Environmental Product Declaration

In accordance with ISO 14025 and EN 15804 for:

Hot rolled concrete steel rebar

from

Metalfer Steel Mill doo

Programme:	The International EPD® System, www.environdec.com
Programme operator:	EPD International AB
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Programme information

Programme:	The International EPD® System EPD International AB Box 210 60 SE-100 31 Stockholm Sweden www.environdec.com info@environdec.com

Product category rules (PCR): *PCR 2019:14 Construction products (EN 15804:A2)(1.2.5)*
PCR review was conducted by: *IVL Swedish Environmental Research Institute, Secretariat of 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: Prof. Ing Vladimír Kočí, PhD., Prague, Czech Republic, vladimir.koci@lca.cz 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.

Company information

Owner of the EPD:
Name: METALFER STEEL MILL DOO SREMSKA MITROVICA
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Description of the organisation:
Metalfer Steel Mill (MSM) has been developed as a green field investment. It was completed in 2008 and still is the only rebar producer in Serbia.

The steel products are also exported to the markets of Montenegro, Bosnia and Herzegovina, Croatia, Macedonia, Romania, Hungary, Germany and Austria. Metalfer Steel Mill holds the following Product-related and management system- related certifications: ISO 14001; ISO 9001; ISO45001 (OH&S).

MSM is a modern rolling mill based on Electric Arc Furnace meltshop with annual capacity of 500,000 MT and a rolling mill for rebars, wire rod and spooled coil.

Name and location of production site:
METALFER STEEL MILL DOO SREMSKA MITROVICA, Serbia

Product information

Product name: Hot rolled concrete steel rebar
Product identification: n/a
Product description: Used in construction to increase the load-bearing capacity of concrete structures.
UN CPC code: 412 Products of iron or steel
Geographical scope: Europe, Serbia

LCA information

Functional unit / declared unit: 1 ton of rebar without packaging
Reference service life: not applicable
Time representativeness: The reference year is calendar year 2022
Database(s) and LCA software used: GaBi Professional Datenbank, Version 2023.1
Ecoinvent Datenbank, Version 3.5, 2020

System diagram:

	Product stage			Construction process 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	X	ND	ND	ND	ND	ND	ND	ND	X	X	X	X	X
Geography	Serbia	EU	EU	EU	EU	-	-	-	-	-	-	-	EU	EU	EU	EU	EU
Specific data used	Data from production site in Sremska Mitrovica, Serbia					-	-	-	-	-	-	-	-	-	-	-	-
Variation – products	0%	0%	0%	0%	0%	-	-	-	-	-	-	-	0%	0%	0%	0%	0%
Variation – sites	0%	0%	0%	0%	0%	-	-	-	-	-	-	-	0%	0%	0%	0%	0%

Description of system boundaries: Cradle-to-gate (A1-A3) with options: A4 (Transport to Customers), A5 (Disposal of packaging materials), C2 (Transport to End of Life), C1 (De-construction), C3 (Waste processing), C4 (disposal) and D (Reuse-Recovery-Recycling-potential).

Excluded lifecycle stages: all phases of the use stage (as there are no emissions during the use of the product).

LCA Practitioner:

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TÜVRheinland®
Precisely Right.

Further information:

The Metalfer Steel Mill in Sremska Mitrovica has two facilities: A melt shop (smelter) and a rolling mill. In the melt shop, steel billets are made from scrap metal and are used as input material for the rolling mill, where rebar is produced, among other products. They are located one next to other. The melt shop uses iron and steel waste (pre- and post-consumer scrap) as input. Steel waste is mainly from production processes of other companies and bought from waste collectors. All steel waste from the rolling mill production is also used as input for the melt shop.

After the use of the rebars in a building, the material is often recovered and recycled[1].

Based on the above descriptions the following decisions were made for the LCA calculation:

- Steel billets are considered as pre- and post-consumer waste (according to DIN EN ISO 14021:2016), therefore only impacts for reprocessing were taken into account, not impacts of the material itself.
- Information on the amount of inputs, energies and utilities needed for reprocessing the scrap into steel billets was provided by Metalfer.
- Steel waste from the rolling mill production was not considered, as it is fully reused at the melt shop. No credits were given for the reuse.
- For the end of life scenario, a recycling quota of 100% was assumed for both packaging and steel rebars. For steel rebars, burdens for the recovery of the material out of the building were considered as well.
- Credits for recycling were given only for recycling of the packaging material (steel wire rod). For recycling of the steel rebar itself, no credits were given due to the fact that the input material was already considered burden-free.

All primary data of the production processes were considered. No cut-off rules were applied.

For the electricity used during reprocessing of steel scrap (A1) as well as for the production process of the wire coil (A3), the use of 100% of electricity from hydro power was considered, based on information from Metalfer's energy provider.

For transports to customers, an average distance of 250 km was assumed (currently, all customers are located in Serbia). For transports to the landfill, an average distance of 20 km was assumed.

[1] CRSI, 2021; SteelConstruction.info, 2021

Content declaration

Product

No substances contained in the products are listed in the "Candidate List of Substances of Very High Concern for Authorisation" (SVHC). The only input material to produce rebars are steel billets.

Packaging

Only steel wire is used for packing rebars.
No further packaging material is required.

Recycled material

Provenience of recycled materials (pre-consumer or post-consumer) in the product:
Steel billets made from metal scrap (see description on page 5)

Environmental performance

Potential environmental impact

Impact categories	Unit	A1	A4	A5	C1	C2	C3	C4	D
CC - total	[kg CO2 eq.]	1,66E+02	2,50E+01	6,10E-02	0,00E+00	2,00E+00	6,11E+01	0,00E+00	-2,24E+00
CC, fossil	[kg CO2 eq.]	1,48E+02	2,52E+01	6,10E-02	0,00E+00	2,01E+00	6,11E+01	0,00E+00	-2,24E+00
CC, biogenic	[kg CO2 eq.]	1,74E+01	-3,52E-01	1,40E-05	0,00E+00	-2,82E-02	1,40E-02	0,00E+00	-2,01E-03
CC, land use and land use change	[kg CO2 eq.]	1,49E-01	2,31E-01	1,01E-05	0,00E+00	1,85E-02	1,01E-02	0,00E+00	-5,75E-04
GWP-GHG	[kg CO2 eq.]	1,48E+02	2,54E+01	6,10E-02	0,00E+00	2,03E+00	6,11E+01	0,00E+00	-2,24E+00
ODP	[kg CFC-11 eq.]	9,65E-11	2,18E-12	1,32E-08	0,00E+00	1,74E-13	1,33E-05	0,00E+00	-2,48E-15
AP	[Mole of H+ eq.]	1,88E-01	6,65E-02	6,24E-04	0,00E+00	5,31E-03	6,25E-01	0,00E+00	-7,17E-03
EP, freshwater	[kg P eq.]	2,43E-04	9,09E-05	4,32E-06	0,00E+00	7,27E-06	4,33E-03	0,00E+00	-1,63E-06
EP, marine	[kg N eq.]	8,24E-02	2,96E-02	2,67E-04	0,00E+00	2,37E-03	2,67E-01	0,00E+00	-1,00E-03
EP, terrestrial	[Mole of N eq.]	8,99E-01	3,34E-01	2,93E-03	0,00E+00	2,67E-02	2,93E+00	0,00E+00	-1,04E-02
POCP, human health	[kg NMVOC eq.]	2,19E-01	5,97E-02	8,03E-04	0,00E+00	4,77E-03	8,05E-01	0,00E+00	-4,03E-03
ADP-mineral and metals	[kg Sb eq.]	1,57E-05	1,61E-06	2,17E-08	0,00E+00	1,29E-07	2,18E-05	0,00E+00	-1,58E-07
ADP-fossils	[MJ]	2,33E+03	3,39E+02	8,83E-01	0,00E+00	2,71E+01	8,85E+02	0,00E+00	-2,38E+01
WDP	[m³ world equiv.]	3,93E+01	2,87E-01	5,82E-03	0,00E+00	2,30E-02	5,83E+00	0,00E+00	-1,25E-01

Use of resources

Parameter	Unit	A1-A3	A4	A5	C1	C2	C3	C4	D
PERE	[MJ]	2,32E+03	2,40E+01	8,99E-03	0,00E+00	1,92E+00	9,01E+00	0,00E+00	-1,57E+00
PERM	[MJ]	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
PERT	[MJ]	2,32E+03	2,40E+01	8,99E-03	0,00E+00	1,92E+00	9,01E+00	0,00E+00	-1,57E+00
PENRE	[MJ]	2,33E+03	3,40E+02	8,83E-01	0,00E+00	2,72E+01	8,85E+02	0,00E+00	-2,38E+01
PENRM	[MJ]	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
PENRT	[MJ]	2,33E+03	3,40E+02	8,83E-01	0,00E+00	2,72E+01	8,85E+02	0,00E+00	-2,38E+01
SM	[kg]	1,02E+03	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
RSF	[MJ]	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
NRSF	[MJ]	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
FW	[m3]	9,58E-01	2,64E-02	1,35E-04	0,00E+00	2,11E-03	1,36E-01	0,00E+00	-3,90E-03

PERE = Renewable primary energy as energy carrier; PERM = Renewable primary energy as material utilization; PERT = Total renewable primary energy resources; PENRE = Non-renewable primary energy as energy carrier; PENRM = Non-renewable primary energy as material utilization; PENRT = Total non-renewable primary energy resources; SM = Use of secondary material; RSF = Renewable secondary fuels; NRSF = Non-renewable secondary fuels; FW = Use of net fresh water

Waste production and output flows

Waste production

Parameter	Unit	A1-A3	A4	A5	C1	C2	C3	C4	D
Hazardous waste disposed (HWD)	[kg]	3,47E-07	1,26E-09	0,00E+00	0,00E+00	1,01E-10	0,00E+00	0,00E+00	-1,38E-09
Non-hazardous waste disposed (NHWD)	[kg]	1,54E+01	4,90E-02	0,00E+00	0,00E+00	3,92E-03	0,00E+00	0,00E+00	-1,32E-01
Radioactive waste disposed (RWD)	[kg]	1,63E-02	4,39E-04	0,00E+00	0,00E+00	3,51E-05	0,00E+00	0,00E+00	-9,77E-07

Output flows

Parameter	Unit	A1-A3	A4	A5	C1	C2	C3	C4	D
Components for reuse	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
Material for recycling	kg	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	1,02E+03	0,00E+00	0,00E+00
Materials for energy recovery	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
Exported energy, electricity	MJ	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
Exported energy, thermal	MJ	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00

Interpretation of LCA Results

In the interpretation, following representative impact categories are selected for considered product: CC-total, ODP, AP, EP-freshwater, POCP, ADP-mineral and metals (ADPe) as well as ADP-fossil (ADPf). Module D is excluded in the interpretation of share because it's outside the system boundary.

For rebar, the main drivers in all selected impact categories are modules A3 (production process) and C3 (waste processing). A3 has the highest contribution in CC-total (49%) and ADPf (47%). C3 is the main driver for other selected categories, ranging from 56% (ADPe) to 100% (ODP). For the categories CC-total, ADPe and ADPf, A1 (input materials), is also of relevance (CC-total: 11%, ADPe: 28% and ADPf: 12.0%). All other modules in all impact categories have a contribution of less than 9% to the overall results.

The environmental impacts in module A1 result only from the reprocessing of the steel billets, as the material itself is considered as pre- and post-consumer waste and therefore unencumbered. In the reprocessing, the consumption of thermal energy is the main driver for environmental impacts in the categories CC-total (74%), AP (49%), POCP (65%) and ADPf (76%). For ADPe, the biggest impact results from the electricity generated from hydro power (92%). Oxygen is the main driver for ODP (92%) and EP (84%).

References

Concrete Reinforcing Steel Institute (CRSI), 2021, www.crsi.org/index.cfm/architecture/recycling, visited on November 3, 2021.

DIN EN ISO 14020:2000, Environmental labels and declarations - General principles

DIN EN ISO 14021: 2016, Environmental labels and declarations - Self-declared environmental claims (Type II environmental labelling)

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

Ecoinvent Database, Version 3.5, 2020

EN 15804:2012-04+A1 2014, Sustainability of construction works - Environmental product declarations - Core rules for the product category of construction products

GaBi Professional Database, Version 2023.1

General Programme Instructions of the International EPD® System. Version 3.0.

PCR 2019:14 Construction products (EN 15804:A2) (1.2.5).

SteelConstruction.info, 2021, The recycling and reuse survey, https://www.steelconstruction.info/The_recycling_and_reuse_survey, visited on November 3, 2021.

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