



Environmental Product Declaration

*In accordance with ISO 14025:2006,
EN 15804:2012+A2:2019/AC:2021*

Bead wire

wire with diameter $\varnothing < 1,2$ mm

EPD of average products



Date of publication:	01.11.2025
Date of revision:	-
Date of validity:	01.11.2030

General information

Accountabilities for PCR, LCA and independent, third-party verification
Product Category Rules (PCR)
CEN standard EN 15804+A2 serve as the core Product Category Rules (PCR)
Independent verification of the declaration and data according to EN ISO 14025:2010 ☒ Internal ☐ External

Life Cycle Assessment (LCA)
LCA accountability: Luboš Nobilis, nobilis.lubos@gmail.com

The EPD owner has the sole ownership, liability, and responsibility for the EPD.

EPDs within the same product category but registered in different EPD programmes, or not compliant with EN 15804, may not be comparable. For two EPDs to be comparable, they must be based on the same PCR (including the same version number) or be based on fully-aligned PCRs or versions of PCRs; cover products with identical functions, technical performances and use (e.g. identical declared/functional units); have equivalent system boundaries and descriptions of data; apply equivalent data quality requirements, methods of data collection, and allocation methods; apply identical cut-off rules and impact assessment methods (including the same version of characterisation factors); have equivalent content declarations; and be valid at the time of comparison. For further information about comparability, see EN 15804 and ISO 14025.

Company information

Manufacturing company	KERN s.r.o.
EPD owner	Konská 741, 739 61 Třinec, Czech Republic Registration N°: 25860984 VAT N°: CZ25860984
Production site and address	Konská 741, 739 61 Třinec, Czech Republic
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KERN s.r.o. is a medium-sized manufacturer based in Třinec, Czech Republic, specializing in the production of high-carbon steel wires, particularly bead wire for tire reinforcement. The company is committed to delivering top-quality products with bronze or copper coating, supported by continuous process improvement and strong commitments to environmental protection and occupational safety.

KERN s.r.o. operates an integrated and certified management system in accordance with IATF 16949:2016, ISO 9001:2015, ISO 14001:2015, and ISO 45001:2018 standards. Continuous investment in state-of-the-art technology, innovation, and digitalization ensures high productivity, consistent product quality, and minimized environmental impact.

The company primarily supplies the tire industry, as well as the construction, engineering, and metal manufacturing sectors.

A focus on occupational safety, employee development, environmental responsibility, and maintaining long-term partnerships are central elements of the company's business philosophy.



Product information

Bead wire is dry drawn high carbon steel wire with bronze coating. We produce normal tensile bead wire (NT) and high tensile bead wire (HT). Diameter range is from 0,89 mm up to 2,5 mm.

Example of bead wire parameters

Diameter [mm]	Tensile class	Min. Braking load [N]	Min. Tensile [N/mm ²]	Min. Total Elongation [%]	Mass of bronze coating [g/kg]	Number of torsions*
<i>wire with diameter $\phi < 1,2$ mm</i>						
0,89	NT	1200	1930	6	0,30 – 0,70	50
0,89	HT	1350	2170	6	0,30 – 0,70	30
0,965	NT	1375	1880	6	0,30 – 0,65	52
0,965	HT	1525	2090	6	0,30 – 0,65	30

*Testing length of sample with diameter $< 1,0$ mm $\Rightarrow L = 200 * d$; with diameter $> 1,0$ mm $\Rightarrow L = 100 * d$

Bead wire is standardly delivered on returnable spool BS900 or BS1150 in metallic racks.



Content declaration

The composition corresponds to the material inputs for whole production of bead wire with diameter $\varnothing < 1,2$ mm.

diameter $\varnothing < 1,2$ mm			
Product components	Weight (kg/DU)	Post-consumer recycled material, weight-%	Biogenic material, weight-% and kg C/DU
Steel drawn wire	1 000	0	0
Total	1 000	0	0

Packaging materials	Weight (kg/DU)	Weight-% (versus the product)	Weight biogenic carbon, kg C/DU
Plastic foil	1.61E-04	0.02%	0
Cardboard	2.58E-05	0.00%	1.16E-05
Total	1.87E-04	0.11%	4.14E-04

Note: There are no dangerous substances from the candidate list of SVHC for authorisation in this product

UN CPC: 463, Insulated wire and cable; optical fibre cables

Biogenic carbon content

BIOGENIC CARBON CONTENT <i>per DU</i>	
Biogenic carbon content in product	0
Biogenic carbon content in accompanying packaging	4.14E-04

LCA information

Declared unit:	1 ton of KERN bead wire <i>as defined on pages 4-5, divided into average products categories:</i>
	- all specific types of bead wire with diameter $\varnothing < 1,2$ mm
Time representativeness of data:	2024
Reference service life:	not defined (depends on the further use)
Database(s) and LCA software used:	Ecoinvent 3.11 (using the EN15804 proc./allocation model), Simapro v. 10.2 EN 15804 reference package based on EF 3.1 (https://eplca.jrc.ec.europa.eu/LCDN/developerEF.html)
Cut-off rules:	Neglected flow in all modules is less than 1% of the energy use and total mass.
Allocation method:	All inputs and outputs in A1-A3 modules are allocated to average DU in two categories (all specific types of bead wire with diameter $\varnothing < 1,2$ mm / $\varnothing > 1,2$ mm) by total evidence over 1 (reference) year. Raw materials for production also include production waste. They are deducted based on the economic allocation of sold secondary raw materials.
Description of system boundaries:	The type of EPD is Cradle to Gate with options, modules C1-C4 and module D (EPD Type b - Modules A1-A3, A4-A5, C1-C4, and D)
Infrastructure/capital goods:	Infrastructure is part of the genetic processes used for upstream and downstream. for the Core phase, infrastructure was not considered.

Production stage (A1-A3)

The A1 module contains primarily the production of components for the processing of a final wire (wire with final requires). This is semi-finished product ($\varnothing < 1,2$ mm) and consumables needed for technological drawing (lime hydrate, sulfuric acid etc.). Furthermore, it concerns the production of electricity and indirect heat and production of fuels and operational inputs for production.

The specific data from suppliers of steel rods EPDs were used for calculation.

Phase A2 includes the transportation of the above-mentioned materials and components to production in phase A3 and internal transport (fuels consumption).

In production (A3), the modification of components takes place, mainly the wire drawing. This is related to the consumption of electricity, tools, fuels and emissions from their use.

PE foil, and cardboard are used for product packaging.

Production generates waste from production (ferrous metals) and waste packaging (plastics, paper and cardboard, mixed).

GHG emissions from the production of electricity (2024): 0.42 kgCO₂eq/kWh

(Czech residual mix, contains: 45 % of fossil fuels, 38 % of nuclear, 17 % of renewable sources)

Transport to construction stage (A4)

The A4 module represents specific transportation requirements for products distribution in 2024.

Construction-Installation (A5)

Installation of wires to building or other further use can be done in different ways and using different tools and materials. Thus, only the production of packaging waste is taken into account in the A5 module.

Use stage (B1-B7)

Wires are a passive building element, with no expected inputs and outputs. This phase is not declared.

End-of-Life stage (C1-C4)

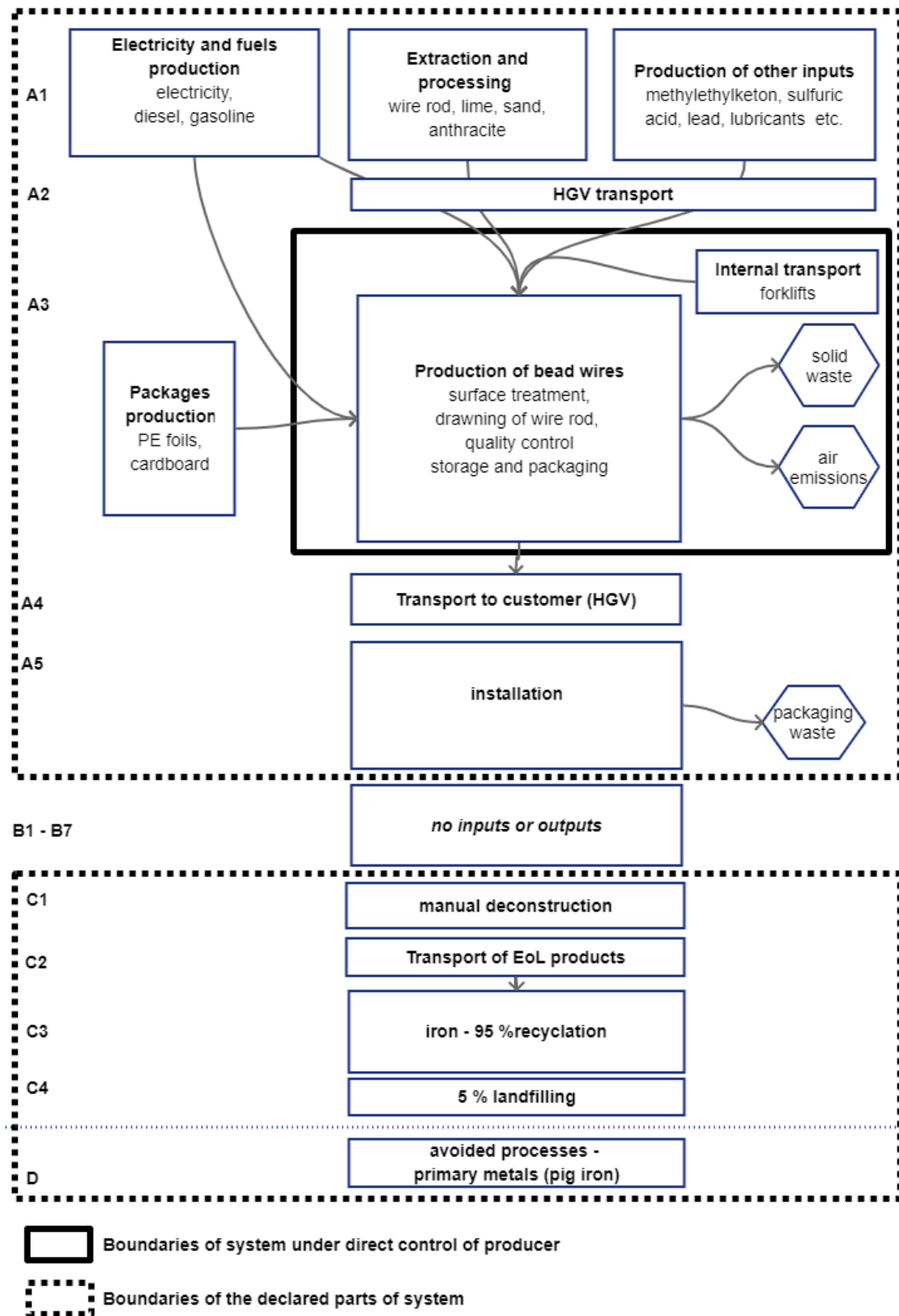
In the C1 module, manual deconstruction and transport for processing at a distance of 50 km is considered.

The rates of recovery and disposal are set to: 95 % of material recovery for iron and 5 % of its disposal. Approximately 95% of steel is assumed to be recycled based on data *World Steel Association, 2020*.

Benefits and loads (D) - Future Reuse, Recycling or Energy Recovery Potentials

Beyond the system boundary these avoiding products are considered as results of recycling: 95 % of DU avoiding the pig iron. The quantity of avoided products is provided in the Output flows tables.

System diagram



Results information

	Product stage			Construction stage		Use stage	End of life stage				Benefits and loads beyond the system boundary
	Raw material supply	Transport	Manufacturing	Transport	Construction-Installation process	Use Maintenance Repair Replacement Refurbishment Operational energy use Operational water use	De-construction demolition	Transport	Waste processing	Disposal	Reuse-recovery
Module	A1	A2	A3	A4	A5	B1 - B7	C1	C2	C3	C4	D
Modules declared	X	X	X	X	X	ND	X	X	X	X	X
Geography	GLO	EU	CZ	EU	-	-	EU	EU	EU	EU	EU
Specific data	95 %			-	-	-	-	-	-	-	-
Variation - products	N/A			-	-	-	-	-	-	-	-
Variation - sites	N/A			-	-	-	-	-	-	-	-
	<i>X – module declared</i> <i>ND – module not declared</i>										

In accordance with EN 15804+A2:2019/AC:2021, the environmental impacts are declared using the EC-JRC basic characterisation factors (reference package based on EF 3.1). Specific data are derived from the operation and general data are derived from the Ecoinvent database.

The estimated impact results are only relative data that do not indicate the end points of the impact categories, threshold exceedances, safety margins or risks.

All emissions to air, water and land and all materials and energy used have been included in the calculation.

The results of the LCA data are detailed in the following tables and apply to the declared unit of 1 t bead wire with diameter $\varnothing < 1,2$ mm.

Note: It is not recommended to use the results of modules A1-A3 without taking into account the results of module C.

Environmental impacts – per 1 t of all specific types of bead wire with diameter $\phi < 1,2$ mm

EN 15804 reference package based on EF 3.1 was used as LCIA method.

CORE ENVIRONMENTAL IMPACTS *per 1 t of all specific types of bead wire with diameter $\phi < 1,2$ mm*

Impact category	Unit	A1-A3	A4	A5	C1	C2	C3	C4	D
Climate change - Total	kg CO2 eq	3,74E+03	4,97E+01	1,53E-01	5,99E+01	9,34E+00	1,87E+02	3,13E-01	-1,66E+03
Climate change - Fossil	kg CO2 eq	3,74E+03	4,97E+01	1,51E-01	5,98E+01	9,33E+00	1,85E+02	3,13E-01	-1,66E+03
Climate change – Biogenic	kg CO2 eq	-9,36E+00	3,32E-02	1,17E-03	1,20E-02	6,23E-03	1,61E+00	1,50E-04	6,23E+00
Climate change - Land use and LU change	kg CO2 eq	8,09E+00	1,68E-02	2,37E-04	6,13E-03	3,15E-03	1,41E-01	1,79E-04	-3,90E-01
Ozone depletion	kg CFC11 eq	1,92E-05	1,08E-06	8,92E-10	8,88E-07	2,03E-07	1,31E-06	8,71E-09	-7,23E-06
Acidification	mol H+ eq	9,49E+00	1,07E-01	2,89E-04	5,35E-01	2,00E-02	3,99E-01	2,19E-03	-5,86E+00
Eutrophication, freshwater ¹	kg P eq	9,15E-01	3,45E-03	4,18E-05	1,92E-03	6,47E-04	2,08E-01	2,74E-05	-6,55E-01
Eutrophication, marine	kg N eq	2,10E+00	2,57E-02	8,32E-05	2,49E-01	4,83E-03	9,06E-02	8,41E-04	-1,42E+00
Eutrophication, terrestrial	mol N eq	2,21E+01	2,77E-01	5,15E-04	2,73E+00	5,21E-02	9,48E-01	9,19E-03	-1,53E+01
Photochemical ozone formation	kg NMVOC eq	7,80E+00	1,69E-01	1,67E-04	8,16E-01	3,18E-02	3,78E-01	3,32E-03	-5,27E+00
Resource use, minerals and metals ¹	kg Sb eq	1,43E-02	1,70E-04	6,24E-07	2,09E-05	3,20E-05	2,77E-04	4,55E-07	-8,90E-04
Resource use, fossils ¹	MJ	2,83E+04	7,06E+02	1,05E+00	7,79E+02	1,33E+02	1,46E+03	7,66E+00	-1,75E+04
Water use ¹	m3 depriv.	1,18E+03	3,62E+00	2,65E-02	2,26E+00	6,79E-01	2,76E+02	3,40E-01	-1,33E+02

The estimated impact results are only relative statements, which do not indicate the endpoints of the impact categories, exceeding threshold values, safety margins and/or risks.

¹ *Disclaimer: The results of this environmental impact indicator shall be used with care as the uncertainties of these results are high or as there is limited experience with the indicator.*

ADDITIONAL ENVIRONMENTAL IMPACTS per 1 of all specific types of bead wire with diameter $\phi < 1,2$ mm

Impact category	Unit	A1-A3	A4	A5	C1	C2	C3	C4	D
Human toxicity, non-cancer ¹	CTUh	1,91E-05	4,45E-07	1,01E-09	9,59E-08	8,36E-08	1,41E-06	1,28E-09	-4,09E-06
Human toxicity, cancer ¹	CTUh	2,66E-06	8,36E-09	2,97E-11	6,10E-09	1,57E-09	1,21E-07	5,67E-11	-2,38E-06
Particulate matter	disease inc.	2,13E-04	3,72E-06	1,36E-09	1,53E-05	6,99E-07	1,26E-05	5,04E-08	-1,25E-04
Ecotoxicity, freshwater	CTUe	1,02E+04	9,49E+01	3,43E-01	4,22E+01	1,78E+01	2,57E+02	5,54E-01	-4,50E+03
Land use ¹	Pt	8,52E+03	4,24E+02	2,80E-01	5,15E+01	7,96E+01	4,33E+02	1,51E+01	-3,60E+03
Ionising radiation ²	kBq U-235 eq	1,73E+02	8,53E-01	2,76E-02	3,32E-01	1,60E-01	2,93E+01	4,59E-03	-1,94E+01

The estimated impact results are only relative statements, which do not indicate the endpoints of the impact categories, exceeding threshold values, safety margins and/or risks.

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² *Disclaimer: This impact category deals mainly with the eventual impact of low dose ionising radiation on human health of the nuclear fuel cycle. It does not consider effects due to possible nuclear accidents, occupational exposure nor due to radioactive waste disposal in underground facilities. Potential ionising radiation from the soil, from radon and from some construction materials is also not measured by this indicator.*

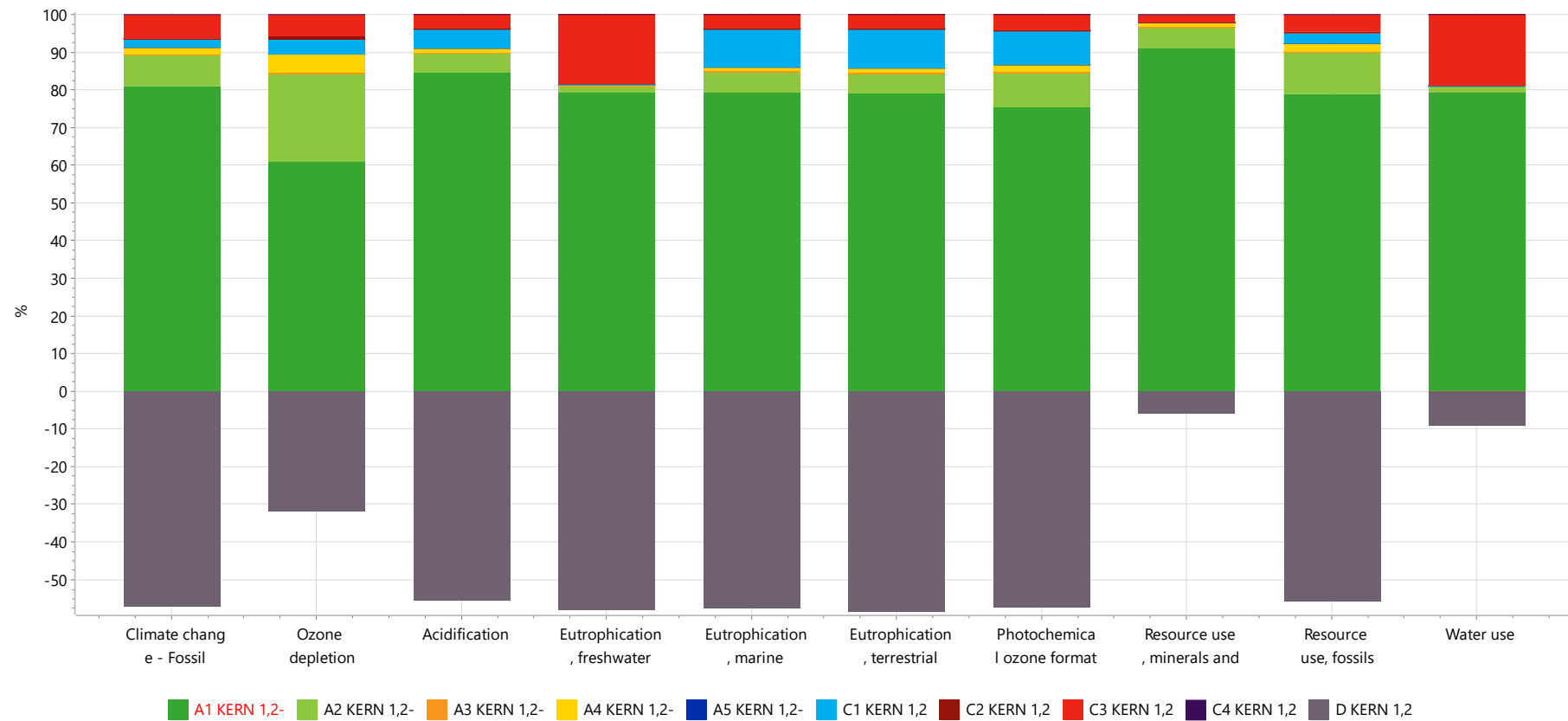
USE OF RESOURCES *per 1 t of all specific types of bead wire with diameter $\phi < 1,2$ mm*

Parameter	Unit	A1-A3	A4	A5	C1	C2	C3	C4	D
Use of renewable primary energy excluding renewable primary energy resources used as raw materials	MJ, net calorific value	1,33E+03	1,16E+01	2,72E-01	4,89E+00	2,19E+00	2,57E+02	7,16E-02	-3,77E+02
Use of renewable primary energy resources used as raw materials	MJ, net calorific value	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
Total use of renewable primary energy resources (primary energy and primary energy resources used as raw materials)	MJ, net calorific value	1,33E+03	1,16E+01	2,72E-01	4,89E+00	2,19E+00	2,57E+02	7,16E-02	-3,77E+02
Use of non- renewable primary energy excluding non-renewable primary energy resources used as raw materials	MJ, net calorific value	2,83E+04	7,06E+02	1,05E+00	7,79E+02	1,33E+02	1,46E+03	7,66E+00	-1,75E+04
Use of non- renewable primary energy resources used as raw materials	MJ, net calorific value	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
Total use of non- renewable primary energy resources (primary energy and primary energy resources used as raw materials)	MJ, net calorific value	2,83E+04	7,06E+02	1,05E+00	7,79E+02	1,33E+02	1,46E+03	7,66E+00	-1,75E+04
Use of secondary material	kg	2,51E+02	3,20E-01	2,11E-04	3,22E-01	6,01E-02	3,59E-01	1,91E-03	-2,22E+00
Use of renewable secondary fuels	MJ, net calorific value	1,12E-01	4,20E-03	3,12E-06	8,45E-04	7,89E-04	4,12E-02	3,98E-05	-2,16E-02
Use of non renewable secondary fuels	MJ, net calorific value	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
Use of net fresh water	m ³	2,87E+01	8,95E-02	7,06E-04	5,50E-02	1,68E-02	6,53E+00	7,95E-03	-3,21E+00

WASTE PRODUCTION and OUTPUT FLOWS per 1 t of all specific types of bead wire with diameter $\phi < 1,2$ mm

Parameter	Unit	A1-A3	A4	A5	C1	C2	C3	C4	D
Hazardous waste	kg	4,66E+02	1,02E+00	3,56E-03	8,74E-01	1,93E-01	1,67E+02	8,72E-03	-1,52E+02
Non-hazardous waste disposed	kg	5,00E+03	2,20E+01	2,90E-01	1,27E+01	4,13E+00	1,34E+03	2,02E-01	-3,36E+03
Radioactive waste disposed/stored	kg	4,22E-02	2,10E-04	7,08E-06	8,15E-05	3,95E-05	7,50E-03	1,12E-06	-4,81E-03
Components for re-use	kg	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
Materials for recycling	kg	1,75E+00	8,56E-03	1,09E-01	3,47E-03	1,61E-03	9,50E+02	0,00E+00	0,00E+00
Materials for energy recovery	kg	3,60E-02	4,55E-05	1,54E-06	1,11E-05	8,54E-06	0,00E+00	0,00E+00	0,00E+00
Exported energy - electricity	MJ per energy carrier	5,39E+01	1,40E-01	4,71E-03	3,69E-02	2,64E-02	0,00E+00	0,00E+00	0,00E+00
Exported energy - heat	MJ per energy carrier	4,22E+00	1,72E-01	1,32E-04	1,73E-02	3,23E-02	0,00E+00	0,00E+00	0,00E+00

Chart of LCA results in life cycle phases



Method: EN 15804 +A2 LCIA & LCI indicators EPD V1.01 / EN 15804 official / Characterization
Analyzing 1 p 'KERN 1,2-';

Other Environmental Performance Indicators

None included

Additional Environmental Information

The company has established management system according to IATF 16949:2016, ISO 9001:2015, ISO 14001:2015 and ISO 45001:2018.



Additional Social and Economic Information

None included

Information Related to Sector EPD

Not applicable

References

ISO 14040/44/ DIN EN ISO 14040:2006-10, Environmental management - Life cycle assessment - Principles and framework (ISO14040:2006) and Requirements and guidelines (ISO 14044:2006)

ISO 14044:2006-10, Environmental Management — Life Cycle Assessment — Requirements and Instructions (ISO 14044:2006); EN ISO 14044:2006

EN EN 15804:2012+A2:2019/AC:2021, Sustainability of construction works — Environmental Product Declarations — Core rules for the construction products product category

ISO 14025/ DIN EN ISO 14025:2009-11: Environmental labels and declarations - Type III environmental declarations — Principles and procedures

/Ecoinvent / Ecoinvent Centre, www.ecoinvent.org

/SimaPro/ SimaPro LCA Software, Pré Consultants, the Netherlands, www.pre-sustainability.com