ENVIRONMENTAL PRODUCT DECLARATION

Steel Rebars

KAUNAS METAL, UAB

KM STEEL SERVICE

1 GENERAL INFORMATION

Program operator 	**The International EPD System** Valhallavägen 81 11427 Stockholm Sweden www.environdec.com
Owner of the declaration 	**KAUNAS METAL, UAB** Chemijos g. 27B 51332 Kaunas Lithuania www.kaunasmetal.lt info@kaunasmetal.lt +370 37 465801
This declaration is based on the PCR	PCR 2012:01 Construction products and Construction services (Version 2.3)
Product	Kaunas steel rebar products
UN CPC Classification	4126
Place of production	Kaunas, Lithuania
Registration number	S-P-01659
ECO EPD Ref. no.	00001122
Manufacturer	KAUNAS METAL, UAB
Publication date	2020-01-13
Valid to	2025-01-13
Year of study	2020
Geographical scope	Global
Declared unit	1 kg of average steel rebar products
The study was carried out in accordance with	SS-EN ISO 14025:2010. Environmental labels and declarations – Type III environmental declarations-Principles and procedures. EN 15804:2012 + A1:2013, Sustainability of construction works- Environmental product declarations, in the International EPD® System.
Comparability	EPD of construction products may not be comparable if they do not comply with EN 15804:2012 + A1:2013. EPD within the same product category from different programs may not be comparable.

2 PRODUCT INFORMATION

2.1 PRODUCT DESCRIPTION AND SPECIFICATION

Rebars (short for reinforcing bar) are steel bars or meshes of steel wires used as a tension device in reinforced concrete and reinforced masonry structures to strengthen and aid the concrete under tension. Concrete is strong under compression but has weak tensile strength. Rebar significantly increases the tensile strength of the structure. Rebar's surface is often deformed to promote a better bond with the concrete.

Kaunas provides reinforcement of different lengths (6 m, 12 m, 14 m, 16 m) and diameter (8-40 mm) according to individual needs of the customers.

Further information is available on www.kaunasmetal.lt.

MATERIAL	SHARE
Steel	100 %
Substances of very high concern The product does not contain any substances listed in the "Candidate List of Substances of Very High Concern (SVHC) for authorisation" exceeding 0.1 % of the weight of the product.	

2.2 APPLICATION

Rebars are used for various purposes. A single bar reinforcement used for example in narrow beams or piers. For other applications, the steel bars are tied together to form a so-called reinforcement cage. Reinforcing steel meshes are usually used for flat components such as ceilings, walls or floor slabs. Such a mat consists of intersecting longitudinal and transverse bars welded together. The reinforcement is poured with concrete after installation in the formwork.

2.3 DELIVERY STATUS

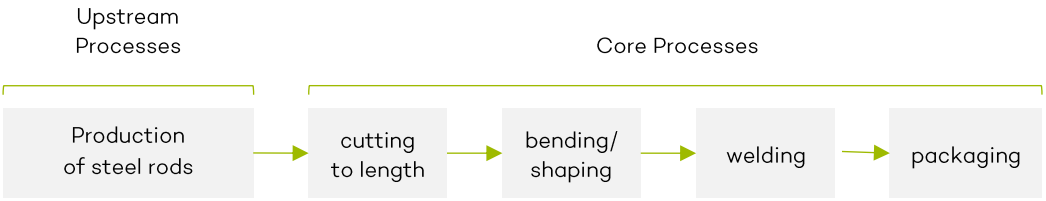
The dimensions of the declared product may vary according to the particular requirements of the construction project.

2.4 MANUFACTURING PROCESS

The production takes place in 4 steps:

1) Cutting to length
2) Bending/shaping
3) Welding (meshes, cages, columns, etc.)
4) Packaging

The delivered steel rods are first cut to the required length. The rods are then bent into the final shape according to requirements. For meshes, cages, columns, etc., individual rebars are welded together. At the end the rebars are fixed on pallets or webbing slings are ready for delivery.



2.5 PACKAGING

Rebars are loaded on pallets or fixed with webbing slings. Depending on the type of product, euro pallets are also equipped with collars. All packaging materials are usually reused afterwards.

3 LCA CALCULATION RULES

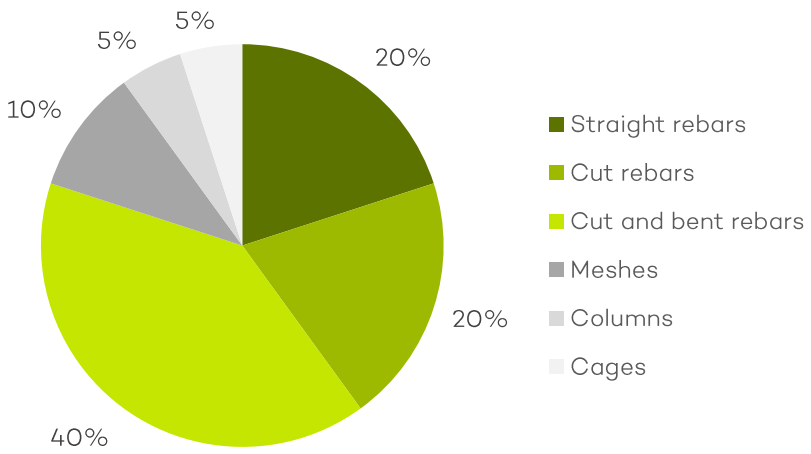
Declared unit	1 kg steel rebars
System boundary	Cradle to gate (with options)

X = declared modules; MND = module not declared; NR = not relevant:

Production			Installation		Utilization Stage							Disposal Stage				beyond system boundary
raw material supply	transport to the manufacturer	manufacture	transport to the construction site	installation in the building	use / application	maintenance	repair	replacement	renewal	energy input for operation	water use for operation	dismantling / demolition	transport	waste management	landfilling	reuse, recovery or recycling potential
A1	A2	A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
X	X	X	X	NR	MND	MND	MND	MND	MND	MND	MND	MND	X	X	MND	X

3.1 AVERAGE FORMATION

The average product corresponds to the proportions of manufactured products:



3.2 CUT-OFF CRITERIA

Overall, the packaging materials have a mass share of 0.4%. Due to the low weight compared to steel and the fact that pallets, webbing slings and pallet collars are used repeatedly, no modelling was carried out. It can also be strongly assumed that the environmental impact of packaging materials will not exceed 1% each or 5% in total.

3.3 DATA QUALITY

The material and energy data collected are from the year 2018 and include the raw materials and the energy consumption data for a production quantity of 34,862 tons and converted to 1 kg steel rebar product. The collected data were checked for plausibility and consistency. Good data quality can be assumed.

3.4 BACKGROUND DATA

The manufacturing process was modelled based on manufacturer-specific data. However, generic background datasets were used for the upstream and downstream processes. The background datasets used were taken from the current versions of various GaBi databases.

The datasets contained in the databases are documented online. All necessary processes within the defined system boundaries were considered.

The background datasets used for accounting purposes should not be older than 10 years. In this study, no datasets older than 10 years were used.

Since only few Lithaunian datasets are available, available European datasets were used for processes in module A1-3. For distribution transports (A4), disposal of packaging materials (A5) and disposal scenarios (C modules), the corresponding European datasets were used. Where no European datasets were available, German datasets were used.

3.5 ESTIMATES AND ASSUMPTIONS

- The collection rate for waste is 100% to reflect all the burdens of disposal.
- For the distribution transports, the distances for trucks and ships to the capitals of the receiver countries were determined.
- The electricity mix used for the preliminary products has a GWP of 0.422 kg CO2-eq/kWh. This was modelled using a combination of Russian electricity mix (0.614 kg CO2 eq/kWh) and nuclear energy (0.0047 kg CO2 eq/kWh). To achieve an average value of 0.422 kg CO2-eq/kWh, the share of nuclear energy was adjusted accordingly. The ratio of electricity mix to nuclear energy is thus 68.4 to 31.6.

3.6 ALLOCATION

No allocations were made for the modelling of production processes, as the available data do not concern other products manufactured in the plant and there are no coupling processes. Nor were any multi-input processes carried out.

Allocations in the LCA datasets used are documented accordingly in the datasets themselves. Potential credits and avoided burdens resulting from the scrap recycling in the *end of life* (Module C3) are assigned to module D.

3.7 LCA SCENARIOS AND ADDITIONAL TECHNICAL INFORMATION

Transport from production place to user (module A4)

The average transport distance to the customer is 611 km by truck and 254 km by ship. Transport is mainly carried out by diesel-powered trucks, EURO 4 with an average load factor of 90%, their carriers take cargos back to Lithuania from other clients. A capacity utilisation of 70% is assumed for transport by container ship.

Type	Capacity utilization	Type of vehicle	Average distance	Fuel consumption
Truck	90 %	EURO 4	611 km	14,51 ml/kg
Ship	70 %	Container ship, 5,000 to 200,000 dwt	254 km	0,68 ml/kg

Transport (module C2)

With a collection rate of 100%, the transports are carried out by truck over 75 km and with a capacity utilization of 50%.

Since the product is poured into concrete, it is collected as mixed construction waste.

Type	Capacity utilization	Type of vehicle	Average distance	Fuel consumption
Truck	50 %	EURO 4	75 km	2,33 ml/kg

Waste processing (module C3)

Steel rebars must be mechanically separated from the concrete surrounding them prior to recycling so that the steel can be made available to a downstream product system as secondary material. This is considered in module C3. Corresponding potentials and avoided loads are assigned to module D.

Waste	kg for re-use	kg for recycling	kg for energy recovery
Steel scrap	-	1	-

Recyclability potentials (module D)

Module D contains credits from the recycling of rebars in module C3.

4 LCA RESULTS

Environmental Impact

PARAMETER	UNIT	A1 -A3	A4	A5	C2	C3	D
Global Warming Potential (GWP)	[kg CO2-eq.]	5,16E-01	4,43E-02	0,00E+00	6,78E-03	2,54E-03	-5,96E-02
Stratospheric ozone depletion potential (ODP)	[kg CFC11-eq.]	5,44E-13	7,31E-18	0,00E+00	1,13E-18	8,30E-18	1,82E-16
Acidification potential of soil and water (AP)	[kg SO2-eq.]	2,60E-03	2,19E-04	0,00E+00	2,91E-05	1,81E-05	-1,15E-04
Eutrophication potential (EP)	[kg PO43--eq.]	2,08E-04	5,20E-05	0,00E+00	7,37E-06	4,33E-06	-8,01E-06
Formation potential for tropospheric ozone (POCP)	[kg Ethene-eq.]	6,09E-05	-6,33E-05	0,00E+00	-1,08E-05	1,99E-06	-2,79E-05
Potential for abiotic depletion of non-fossil resources (ADPE)	[kg Sb-eq.]	1,01E-07	3,34E-09	0,00E+00	5,28E-10	2,88E-09	-1,01E-06
Potential for abiotic depletion of fossil fuels (ADPF)	[MJ]	6,08E+00	6,06E-01	0,00E+00	9,28E-02	4,93E-02	-5,59E-01

Use of resources

PARAMETER	UNIT	A1 -A3	A4	A5	C2	C3	D
Renewable primary energy as an energy carrier (PERE)	[MJ]	5,63E-01	3,37E-02	0,00E+00	5,40E-03	3,64E-03	4,17E-02
Renewable primary energy for material use (PERM)	[MJ]	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
Total renewable primary energy (PERT)	[MJ]	5,63E-01	3,37E-02	0,00E+00	5,40E-03	3,64E-03	4,17E-02
Non-renewable primary energy as an energy carrier (PENRE)	[MJ]	8,49E+00	6,09E-01	0,00E+00	9,31E-02	5,12E-02	-5,38E-01
Non-renewable primary energy for material use (PENRM)	[MJ]	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
Total non-renewable primary energy (PENRT)	[MJ]	8,49E+00	6,09E-01	0,00E+00	9,31E-02	5,12E-02	-5,38E-01
Use of secondary materials (SM)	[kg]	9,63E-01	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
Renewable secondary fuels (RSF)	[MJ]	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
Non-renewable secondary fuels (NRSF)	[MJ]	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
Use of freshwater resources (FW)	[m^3]	1,49E-03	5,69E-05	0,00E+00	9,13E-06	1,52E-05	-1,10E-04

Output flows and waste categories

PARAMETER	UNIT	A1 -A3	A4	A5	C2	C3	D
Hazardous waste to landfill (HWD)	[kg]	4,28E-08	3,23E-08	0,00E+00	5,20E-09	1,60E-09	-6,88E-08
Non-hazardous waste disposed (NHWD)	[kg]	2,26E-03	4,72E-05	0,00E+00	7,57E-06	1,04E-05	6,41E-03
Disposed radioactive waste (RWD)	[kg]	9,53E-04	8,20E-07	0,00E+00	1,26E-07	7,55E-07	1,91E-08
Components for Reuse (CRU)	[kg]	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
Materials for recycling (MFR)	[kg]	1,82E-01	0,00E+00	0,00E+00	0,00E+00	1,00E+00	0,00E+00
Substances for energy recovery (MER)	[kg]	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
Exported Energy [Electricity]	[MJ]	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
Exported Energy [Thermal Energy]	[MJ]	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00

5 ADDITIONAL REQUIREMENTS

CEN STANDARD EN 15804 SERVED AS THE CORE PCR	
PCR:	PCR 2012:01 Construction products and construction services, Version 2.3
PCR review was conducted by:	The Technical Committee of the International EPD® System. Chair: Massimo Marino. Contact via info@environdec.com
Independent verification of the declaration and data, according to ISO 14025:	☐ EPD process certification ☑ EPD verification
Third party verifier:	GreenDelta GmbH
Accredited and approved by:	Andreas Ciroth
	**Owner of the declaration** KAUNAS METAL, UAB Chemijos g. 27B 51332 Kaunas Lithuania www.kaunasmetal.lt info@kaunasmetal.lt +370 37 465801
	**Commissioner of the Life Cycle Assessment** brands & values GmbH Vagtstr. 48/49 28203 Bremen Germany www.brandsandvalues.com info@brandsandvalues.com +49 421 69 68 67 15

5.1 REFERENCES

DIN EN ISO 14025	Environmental labels and declarations — Type III environmental declarations — Principles and procedures; 2009-11.
DIN EN ISO 14044	Environmental management - Life cycle assessment - Requirements and guidance (ISO 14044:2006); German and English version EN ISO 14044:2006.
DIN EN 15804	Sustainability of construction works - Environmental product declarations - Core rules for the product category of construction products; German version EN 15804:2012
ECHA	European Chemicals Agency (ECHA) Candidate List of Substances of Very High Concern (SVHC) for Authorisation https://echa.europa.eu/de/candidate-list-table (accessed 22-Jul-2019; 191 substances listed)
GaBi 8.7	Software und Datenbank zur Ganzheitlichen Bilanzierung, LBP [Lehrstuhl für Bauphysik] Universität Stuttgart und thinkstep AG, Leinfelden-Echterdingen,1992 – 2019
The International EPD System	PCR 2012:01 Construction products and Construction services (Version 2.3)
worldsteel	World Steel Association (worldsteel): Life cycle inventory methodology report for steel products; 2017
UN CPC	United Nations Department of Economic and Social Affairs Statistics Division: Central Product Classification (CPC), Version 2.1