Environmental Product Declaration

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

Cold-rolled coils of carbon, structural, and low-alloy steels

from

PJSC "ZAPORIZHSTAL"

EPD of multiple products, based on average results

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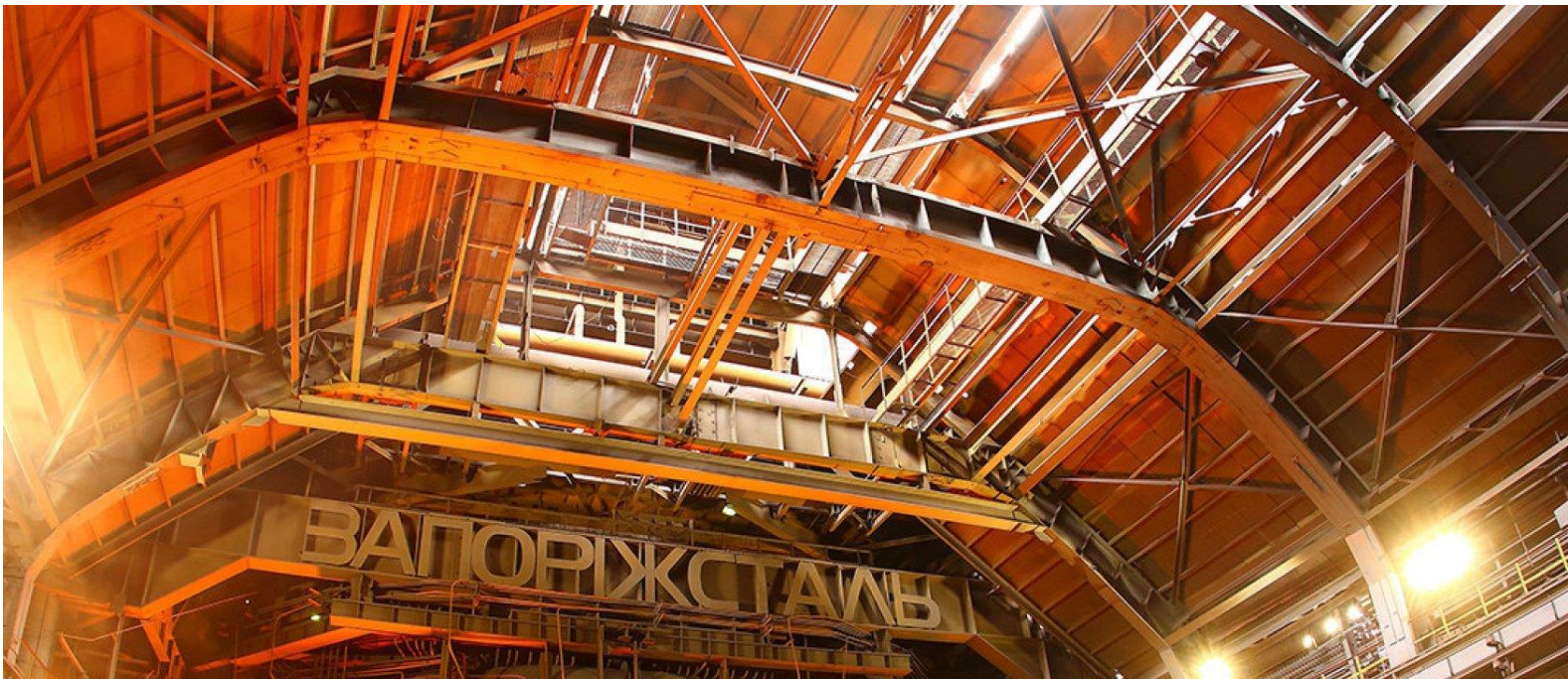
An EPD should provide current information and may be updated if conditions change. The stated validity is therefore subject to the continued registration and publication at www.environdec.com



General information

Programme information

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

Accountabilities for PCR, LCA and independent, third-party verification
Product Category Rules (PCR)
CEN standard EN 15804 serves as the Core Product Category Rules (PCR)
Product Category Rules (PCR): PCR 2019:14 CONSTRUCTION PRODUCTS, version 1.3.4.
PCR review was conducted by: The Technical Committee of the International EPD® System. Chair of the PCR review is Claudia A. Peña. The review panel may be contacted via info@environdec.com
Life Cycle Assessment (LCA)
LCA accountability: LCA Studio s.r.o. Mgr. Ivanna Harasymchuk, Ing. et Ing. Tatiana Trecáková, PhD., prof. Ing. Vladimír Kočí, Ph.D., MBA Šárecká 1962/5, 16000 Prague 6, Czech Republic, www.lcastudio.cz LCA Studio
Third-party verification
Independent third-party verification of the declaration and data, according to ISO 14025:2006, via: ☒ EPD verification by individual verifier Third-party verifier: prof. Ing. Silvia Vilčeková, Ph.D., Silcert, s.r.o. 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 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

Owner of the EPD: **PJSC "ZAPORIZHSTAL"**

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Description of the organisation:

PJSC "ZAPORIZHSTAL" is one of the largest steel producers in Ukraine, specializing in the production of high-quality hot-rolled and cold-rolled steel products, carbon and low-alloy steel sheets, steel strip, black tinplate, commercial pig iron, and slabs. The company is renowned for its commitment to high production standards, product quality, and environmental sustainability.

PJSC "ZAPORIZHSTAL STRUCTURE
To maintain a strong competitive advantage and expand its global presence, Zaporizhstal is part of Metinvest Group, a vertically integrated international steel and mining group. This allows the company to integrate production and distribution capabilities, ensuring high-quality products and professional services for clients worldwide.
The company exports its steel products to more than 50 countries, serving key industries such as construction, mechanical engineering, shipbuilding, automotive, energy, and more. Its primary customers include manufacturers of pipes, metal structures, and machinery, as well as large industrial enterprises.

PRODUCT RANGE & INDUSTRY APPLICATIONS
Zaporizhstal retains a significant market share in Europe and beyond, supplying a wide range of steel products, including:

- Hot-rolled and cold-rolled steel – used in construction, machine building, automotive, and heavy industry
- Steel strips and sheets – for mechanical engineering and industrial applications
- Black tinplate – widely applied in the packaging industry
- Commercial pig iron and slabs – essential for further steel processing and casting

The company continuously modernizes its production facilities to meet the growing demand for high-value-added products that comply with international quality standards.

PJSC "ZAPORIZHSTAL" prioritizes:

- The health and safety of its employees, partners, and visitors
- Environmental protection, focusing on pollution prevention and reducing its carbon footprint
- Sustainable production practices, implementing eco-friendly technologies to minimize industrial emissions and waste

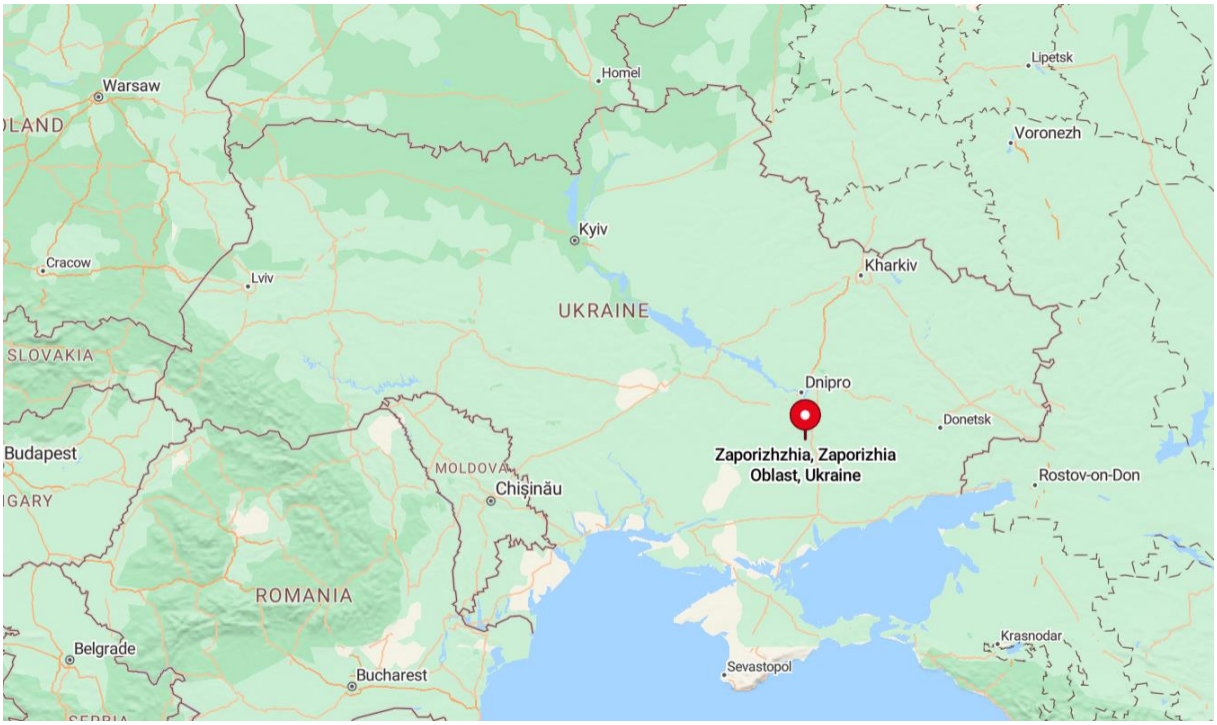
The company is actively investing in modern environmental initiatives, including upgrading its manufacturing processes to comply with European environmental regulations.

Product-related or management system-related certifications:

PJSC “ZAPORIZHSTAL” has an integrated Management System according to standards ISO 9001, ISO 14001 and ISO 45001, enabling the company to streamline operation, improve efficiency and meet stakeholders expectation. PJSC “ZAPORIZHSTAL” is focuses on consistently delivering high-quality products, emphasizes customer satisfaction, compliance with regularly requirements and continuous improvement. Company promotes sustainability by minimizing the environmental impact of operation, include waste management, pollution prevention and resource conservation from a circular perspective. PJSC “ZAPORIZHSTAL” ensure a safe and healthy workplace for employees, implement measures to identify, evaluate and mitigate occupational hazards. PJSC “ZAPORIZHSTAL” is committed to reduce the intensity and overall level of CO_2 emissions by using energy resources efficiency, implementing best available technologies.

Name and location of production site(s):

Zaporizhstal Steel Works is strategically located in Zaporizhzhia, Ukraine, an important industrial center known for its strong metallurgical and heavy industry base. The production site is situated at:
72 Pivdenne Highway, Zaporizhzhia, 69008, Ukraine



Product information

Product name: Cold-rolled coils of carbon, structural, and low-alloy steels.

Product identification:

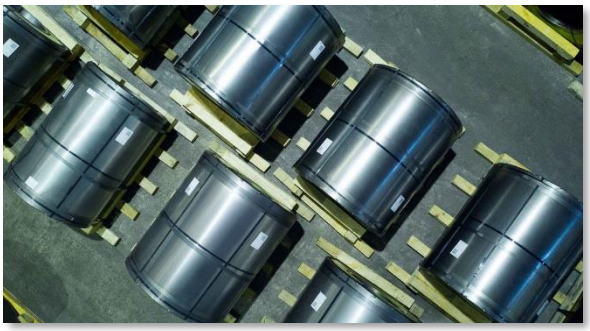
Cold-rolled coils are produced according to national standards (DSTU 2834-94 (GOST 16523-97), GOST 9045-93, DSTU 8971:2019) and international standards (EN 10130:2006, DIN 1623:2009-05), as well as manufacturers' specifications (TU SDU 01, protocol No. 14-226-209:2020) and customer requirements.

Steel grades and dimensions of cold-rolled coils

Steel type	Grade	Dimensions
General-purpose structural steels	DC01, 08kp/ps, 10kp/ps	0.5-2.5 × 1000-1500 mm
Mild carbon steels	15kp/ps, 20kp/ps, 10, 15, 20	0.8-2.0 × 1000-1360 mm
Deep-drawing and forming steels	1-2kp/ps	0.8-2.0 × 1000-1500 mm
High-strength structural steels	3kp/ps, 1-3sp	0.8-2.0 × 1000-1360 mm
Special-purpose steels	S215G	0.6 × 1250 mm, 1.5 × 1000-1192 mm
	DX51D	0.36-0.49 × 1000 mm, 0.5-2.0 × 1000-1250 mm
	S250GD	1.38-1.88 × 1000-1250 mm
	S320GD, S350GD	1.48-2.0 × 1000-1250 mm

Product description:

Next, the hot-rolled coil undergoes cold rolling. Cold rolling is necessary for the production of coils with a steel thickness of less than 1.5 mm. This is due to the fact that at a certain thickness, hot rolling ceases to be effective. The metal cools rapidly, deformation resistance increases, and frequent reheating leads to the formation of even more scale on the surface. This production method allows for more precise control of the final product's thickness, improves surface quality, and enhances the mechanical properties of the rolled steel. Before undergoing cold rolling, the hot-rolled metal is treated with a solution of sulfuric or hydrochloric acid. A portion of the scale dissolves, while another portion peels off. The metal is then rinsed with clean water, and any residual acid is neutralized in an alkaline bath. Next, it is lubricated with special oils or emulsions and then rolled. Once the required thickness is achieved, the material undergoes heat treatment. To relieve strain hardening, the steel undergoes annealing—a type of heat treatment in which the metal is heated to a specific temperature, held at that temperature for a certain period, and then gradually cooled. During annealing, the metal "relaxes," its hardness decreases, and its microstructure becomes homogeneous. After annealing, the rolled steel undergoes final processing or temper rolling—this is a form of cold rolling with slight compression and no lubrication. Temper rolling improves the surface quality of the steel. The final stage is processing. The sheets or coils are edge-trimmed, cut to length, and oil coating. As a structural and construction material, cold-rolled coils belong to widely used products. This necessitates their production in a wide range of sizes from various grades of carbon, low-alloy, and alloy steels.



UN CPC code: 41221 - Flat rolled non-alloy steel, without further machining, than cold-rolled, with a width of 600 mm or more.

Geographical scope: Global, Ukraine

LCA information

Functional unit / declared unit:

The declared unit refers to 1 ton of cold-rolled coils of carbon, structural, and low-alloy steels.

Time representativeness:

Site specific data from producer are based on 1 year average for process data (reference year 2023). Time scope less than 10-years was applied for background data. Time scope less than 2-years was applied for specific data.

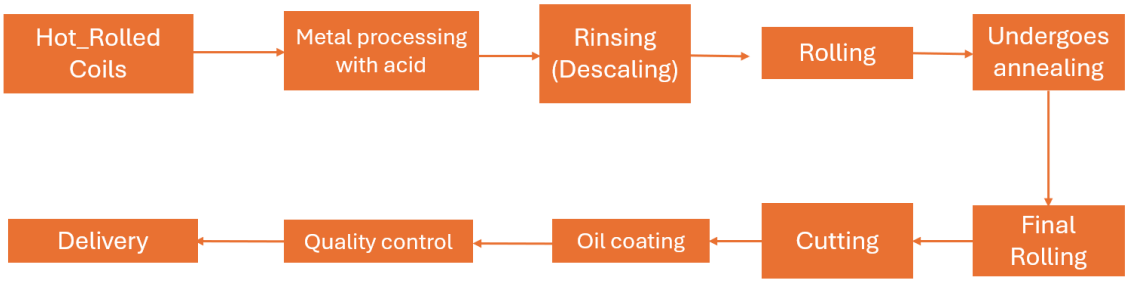
Database(s) and LCA software used:

LCA for Experts (Sphera), Sphera database and ecoinvent database.

Description of system boundaries:

This EPD is based on system boundary cradle to gate, modules C1–C4, module D and with optional modules A4-A5.
The system boundary covers the production of raw materials, all relevant transport down to factory gate, manufacturing by PJSC “ZAPORIZHSTAL”, transport from the by PJSC “ZAPORIZHSTAL” to the site and installation of construction product based at cold-rolled coils including product unpacking, deconstruction, transport of used construction product based at cold-rolled coils, sorting of used construction product based at cold-rolled coils, treatment of produced waste (recycling and landfill of fractions not entering the recycling treatment).

System diagram:



Cut off rules: The cut-off criterion was chosen based on the used PCR. According to the used PCR, more than 99 % of flows were included.

Electricity mix: Generation of electricity consumed within the production was based on the Ukrainian product electricity mix. GWP-GHG indicator of the used Ukrainian product electricity mix is 0,47 kg CO_2eq./kWh.

Allocations: Specific inputs and outputs were measured or calculated for specific product.
The allocation of CO_2 emissions was based on a fuel consumption approach. For the allocation of post-industry scrap, an economic approach was applied.

Characterisation factors: Characterisation factors are based on Environmental Footprint 3.1. (EF 3.1).

Modules declared, geographical scope, share of specific data (in GWP-GHG results) and data variation (in GWP-GHG results):

	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	GLO	GLO	UA	EU	EU	NR	NR	NR	NR	NR	NR	NR	EU	EU	EU	EU	EU
Specific data used	77,4%			-	-	-	-	-	-	-	-	-	-	-	-	-	-
Variation – products	<10%			-	-	-	-	-	-	-	-	-	-	-	-	-	-
Variation – sites	0%			-	-	-	-	-	-	-	-	-	-	-	-	-	-

Content information

Product components	Weight, kg	Post-consumer material, weight-%	Biogenic material, weight-% and kg C/kg
Cold-rolled coils of carbon, structural, and low-alloy steels	1000	6,58%	0%
Chemical composition			
Iron	992,1		
Manganese	4,6		
Silicon	0,3		
Carbon	1,2		
Other	1,8		
TOTAL	1000	6,58%	0%
Packaging materials	**Weight, kg**	**Weight-% (versus the product)**	**Weight biogenic carbon, kg C/kg**
Plastic packaging	5,97	0,56 %	0%
Metal packaging	13,78	1,34%	0%
Wood packaging	0,09	0,009%	0%
Paper packaging	1,34	0,13%	0%
TOTAL	21,18	2,12%	0%

Dangerous substances from the candidate list of SVHC for Authorisation	EC No.	CAS No.	Weight-% per functional or declared unit
No substances from the SVHC list to report.			

Results of the environmental performance indicators

Mandatory impact category indicators according to EN 15804

Results per 1 t of cold-rolled coils of carbon, structural, and low-alloy steels									
Indicator	**Unit**	**A1-A3**	**A4**	**A5**	**C1**	**C2**	**C3**	**C4**	**D**
GWP-fossil	kg CO_2 eq.	3,86E+03	4,42E+01	1,49E+01	6,29E+01	5,29E+01	2,07E+01	7,49E-01	-4,15E+02
GWP-biogenic	kg CO_2 eq.	1,40E+01	2,58E-01	1,02E-04	2,10E-02	6,38E-01	9,01E-03	0,00E+00	6,55E-01
GWP-luluc	kg CO_2 eq.	1,07E+00	3,43E-01	7,05E-04	6,23E-03	8,77E-01	2,46E-03	4,49E-03	-2,00E-01
GWP-total	kg CO_2 eq.	3,87E+03	4,48E+01	1,49E+01	6,29E+01	5,44E+01	2,08E+01	7,53E-01	-4,15E+02
ODP	kg CFC 11 eq.	7,27E-06	2,62E-10	3,16E-12	1,35E-05	5,26E-12	1,66E-10	2,04E-12	1,25E-09
AP	mol H^+ eq.	7,32E+00	1,36E-01	1,87E-03	3,93E-01	6,78E-02	4,83E-02	5,31E-03	-9,46E-01
EP-freshwater	kg P eq.	1,10E-01	9,86E-05	7,70E-07	1,95E-03	2,23E-04	8,96E-06	1,71E-06	-4,11E-05
EP-marine	kg N eq.	1,72E+00	4,72E-02	5,16E-04	1,64E-01	2,41E-02	1,12E-02	1,37E-03	-2,29E-01
EP-terrestrial	mol N eq.	1,73E+01	5,24E-01	8,65E-03	1,79E+00	2,89E-01	1,21E-01	1,51E-02	-2,49E+00
POCP	kg NMVOC eq.	5,66E+00	1,81E-02	1,49E-03	5,03E-01	6,72E-02	3,31E-02	4,19E-03	-7,61E-01
ADP-minerals&metals*	kg Sb eq.	3,47E-04	2,84E-06	3,28E-08	3,24E-05	4,44E-06	8,49E-07	4,86E-08	-4,79E-06
ADP-fossil*	MJ	3,70E+04	7,03E+02	6,51E+00	8,60E+02	6,81E+02	3,53E+02	9,87E+00	-3,23E+03
WDP*	m^3	1,99E+03	1,65E+00	1,42E+00	2,12E+00	7,77E-01	8,75E-01	8,54E-02	-3,63E+00
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.*

Additional mandatory and voluntary impact category indicators

Results per 1 t of cold-rolled coils of carbon, structural, and low-alloy steels									
Indicator	**Unit**	**A1-A3**	**A4**	**A5**	**C1**	**C2**	**C3**	**C4**	**D**
GWP-GHG[1]	kg CO_2 eq.	3,87E+03	4,46E+01	1,49E+01	6,29E+01	5,39E+01	2,08E+01	7,55E-01	-4,15E+02
Particulate matter	Disease incidences	1,75E-04	1,35E-06	2,29E-08	6,77E-06	6,10E-07	4,03E-07	6,67E-08	-1,38E-05
Ionising radiation, human health	kBq U235 eq.	6,00E+01	8,52E+00	3,01E-02	3,89E+00	1,23E-01	5,39E+00	1,16E-02	4,14E+00
Ecotoxicity fresh water	CTUe	5,79E+03	2,38E+02	4,38E+00	2,30E+02	5,01E+02	8,28E+01	6,55E+00	-4,78E+02
Human toxicity, cancer	CTUh	2,78E-06	6,22E-09	2,16E-10	8,05E-08	1,01E-08	2,90E-09	1,34E-10	-6,39E-07
Human toxicity, non-cancer	CTUh	2,22E-05	2,58E-07	1,72E-08	1,98E-07	4,48E-07	8,51E-08	5,19E-09	5,28E-07
Land Use	Pt	1,88E+03	1,38E+02	1,71E+00	1,08E+02	2,49E+02	2,70E+01	2,81E+00	2,77E+02

Resource use indicators

Results per 1 t of cold-rolled coils of carbon, structural, and low-alloy steels									
Indicator	**Unit**	**A1-A3**	**A4**	**A5**	**C1**	**C2**	**C3**	**C4**	**D**
PERE	MJ	1,57E+03	8,48E+01	1,73E+00	4,87E+00	5,76E+01	4,01E+01	1,73E+00	5,32E+02
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	1,57E+03	8,48E+01	1,73E+00	4,87E+00	5,76E+01	4,01E+01	1,73E+00	5,32E+02
PENRE	MJ	3,70E+04	7,03E+02	6,51E+00	8,60E+02	6,81E+02	3,53E+02	9,87E+00	-3,23E+03
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	3,70E+04	7,03E+02	6,51E+00	8,60E+02	6,81E+02	3,53E+02	9,87E+00	-3,23E+03
SM	kg	2,97E+02	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

[1] This indicator accounts for all greenhouse gases except biogenic carbon dioxide uptake and emissions and biogenic carbon stored in the product. As such, the indicator is identical to GWP-total except that the CF for biogenic CO_2 is set to zero.

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	m^3	8,87E+01	1,13E-01	3,37E-02	4,93E-02	6,47E-02	5,66E-02	2,61E-03	-2,88E-01
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 indicators

Results per 1 t of cold-rolled coils of carbon, structural, and low-alloy steels									
Indicator	**Unit**	**A1-A3**	**A4**	**A5**	**C1**	**C2**	**C3**	**C4**	**D**
Hazardous waste disposed	kg	4,79E-03	7,07E-08	3,73E-09	0,00E+00	2,20E-08	4,18E-08	2,48E-09	1,37E-06
Non-hazardous waste disposed	kg	3,87E+01	1,50E-01	1,35E+00	0,00E+00	1,06E-01	8,46E-02	5,00E+01	-6,17E+00
Radioactive waste disposed	kg	7,59E-01	5,71E-02	2,19E-04	0,00E+00	8,81E-04	3,61E-02	1,02E-04	4,00E-02

Output flow indicators

Results per 1 t of cold-rolled coils of carbon, structural, and low-alloy steels									
Indicator	**Unit**	**A1-A3**	**A4**	**A5**	**C1**	**C2**	**C3**	**C4**	**D**
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
Material for recycling	kg	0,00E+00	0,00E+00	1,52E+01	0,00E+00	0,00E+00	1,00E+03	0,00E+00	0,00E+00
Materials for energy recovery	kg	8,04E-02	0,00E+00	5,97E+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	-2,71E+01
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	-4,84E+01

References

General Programme Instructions of the International EPD® System. Version 5.0.

Product Category Rules (PCR) document for Construction Products (PCR 2019:14 Version 1.3.4 2024-04-30)

ISO 14020:2000 Environmental labels and declarations — General principles, 2000-09

ISO 14025: EN ISO 14025:2006-11: Environmental labels and declarations - Type III environmental declarations — Principles and procedures

ISO 14040:2006 Environmental management — Life cycle assessment — Principles and framework, 2006-07

ISO 14044:2006 Environmental management — Life cycle assessment — Requirements and guidelines, 2006-07

EN 15804+A2:2019/AC:2021 European Committee for Standardization: Sustainability of construction works – Environmental product declarations – Core rules for the product category of construction products, 2021

Ecoinvent: www.ecoinvent.org, ecoinvent database.

Sphera: software LCA for Experts. 2023, Sphera solutions, www.sphera.com

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