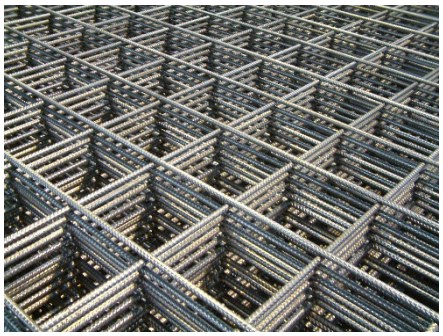
Environmental Product Declaration

In accordance with ISO 14025 and EN 15804:2012+A2:2019 for:

Steel rebars from

SERFAS



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An EPD should provide current information and may be updated if conditions change. The stated validity is therefore subject to the continued registration and publication at www.environdec.com

Environmental Product Declaration

This is an Environmental Product Declaration for steel structures produced by “SERFAS”, Ltd. The declaration is registered by the EPD programme of the International EPD® System and the Product Category Rules for Construction Products 2019:14, version 1.1. The EPD is used in both business-to-business (B2B) and business-to-consumer (B2C) communication.

Company information

Owner of the EPD:
“SERFAS”, Ltd
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www.serfas.lt

Description of the organisation: "SERFAS” Ltd is a private company, which started its activity in year 1994. The founders of the company chose building materials and steel production spheres as they corresponded with the requirements of the market and “know – how” of the owners. The company vision is a professional service net for building, production and small sales companies in Lithuania and expansion abroad.

Name and location of production site(s): The "SERFAS” Ltd manufacturing plant is based in Kaunas, Lithuania.

Product information

Product name: Steel rebars.

Product identification: "SERFAS” Ltd produces two main types of steel rebars:

- Reinforcement rebars and bendings;
- Welded fabric and welded reinforcement steel.

All products comply with European Standard EN 10080. Other product standards and technical classes are provided in the table below. Specific values of properties like yield strength, elongation, etc define technical classes.

Characteristics	Reinforcement rebars and bendings	Welded fabric and welded reinforcement steel
Standards (National and European)	EN 10080; NS 3576-3; SS 212540; EN1992-1-1; SFS 1300	EN 10080; NS 3576-4; SS 212540; EN1992-1-1 DK NA; EN ISO 17 660-1; EN ISO 17660-2
Technical classes	B500NA/B500NC/K500B-T/K500C-T/K500C-KR/B500A/B500B/B500C	B500A; NK500AB-W; NK500B-K; S500A

Products description: Steel reinforcement rebars are used to improve the tensile strength of the concrete since concrete is very weak in tension but is strong in compression. Steel rebars are also used because the elongation of steel due to high temperatures (thermal expansion coefficient) is nearly equals to that of concrete.
Welded fabric is a joined grid consisting of a series of parallel longitudinal steel wires with accurate spacing welded to cross wires at the required spacing, while welded reinforcement steel is steel bars cut, bent and welded together to satisfy the required parameters.

The purpose of reinforcement is to provide additional strength for concrete where needed. Steel is ideal for reinforcement in concrete, as it bods well with the concrete mixture and can be manipulated (cut and bent) to fit any concrete shape. Steel adds tensile strength to the concrete structure so that the structure is not affected by tensile stresses. Welded mesh reinforcing sheets are the most used form of reinforcing in concrete and are particularly suited for flat slab construction and concrete surface beds. Other design applications of welded reinforcement steel would be retaining walls, shear walls, beams, and columns.

UN CPC code: 412

Geographical scope: Europe

LCA information

Functional unit / declared unit: In accordance with the PCR, the declared unit is 1 kg of the product.

Reference service life: The reference service life for the steel structures is set at 60 years.

Time representativeness: Primary data was collected internally. The production data refers to the average of the year 2020.

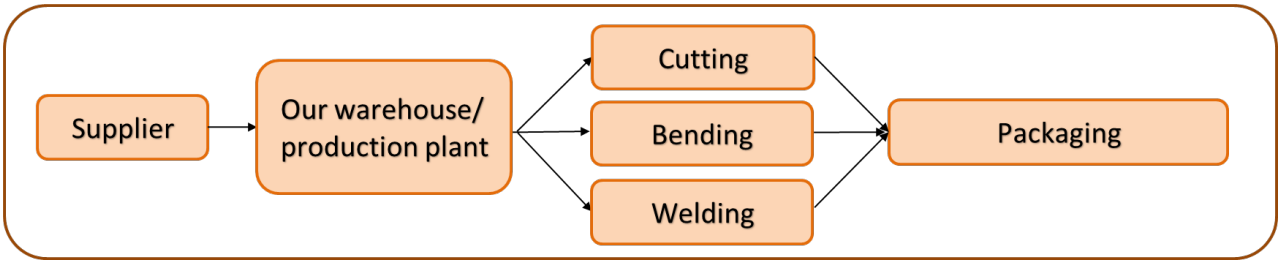
Database(s) and LCA software used: The Ecoinvent database provides the life cycle inventory data for the raw and process materials obtained from the background system. The used database is Ecoinvent 3.8. The LCA software used is One Click LCA.

Description of system boundaries: Cradle to gate with options. The LCA was carried out considering the Product stage phases (A1, A2, A3), Assembly (A4) and End of life (C1, C2, C3, C4), and potential environmental benefits (D) in accordance with EN 15804.

Data quality: The foreground data collected internally is based on yearly production amounts and extrapolations of measurements on specific machines and plants. Overall, the data quality can be described as good. The primary data collection has been done thoroughly.

Cut-off criteria: Life cycle inventory data for a minimum of 98% of total material and energy input flows have been included in the life cycle analysis. However only materials having in summa less than 1% of the weight of the product were not used in calculations.

System diagram:



System boundary:

	Product stage			Assembly stage		Use stage							End of life stage				Resource recovery stage
	Raw material supply	Transport	Manufacturing	Transport	Construction installation	Use	Maintenance	Repair	Replacement	Refurbishment	Operational energy use	Operational water use	De-construction demolition	Transport	Waste processing	Disposal	Reuse-Recovery-Recycling-potential
Module	**A1**	**A2**	**A3**	**A4**	**A5**	**B1**	**B2**	**B3**	**B4**	**B5**	**B6**	**B7**	**C1**	**C2**	**C3**	**C4**	**D**
Modules declared	x	x	x	x	MND	MND	MND	MND	MND	MND	MND	MND	x	x	x	x	x
Geography	EU	EU	LT	EU									EU	EU	EU	EU	EU
Specific data used	>90%																
Variation – products	0%																
Variation – sites	Not relevant																

Description of the system boundary (X = Included in LCA; MND = Module Not declared)

Product stage:

A1: This stage considers the extraction and processing of raw materials as well as energy consumption.

A2: The raw materials are transported to the manufacturing plant. In this case, the model includes road transportation of each raw material.

A3: This stage includes the manufacture of products and packaging. It also considers the energy consumption and waste generated at production plant.

Production process description

Steel rebar production consists of cutting, bending, and packaging. Firstly, steel rebars are cut to the required length. It may be bent if necessary. Welded fabrics are produced from coils using automated welding machines. As for welded reinforcement steels, rebars are cut to the required length, then bent and welded to the required form. Afterwards, everything is packed either on pallets or using slings.

Construction process stage:

A4: This stage includes transportation from the production gate to the construction site where the product shall be installed.
Transportation is calculated based on data from the manufacturer and a scenario with the parameters described in the following table.

Parameter	Value/Description
Vehicle type used for transport	EURO 5 truck with a trailer with an average load of >32t
Distance	25 % of production: Truck – 486 km. 75% of production: Truck – 491 km. Ship – 248 km.
Capacity utilization	56 % of the capacity in volume (truck) 50 % of the capacity in volume (ship)
Return trips	Empty returns are not taken into account, as it is assumed that the return trip is used by the transportation company to serve the needs of other clients

Use stage:
In normal use scenario, it is assumed that no maintenance (B2), repair (B3), replacement (B4) or refurbishment (B5) is needed.

End of Life stage:
This stage includes the following modules:

C1: Deconstruction, dismantling, demolition.
Consumption of fuel in the demolition process is calculated according to transported mass. Energy consumption for demolition is 10 kWh/1000 kg = 0,01 kwh. The source of energy is diesel fuel used by work machines.

C2: Transport of the discarded product to the processing site.
Scrap metals are transported to the processing site. Materials are transported by truck with a >32-ton trailer. A transportation distance of 50 km has been considered.

C3: Waste processing for reuse, recovery and/or recycling.
Based on the European average 90% of steel is transformed into secondary material in a recycling plant.

C4: Discharge (disposal).
10% of the steel cannot be separated and is assumed to be landfilled.

Benefits and loads beyond the system boundary (D):

The benefits of recyclable waste generated in phase C3 are considered in phase D. The recycled steel has been modelled to avoid the use of primary materials. The scrap content in the studied product has been acknowledged, and only the mass of primary steel in the product provides the benefit of avoiding double counting.

Content information

Product components	Weight, kg	Recycled material, weight-%	Biogenic material, weight-% and kg C/kg
Steel	1	99.4	0

No dangerous substances from the candidate list of SVHC for Authorisation are used in the product.

Packaging

Distribution packaging: products are packed on pallets or using slings. After use, packaging materials can be re-used or recycled.

Environmental Information

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.

Note: it is discouraged to use the results of modules A1-A3 without considering the results of module C when module C is declared.

Potential environmental impact – mandatory indicators according to EN 15804:2012+A2:2019

Results per functional or declared unit								
Indicator	**Unit**	**A1-A3**	**A4**	**C1**	**C2**	**C3**	**C4**	**D**
GWP-total	kg CO_2 eq.	4.57E-01	2.29E-02	3.31E-03	4.70E-03	1.98E-02	5.27E-04	-8.04E-03
GWP-fossil	kg CO_2 eq.	4.56E-01	2.31E-02	3.31E-03	4.69E-03	1.97E-02	5.27E-04	-8.04E-03
GWP-biogenic	kg CO_2 eq.	2.75E-05	9.07E-06	6.06E-07	0.00E+00	0.00E+00	0.00E+00	0.00E+00
GWP-luluc	kg CO_2 eq.	8.02E-04	8.63E-06	3.30E-07	1.73E-06	2.58E-05	4.97E-07	-1.28E-06
ODP	kg CFC 11 eq.	4.10E-08	5.48E-09	7.07E-10	1.08E-09	2.44E-09	2.13E-10	-3.12E-10
AP	mol H^+ eq.	2.60E-03	1.21E-04	3.44E-05	1.99E-05	2.50E-04	4.95E-06	-3.29E-05
EP-freshwater	kg P eq.	7.08E-06	1.55E-07	1.10E-08	3.84E-08	1.06E-06	5.52E-09	-3.31E-07
EP-marine	kg N eq.	6.58E-04	3.51E-05	1.52E-05	5.90E-06	5.29E-05	1.71E-06	-6.75E-06
EP-terrestrial	mol N eq.	5.51E-03	3.87E-04	1.67E-04	6.51E-05	6.11E-04	1.89E-05	-7.86E-05
POCP	kg NMVOC eq	2.30E-03	1.20E-04	4.59E-05	2.08E-05	1.68E-04	5.48E-06	-4.02E-05
ADP-minerals & metals*	kg Sb eq.	5.41E-07	5.34E-08	1.68E-09	1.10E-08	2.65E-06	1.21E-09	-1.54E-07
ADP-fossil*	MJ	6.81E+00	3.51E-01	4.45E-02	7.05E-02	2.67E-01	1.44E-02	-6.98E-02
WDP	m^3	1.89E-01	1.60E-03	1.20E-04	3.15E-04	5.18E-03	4.58E-05	-1.46E-03
Acronyms	GWP-fossil = Global Warming Potential fossil fuels; GWP-biogenic = Global Warming Potential biogenic; GWP-luluc = Global Warming Potential land use and land use change; ODP = Depletion potential of the stratospheric ozone layer; AP = Acidification potential, Accumulated Exceedance; EP-freshwater = Eutrophication potential, fraction of nutrients reaching freshwater end compartment; EP-marine = Eutrophication potential, fraction of nutrients reaching marine end compartment; EP-terrestrial = Eutrophication potential, Accumulated Exceedance; POCP = Formation potential of tropospheric ozone; ADP-minerals & metals = Abiotic depletion potential for non-fossil resources; ADP-fossil = Abiotic depletion for fossil resources potential; WDP = Water (user) deprivation potential, deprivation-weighted water consumption							

** 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.*

Reading example: 9.00E-03 = $9.0*10^{-3}$ = 0.009

Use of resources

Use of resources per functional of declared unit								
Indicator	**Unit**	**A1-A3**	**A4**	**C1**	**C2**	**C3**	**C4**	**D**
PERE	MJ	7.26E-01	4.48E-03	2.54E-04	7.94E-04	4.74E-02	1.25E-04	-5.87E-03
PERM	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
PERT	MJ	7.26E-01	4.48E-03	2.54E-04	7.94E-04	4.74E-02	1.25E-04	-5.87E-03
PENRE	MJ	1.62E+00	3.51E-01	4.45E-02	7.05E-02	2.67E-01	1.44E-02	-6.98E-02
PENRM	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
PENRT	MJ	1.62E+00	3.51E-01	4.45E-02	7.05E-02	2.67E-01	1.44E-02	-6.98E-02
SM	kg	1.27E+00	1.01E-04	1.74E-05	1.96E-05	2.97E-04	3.03E-06	4.65E-03
RSF	MJ	3.15E-06	8.59E-07	5.70E-08	1.97E-07	1.55E-05	7.93E-08	-7.43E-07
NRSF	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
FW	m^3	4.50E-03	4.58E-05	2.70E-06	9.13E-06	1.57E-04	1.58E-05	-1.68E-05
Acronyms	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 re-sources; SM = Use of secondary material; RSF = Use of renewable secondary fuels; NRSF = Use of non-renewable secondary fuels; FW = Use of net fresh water							

Waste production and output flows

Waste production

Results per functional or declared unit								
Indicator	**Unit**	**A1-A3**	**A4**	**C1**	**C2**	**C3**	**C4**	**D**
Hazardous waste disposed	kg	2.56E-03	3.80E-04	5.96E-05	9.34E-05	0.00E+00	0.00E+00	-2.69E-03
Non-hazardous waste disposed	kg	8.88E-02	6.47E-03	4.19E-04	1.54E-03	0.00E+00	1.00E-01	-1.32E-02
Radioactive waste disposed	kg	3.53E-05	2.42E-06	3.13E-07	4.71E-07	0.00E+00	0.00E+00	2.32E-08

Output flows

Results per functional or declared unit								
Indicator	**Unit**	**A1-A3**	**A4**	**C1**	**C2**	**C3**	**C4**	**D**
Components for re-use	kg	0E0	0E0	0E0	0E0	0E0	0E0	0E0
Material for recycling	kg	1E−2	0E0	0E0	0E0	9E−1	0E0	0E0
Materials for energy recovery	kg	0E0	0E0	0E0	0E0	0E0	0E0	0E0
Exported energy	MJ	0E0	0E0	0E0	0E0	0E0	0E0	0E0

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Results per functional or declared unit								
Indicator	**Unit**	**A1-A3**	**A4**	**C1**	**C2**	**C3**	**C4**	**D**
GWP-GHG	kg CO2 eq.	4.56E-01	2.31E-02	3.31E-03	4.69E-03	1.97E-02	5.27E-04	-8.04E-03

Programme information

Programme:	The International EPD® System
Address:	EPD International AB Box 210 60 SE-100 31 Stockholm Sweden
Website:	www.environdec.com
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CEN standard EN 15804 serves as the Core Product Category Rules (PCR)
Product category rules (PCR): PCR 2019:14 Construction products (version 1.1)
PCR review was conducted by: The International EPD® System
Independent third-party verification of the declaration and data, according to ISO 14025:2006: ☐ EPD process certification ☒ EPD verification
Third party verifier: Vladimir Kočí, LCA Studio Approved by: The International EPD® System
Procedure for follow-up of data during EPD validity involves third party verifier: ☐ Yes ☒ No

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

EPDs within the same product category but from different programmes may not be comparable. EPDs of construction products may not be comparable if they do not comply with EN 15804. For further information about comparability, see EN 15804 and ISO 14025.

Differences versus previous versions:

2021-06-17 Version 1

2023-12-14 Version 1.1.

Revision information: results of A1-A3 were updated due to changes in supply chain – raw materials suppliers.

References

- General Programme Instructions of the International EPD® System. Version 3.01;
- PCR 2019:14 Construction products (version 1.1)
- EN 15804:2012+A2:2019 Sustainability of construction works. Environmental product declarations. Core rules for the product category of construction products.
- ISO 14020:2001 Environmental labels and declarations – General principles.
- ISO 14040:2006 Environmental management. Life cycle assessment. Principles and frameworks.
- ISO 14044:2006 Environmental management. Life Cycle Assessment. Requirements and guidelines.
- ISO 14025:2010 Environmental labels and declarations. Type III environmental declarations. Principles and procedures.

Tools and database

- One Click LCA tool;
- Ecoinvent 3.8 database

Contact information

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The International EPD® System

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