No. 528/2012): no

2.6 Manufacture

After the steel pipes are delivered, they are cut to length using saws and lasers. The raw material is ordered so that no waste is produced. If waste does occur due to rejects, it is stored in containers and collected by a scrap dealer who recycles it according to regulations.

Shaping and further processing
In several work steps involving cold and hot forming, flame cutting and punching, the tubes are thus shaped into their final conical form, the Krinner tip is formed, and the necessary holes are made in the profiles. Subsequently, the connection solutions specific to the product are welded to the head side of the product semi-automatically or by a welding robot. In a final step, the thread coils are welded onto the profile semi-automatically.

Corrosion protection
The finished Krinner ground screws are then hot-dip galvanised in accordance with ISO 1461 to prevent corrosion during subsequent use and to maximise the life of the product.

Quality management
Krinner Schraubfundamente GmbH operates in accordance with an integrated management system to ISO 9001.

2.7 Environment and health during manufacturing

During the entire manufacturing process, no other health protection measures are required extending beyond the standard industrial protection measures for commercial enterprises.

The site is certified as follows:
- ISO 9001 (Quality Management)

In addition, Krinner Schraubfundamente GmbH supports ergonomic workplaces and offers all employees annual health checks. Furthermore, fitness courses are offered throughout the year as well as lunch offers for a balanced diet.

Krinner Schraubfundamente GmbH uses 100% green electricity.

2.8 Product processing/Installation

The installation procedure for Krinner ground screws is as follows:

Measurement of the ground screw position.
Pre-punch a hole that is smaller in diameter than the ground screw to ensure positioning accuracy.
If necessary with harder soil layers: pre-drill.
Screw in the ground screw suitable for load bearing, taking into account the installation torque, which is determined in advance on the basis of experimental investigations.
If the achieved insertion torque is too low, an extension is attached and the ground screw is screwed into deeper soil layers until the minimum insertion torque required for the soil is reached. The minimum internal torque is defined in advance by one or more on-site tests. (V-series only)
This process can be repeated as often as required until the ground screw has the necessary insertion resistance. (V-series)
The screwing-in process must be documented for all ground screws

2.9 Packaging

50% of Krinner ground screws are loaded in full packaging (saran wrap, straps) on wooden pallets/ wooden crates. For the other 50%, full packaging is dispensed with completely for larger deliveries and the ground screws are only loaded onto pallets secured with strapping bands in order to avoid unnecessary packaging waste.

The preliminary product (steel) is delivered with steel strapping (tube bundle) and cardboard (welding wire).
A welding coil lies loose on the wooden packaging. This packaging is recycled.
After assembly, the packaging can be recycled at the construction site.

2.10 Condition of use

The material composition of Krinner ground screws is not altered during use.

2.11 Environment and health during use

No noteworthy environmental pollution is triggered by processing and assembling the products in question. No special measures need to be taken to protect the environment. According to the present state of knowledge, hazards for air and soil cannot arise if the products in question are used properly and as designated.

Special features of the material composition for the period of use or environmentally-relevant material-inherent properties can be excluded.

Nor does the zinc content of the Krinner ground screws have any negative impact on the environment, as can be seen from the Zinc input report.

2.12 Reference service life

The reference service life could not be determined in accordance with ISO 15686, as Krinner ground screws are used under a wide variety of conditions.

According to the Corrosion report, the planned service life in 80% of European soils is 100 years.

2.13 Extraordinary effects

Fire

The steel ground screws declared here comply with building material class A1 – non-combustible according to EN 13501-1.

Fire protection

Name	Value
Building material class	A1
Burning droplets	s1
Smoke gas development	d0

Water

No components which are hazardous to water are washed out. This is evident from the Zinc input report.

Mechanical destruction

In the event of mechanical destruction, all substances remain bound. There are no relevant impacts on the environment in case of mechanical destruction.

2.14 Re-use phase

Krinner ground screws can be 100% recycled and, after careful inspection, sent for reuse.

2.15 Disposal

The waste codes in accordance with the List of Wastes Directive (AVV):
17 04 05 Iron and steel

2.16 Further information

Further information on Krinner Schraubfundamente GmbH products is available at www.krinner.io.

3. LCA: Calculation rules

3.1 Declared Unit

The Declaration refers to the production of 1 kg of Krinner ground screws as an average product of various ground screw series manufactured by KRINNER Schraubfundamente GmbH for the year 2021 (excluding the U-, G- and K-series). Here, the invoiced quantity of the various ground screw sizes related to the year under consideration was divided by the total weight of the products.

Declared unit

Name	Value	Unit
Declared unit	1	kg

3.2 System boundary

The LCA considers the system boundaries 'from the cradle to the factory gate with Modules C1-C4 and Module D' and follows the modular structure according to EN 15804. The LCA takes consideration of the following modules:

A1: Manufacture of preliminary products (e.g. steel tubes, thread coils, laser parts made of structural steel) and project-specific prefabrication of individual components
A2: Transport to manufacturer: Transport of preliminary products to the manufacturing site
A3: Manufacturing processes and expenses: Assessment and project-specific commissioning of the individual components for the various versions of the Krinner ground screw series
C1: Deconstruction of the ground screws
C2: Transport to waste treatment
C3: Waste management for reuse, recovery and/or recycling
C4: Disposal
D: Reuse, recovery or recycling potential as net flows and credits or loads

3.3 Estimates and assumptions

All plant- and process-specific data was made available to the author of the LCA by Krinner Schraubfundamente GmbH. Any missing details were supplemented by estimates based on comparable substitutes or information in the secondary literature. Any data sets missing in the database were assessed by the author of the LCA.

3.4 Cut-off criteria

All relevant data, i.e. all raw materials used in production and the electric energy used, was taken from an operational data survey for the LCA. The actual transport distances were applied or estimated using documented rules for all inputs and outputs considered. Material and energy flows with a share of < 1% were also considered.
The sum of ignored processes is less than 5% of the impact categories. The expenses for providing the infrastructure (machines, buildings etc.) of the entire foreground system were not taken into account. The packaging of the preliminary products and the end product is not considered due to the minor mass share (<1%) and relevance for the LCA (GWP [A1-A3] <1%).
Deconstruction (C1) can be carried out manually using a screwing bar or screwing vehicle (deconstruction by vehicle possible within a few minutes (1-3 mins.)), so that both options were ignored here, as the influence was estimated to be very low (GWP [A-C] <1%).

3.5 Background data

All background data of relevance for the LCA model was taken from the ecoinvent 3.8 database. Specific data missing from upstream processes was taken from the ecoinvent 3.8 database.

3.6 Data quality

Data sets on background data are based on the ecoinvent 3.8 database. Missing specific data of primary products (e.g. steel pipes, thread coils etc.) was modelled on the basis of generic data sets from ecoinvent 3.8, taking into account country-specific conditions. Due to the low vertical range of manufacture, the proportion of primary data in the foreground

system is low. Krinner ground screws are distributed throughout Europe/overseas (worldwide), for which the most generic possible assumptions for recycling were made in the end-of-life (EoL) phase. A quality assessment was made for technological, geographical and temporal representativeness; the overall data quality can be classified as good.
The background data sets used are valid until 2021 without exception.

3.7 Period under review

The volumes of raw materials, energy and waste deployed refer to 2021. It corresponds with the current state of technology and is therefore representative for the period under review.

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

Allocation in the foreground system

The production process does not generate any co-products. The software model applied does not contain any allocations.

Allocation for waste

Due to a lack of data, this study does not consider the product packaging for transport to the assembly site, in deviation from the standard requirements for the EPD. Offcuts in production (A3) are returned to the process as closed-loop production waste. The resulting energy gain for avoided environmental impacts from steel scrap is indicated in Module D. In the end-of-life scenario, a collection loss of 5% is expected, which is recorded in the present balance as a landfill process in Module C3. The remaining 95% of the metal is sent for raw material recycling in Module C3. The amount of metal scrap for reuse in another product system, minus a recycling loss of 5%, is declared as avoided environmental impact in Module D.

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. The ecoinvent 3.8 background database was used. As a general rule, EPD data can only be compared or evaluated when all of the data records to be compared have been drawn up in accordance with EN 15804 and the building context and/or product-specific characteristics are taken into consideration. The ecoinvent 3.8 background database was used.

4. LCA: Scenarios and additional technical information

Characteristic product properties of biogenic carbon

The product contains less than 5% biogenic carbon (as a proportion of the total mass of the product), which is why the information is omitted in this EPD. The same applies to the packaging materials that fall short of the cut-off criteria in the present study (cardboard boxes, bubble wrap <1%).

The following table summarises the results of the LCA. The results of the estimated impact do not make any claims regarding impact category limits, exceeding threshold values, safety levels or risks. Long-term emissions (> 100 years) are not taken into consideration in the estimated impact. The impact assessment is based on the evaluation method in accordance with EN 15804.
The reference service life could not be determined according to ISO 15686. According to the Corrosion report, the design service life in 80% of European soils is 100 years.

Reference service life

Name	Value	Unit
Reference service life (nach ISO 15686-1, -2, -7 und -8)	100	a

End of Life (C1-C4)

Name	Value	Unit
Steel collected separately	1,00	kg
Steel for recycling (95%)	0,95	kg
Steel for landfilling (5% recycling loss)	0,05	kg

Reuse, recovery and recycling potential (D), relevant scenario details

Name	Value	Unit
Net steel scrap at the end of the life cycle	0,66	kg

This scenario contains a recycling rate of 95%.

5. LCA: Results

The following table summarises the results of the LCA. The results of the estimated impact do not make any claims regarding impact category limits, exceeding threshold values, safety levels or risks. Long-term emissions (> 100 years) are not taken into consideration in the estimated impact. The impact assessment is based on the evaluation method in accordance with EN 15804.

DESCRIPTION OF THE SYSTEM BOUNDARY (X = INCLUDED IN LCA; ND = 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 KRINNER Ground Screws (except U-, small G- and K-series)

Parameter	Unit	A1-A3	C1	C2	C3	C4	D
Global Warming Potential total (GWP-total)	kg CO_2 eq	2.39E+00	0	5.4E-03	2.4E-03	0	-1.57E+00
Global Warming Potential fossil fuels (GWP-fossil)	kg CO_2 eq	2.38E+00	0	5.4E-03	2.39E-03	0	-1.57E+00
Global Warming Potential biogenic (GWP-biogenic)	kg CO_2 eq	5.07E-03	0	1.9E-06	1.28E-06	0	-1.93E-03
Global Warming Potential luluc (GWP-luluc)	kg CO_2 eq	1.2E-02	0	1.94E-06	7.17E-06	0	-1.17E-03
Depletion potential of the stratospheric ozone layer (ODP)	kg CFC11 eq	1.35E-07	0	1.29E-09	7.81E-10	0	-7.05E-08
Acidification potential of land and water (AP)	mol H^+ eq	1.1E-02	0	2.25E-05	1.96E-05	0	-7.2E-03
Eutrophication potential aquatic freshwater (EP-freshwater)	kg P eq	1.12E-03	0	3.36E-07	2.5E-07	0	-8.07E-04
Eutrophication potential aquatic marine (EP-marine)	kg N eq	2.58E-03	0	6.87E-06	6.91E-06	0	-1.57E-03
Eutrophication potential terrestrial (EP-terrestrial)	mol N eq	2.52E-02	0	7.52E-05	7.53E-05	0	-1.65E-02
Formation potential of tropospheric ozone photochemical oxidants (POCP)	kg NMVOC eq	1.06E-02	0	2.42E-05	2.18E-05	0	-7.18E-03
Abiotic depletion potential for non fossil resources (ADPE)	kg Sb eq	6.95E-05	0	1.24E-08	6.59E-09	0	-6.27E-05
Abiotic depletion potential for fossil resources (ADPF)	MJ	2.61E+01	0	8.42E-02	5.5E-02	0	-1.6E+01
Water use (WDP)	m^3 world eq deprived	9.34E-01	0	2.9E-04	1.93E-03	0	-4.03E-01

RESULTS OF THE LCA - INDICATORS TO DESCRIBE RESOURCE USE according to EN 15804+A2: 1 kg KRINNER Ground Screws (except U-, small G- and K-series)

Parameter	Unit	A1-A3	C1	C2	C3	C4	D
Renewable primary energy as energy carrier (PERE)	MJ	3.28E+00	0	1.07E-03	6.34E-04	0	-1.6E+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	3.28E+00	0	1.07E-03	6.34E-04	0	-1.6E+00
Non renewable primary energy as energy carrier (PENRE)	MJ	2.77E+01	0	8.94E-02	5.85E-02	0	-1.7E+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	2.77E+01	0	8.94E-02	5.85E-02	0	-1.7E+01
Use of secondary material (SM)	kg	2.58E-01	0	0	0	0	6.65E-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	3.55E-02	0	1E-05	4.67E-05	0	-1.17E-02

RESULTS OF THE LCA – WASTE CATEGORIES AND OUTPUT FLOWS according to EN 15804+A2: 1 kg KRINNER Ground Screws (except U-, small G- and K-series)

Parameter	Unit	A1-A3	C1	C2	C3	C4	D
Hazardous waste disposed (HWD)	kg	3.84E-04	0	2.04E-07	9.76E-08	0	-3.41E-04
Non hazardous waste disposed (NHWD)	kg	0	0	0	0	0	0
Radioactive waste disposed (RWD)	kg	6.3E-05	0	5.7E-07	3.59E-07	0	-3.04E-05
Components for re-use (CRU)	kg	0	0	0	0	0	0
Materials for recycling (MFR)	kg	0	0	0	9.03E-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 KRINNER Ground Screws (except U-, small G- and K-series)

Parameter	Unit	A1-A3	C1	C2	C3	C4	D
Incidence of disease due to PM emissions (PM)	Disease	2.01E-07	0	6.35E-10	3.9E-10	0	-1.23E-07

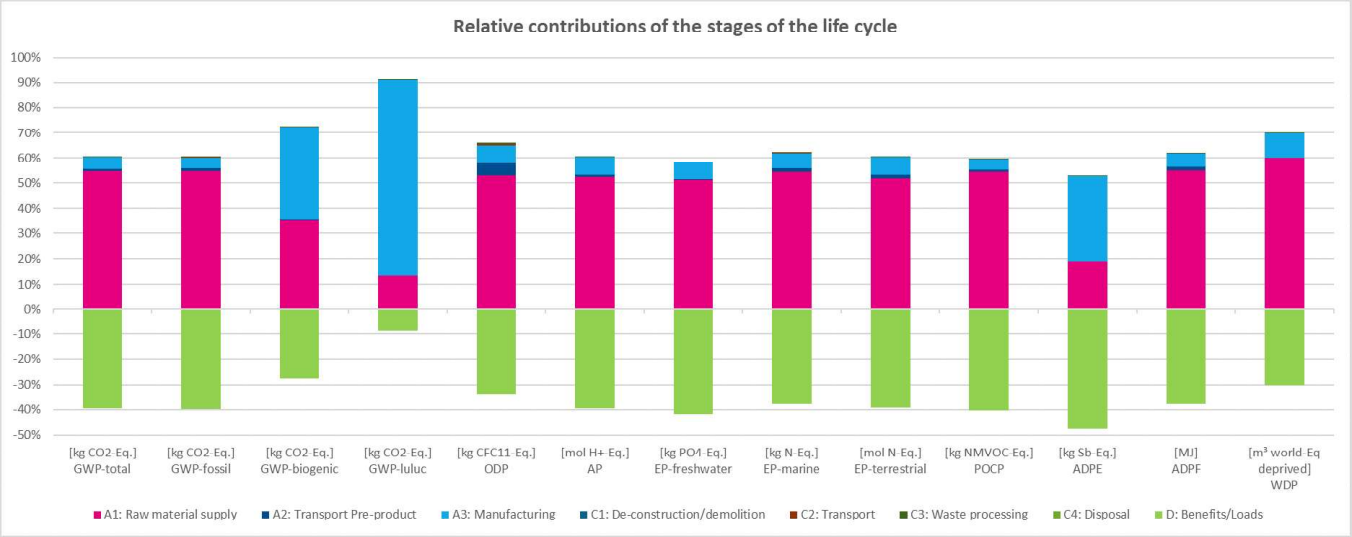
	incidence						
Human exposure efficiency relative to U235 (IR)	kBq U235 eq	1.36E-01	0	4.26E-04	2.49E-04	0	-6.6E-02
Comparative toxic unit for ecosystems (ETP-fw)	CTUe	8.66E+01	0	6.57E-02	3.94E-02	0	-6.35E+01
Comparative toxic unit for humans (carcinogenic) (HTP-c)	CTUh	1.79E-08	0	1.82E-12	1.22E-12	0	-9.82E-09
Comparative toxic unit for humans (noncarcinogenic) (HTP-nc)	CTUh	8.66E-08	0	7.19E-11	3E-11	0	-4.82E-08
Soil quality index (SQP)	SQP	9.89E+00	0	9.68E-02	1.01E-01	0	-6.04E+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 graphic depicts the relative contributions made by various life cycle processes in the form of a dominance analysis.



Regardless of the impact category, a similar percentage distribution of the life cycle phases can be observed with regard to their impact on total emissions.

The impact categories along the life cycle are predominantly determined by the supply of raw materials.
The main driver for this is in particular the use of steel and hot-dip galvanising, which in total contribute with a share of approx. 91% to the greenhouse gas potential (GWP) within production (A1-A3).

The product life cycle results in credits (-1.57 kg CO2 equiv.) in the EoL for subsequent product systems and loads resulting from the net flow calculation for the scrap used in the product.

The ozone depletion potential (ODP) is almost exclusively determined by the preliminary products (81%). Transport contributes 7% and manufacturing 11% to the total emissions from the manufacturing process.

Within production, the acidification potential (AP) is determined by the use of primary raw materials and steel (87%).
Galvanising and the energy sources in A3 contribute 12% to the AP. The share of transport emissions amounts to about 2%.

The eutrophication potential (EP) EP freshwater is 88%, EP salt water 88% and EP cumulative exceedance 86% determined by the preliminary products, followed by manufacturing in A3 with 12% (EP freshwater), 10% (EP salt water) and 1% (EP cumulative exceedance).

The photochemical ozone creation potential (POCP) is dominated by the use of raw materials to approx. 91% within manufacturing. Manufacturing in A3 accounts for almost 7%.

The consumption of non-fossil abiotic resources (ADP elementary) results almost exclusively from the production of preliminary products (89%) and manufacturing (approx. 9%).

The consumption of abiotic fossil resources (ADP fossil) within production (A1-A3) results predominantly from the provision of metals (approx. 89%) and processing (approx. 9%). the provision of metals (approx. 89%) and processing (approx. 9%).

7. Requisite evidence

Not of relevance

Krinner ground screws are hot-dip galvanised (corrosion protection); according to the Corrosion report, the planned service life in 80% of European soils is 100 years. No product-specific data is known about empirical values regarding weathering.

8. References

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KRINNER Schraubfundamente GmbH
www.krinner.io

Publisher

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