

Environmental Product Declaration



EPD of multiple products, based on the average results of the product group.
In accordance with ISO 14025:2006 and EN 15804:2012+A2:2019/AC:2021 for:

Rails for transport, tramways, rail track devices and cranes BOF-based

from

ArcelorMittal Europe – Long Products



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 1.3.3 Published on 2023.06.20. Based on CEN standard EN 15804. ISO standard ISO 21930 and CEN standard EN 15804 serves as the core PCR. UN CPC code 53212*

PCR review was conducted by: The Technical Committee of the International EPD®System. See www.environdec.com/TC for a list of members. Review chair: Claudia A. Peña, University of Concepción, Chile. The review panel may be contacted via the Secretariat www.environdec.com/contact.

Life Cycle Assessment (LCA)

LCA accountability: *Luxembourg Institute of Science and Technology (LIST)*

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: *Matt Fishwick, Fishwick Environmental Ltd*



Approved by: The International EPD® System

Procedure for follow-up of data during EPD validity involves third party verifier:

Yes No

Procedure for follow-up the validity of the EPD is at minimum required once a year with the aim of confirming whether the information in the EPD remains valid or if the EPD needs to be updated during its validity period. The follow-up can be organized entirely by the EPD owner or together with the original verifier via an agreement between the two parties. In both approaches, the EPD owner is responsible for the procedure being carried out. If a change that requires an update is identified, the EPD shall be re-verified by a verifier

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: ArcelorMittal Europe – Long Products.

66, rue de Luxembourg
L-4221 Esch-sur-Alzette
Luxembourg

Contact: rails.specialsections@arcelormittal.com

Description of the organisation:

ArcelorMittal Europe – Long Products operates different production sites in ten countries and is a leader in the manufacture of sections, sheet piles, **rails**, quality wire rod, rebars, bars and wires drawing.

Rails and Special sections is part of ArcelorMittal Europe – Long Products.

ArcelorMittal as a leading rail producer, offer a wide portfolio of solutions for railways, subways, tramways, light-rail tracks, crossings, crane rails and rail components. Today we have presence in infrastructure of over 42 countries and our high technological quality allow us to participate in the more demanding tenders all over the world. Our rails are supplied worldwide for high-speed and heavy haul tracks, urban transport, port, and terminal projects.

In line with the Paris Climate Goals and the European Green Deal, ArcelorMittal has also committed to reduce CO₂ emissions intensity (scopes 1 and 2) by 25% by 2030 and in its European operations by 35% by 2030.

Product-related or management system-related certifications:

Rail Mills are covered by ISO 9001, ISO 14001, ISO 45001, and ISO 50001.

Name and location of production site(s): Rolling mills: ArcelorMittal España (Gijón) in Spain, ArcelorMittal Poland (Dąbrowa Górnicza and Królewska), and Rodange in Luxembourg; Steel Production: Gijón (Spain) and Dabrowa (Poland).

The importance of trust

Our many decades of experience, combined with our high level of technology, allow us to achieve complete customer satisfaction and anticipate future needs in the rail market.



ArcelorMittal



Product information:

Product name: Rails.

Product identification:

Rails produced by ArcelorMittal forming a track for vehicles or cranes.

Product description:

This EPD is valid for Rail products of various grades and geometries, as well as different forms of delivery. Specific information on dimension tolerances, constructional data and mechanical and chemical properties can be found in the relevant standards listed below:

- Transport Rails: Euronorm (EN), ASCE standard, American Standard (AREMA), Australian standard (AS), British standard (BS), Russian standard (GOST), Indian standard (IRST), and to the particular specifications of its customers.
- Grooved Rails: Our process complies with most demanding European requirements according to Euronorm.
- Light Rails: Produced according to the European EN and DIN standards
- Crane Rail: European profiles Produced according to the European EN and DIN standards. American profiles Manufactured in accordance with AREMA and ASTM specification for standard carbon applications

Light rails typically weigh between 18 kg/m and 40 kg/m; tram rails and transport rails usually weigh between 40 kg/m and 80 kg/m; and crane rails can exceed 200 kg/m. Depending on the application one-piece rails can reach up to 120 meters' length.



This EPD is valid for of various grades and geometries.

Content information:

The base material of steel is an alloy of iron and carbon. Other elements are also added in the form of ferro-alloys or metals (most common elements are Manganese, Chromium and Vanadium). Other elements such as Nitrogen or Copper may be present in the steel, depending on the steel designation/grade.

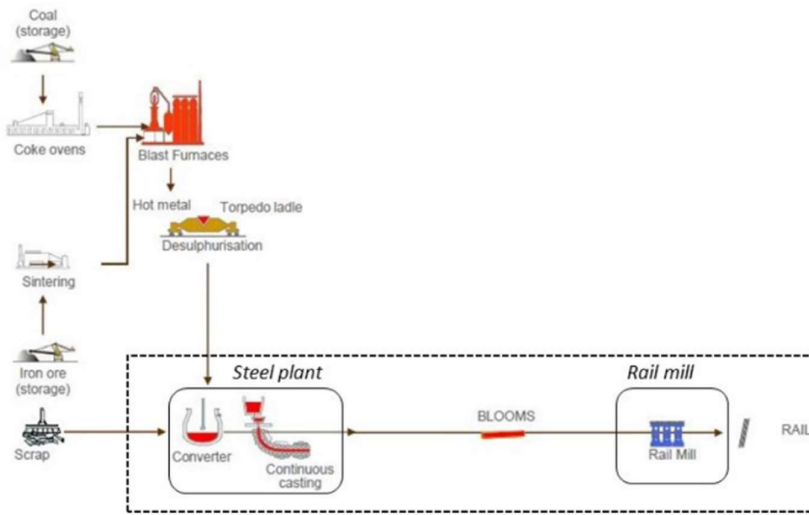
Manufacturing process:

The steel for the production of rails at ArcelorMittal originates from the local Blast Furnace / Basic Oxygen route (BF/BOF).

The production of steel rails goes through following main technological steps:

- Iron- and steelmaking over Blast Furnace / Basic Oxygen route;
- steel refining in Ladle Furnace;
- continuous casting;
- hot rolling;
- cooling and finishing.

Quality control: /ISO 9001/ Monitoring according to the product standards and certifications.



On track to you

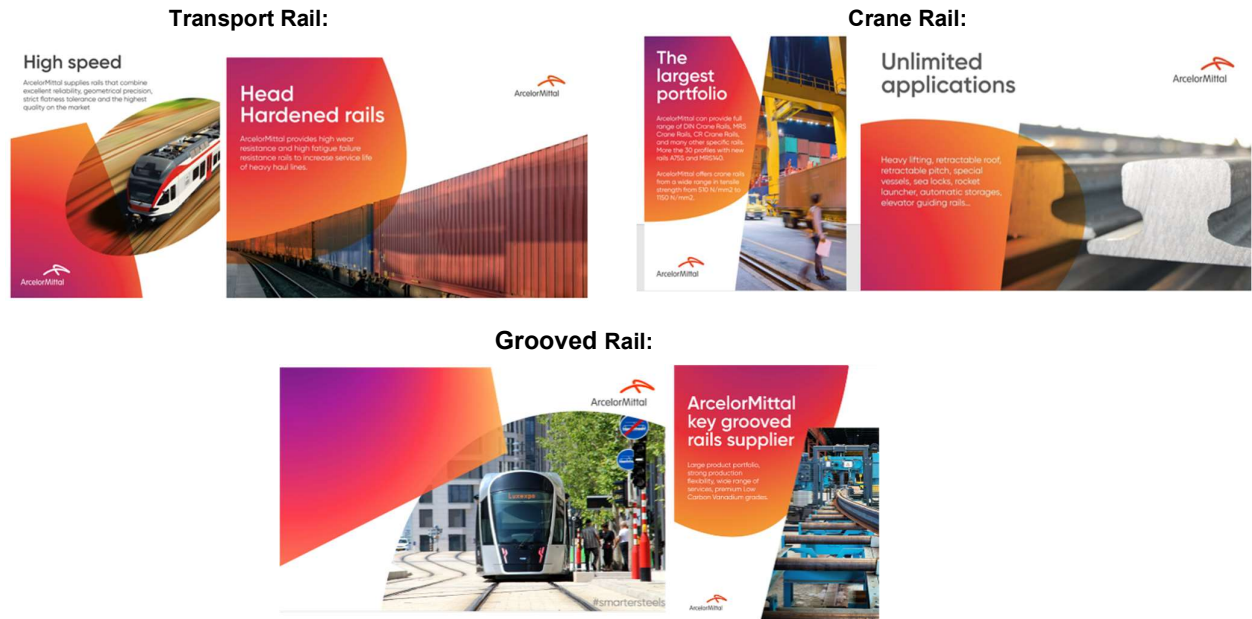
ArcelorMittal is a major rail producer, owns sites in Poland, Spain & Luxembourg and worldwide sales centers providing local customer support with over a million tones of rails produced each year, up to 120m length



Applications:

Rails are typically used in components for railway tracks, conventional or high-speed railway tracks, and tracks for cranes. Technical specifications will depend on the type of rail (e.g., rails for railways, subways, tram, light tracks, crossings, as well as crane rails), location of installation, international standards, and agreement between the manufacturer and the purchaser.

Transport rails are used in several applications, including public and urban transport lines, traditional mixed-traffic systems, heavy haul lines and light railway lines; tram rails are used in tramway lines; crane rails are used for port and terminal projects and industry; and light rails applications include underground mining operations as well as specific light transport solutions.



The size of the delivery is function of the intended application and project.

More information: <https://rails.arcelormittal.com/>

UN CPC code: 53212.

LCA information

Functional unit / declared unit: 1 metric tonne of Rails.

Reference service life: Not applicable.

Rail products are construction products with many different application purposes. The lifetime therefore will be limited by the application as well as the service life of the work.

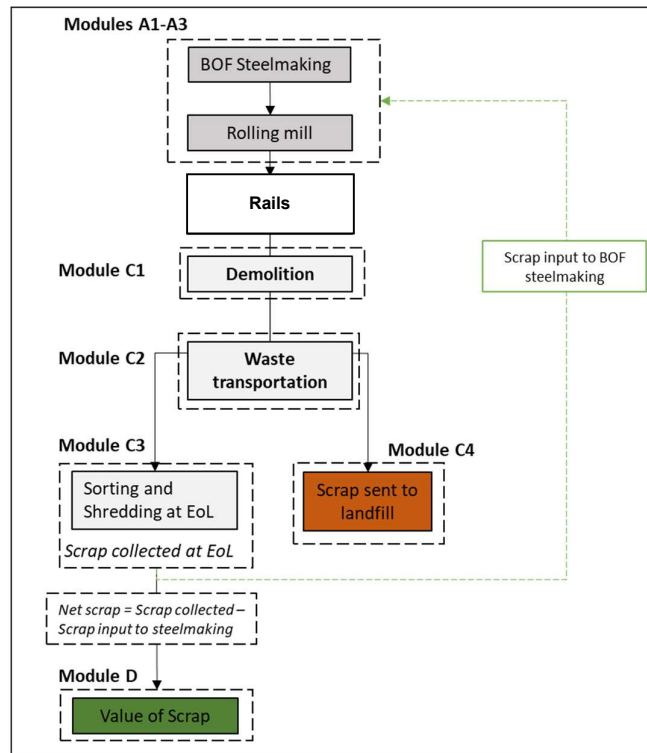
Time representativeness: The collection of the foreground data refers to the year 2021.

Database(s) and LCA software used: The background data has been taken from Sphera Managed LCA Content 2022.2 and the LCA model was created using LCA Sphera for Experts software, version 10.6.2.9.

Calculation methods: Potential environmental impacts are calculated following EN 15804:2012 +A2:2019. The characterization models and factors correspond to the latest update of the defaults list (EF 3.1), referred to as Version 2.0.

Description of system boundaries: Cradle-to-gate with options, modules C1–C4, and module D.

System diagram:



- **Module A1 to A3:**

The blast furnace (BF) / basic oxygen furnace (BOF) steelmaking includes processes from coke making to continuous casting and the related input and output flows. The production of structural steel through BOF route is the conventional route for steel production and consists basically in producing pig iron from iron ore and coke reacting in a blast furnace, then transformed into steel through BOF. Some alloying elements are added to obtain the desired steel grade, and after the continuous casting, steel goes through hot rolling mills in Dabrowa and Gijón. No emissions or waste from packaging is considered in modules A1-A3, as all raw materials, semi-products as well as the final products are transported bulk/loose.

The electricity mixes considered for the processing sites are country-specific (national generic background data) and are representative of the average consumption mix for the country. They were chosen according to the plant location.

The resulting weighted average emission factor for the GWP-GHG indicator for the residual mix is 0.592 kgCO₂eq./kWh.

The modelling is based on datasets from the 2022.2 Managed LCA Content (Sphera) database.

- **Module C1 to C4:**

Within this EPD, the modules C1-C4 are included. These modules consider the dismantling of the considered product (C1), the transportation of the dismantled components to their End-of-Life (EoL)

destination (C2), the waste processing for recovery or recycling (C3) as well as the disposal (C4), if given. At EoL, the steel material leaves the product system in C3 for recycling in Module D.

The considered End-of-Life scenario for the steel material is 99% recycling and 1% landfill. Steel rails are 100% recyclable. According to the /European Commission Technical Steel Research/ and the /German Ministry of Environmental Affairs/, 99% of the used steel is regained after dismantling, thanks to the magnetic properties of steel.

Category	Subcategory	Unit	Quantity
Collection process	Collected separately	kg	1000
	Collected with mixed construction waste	kg	0
Recovery	Reuse	kg	0
	Recycling	kg	990
	Landfill	kg	10
	Incineration	kg	0
	Incineration with energy recovery	kg	0
	Energy conversion efficiency rate	kg	0
	Disposal	Material for final disposal	kg
Transport	Deconstruction site to scrap processing plant	km	100
	Scrap processing plant to site for end of waste	km	200

- *Module D:*

Module D includes any declared benefits and loads from net flows leaving the product system that have not been allocated as co-products and that have passed the end-of-waste state in the form of reuse, recovery and/or recycling potentials.

Metals are assumed to reach the end of waste status directly at the construction site. The treatment as well as net benefits and loads of reuse or recycling potentials (for the net scrap amount only) are grouped to module D.

Potential environmental benefits are given for the net steel scrap that is produced at the end of a final product's life. This net scrap is determined as follows:

Net scrap = Amount of steel recycled at end-of-life – Scrap input from previous product life cycles.

For the product under study, in case of 99% recycling and 1% landfill:

In the production of Rails, 122 kg of external scrap material was utilized. Upon reaching the end of its life cycle, 990 kg of scrap is reclaimed for recycling. Consequently, the system demonstrates a net flow of 868 kg of scrap (calculated as 990 kg – 122 kg). This net value is reflected in module D and can be considered as either an environmental credit or burden, depending on the specific impact category.

This End-of-Life scenario represents an average use of the entire rails production of ArcelorMittal.

Cut-off criteria:

The environmental impact of the product studied has been assessed by considering all significant processes, materials, and emissions. Excluded flows are assumed to have a negligible impact, contributing less than 5% to the cumulative impact assessment categories. The production of capital equipment, facilities, and infrastructure required for manufacture has not been considered.

Data quality and sources:

Data quality is compliant with ISO 14025:2006. All primary data were collected for 2021. All background data come from the Sphera Managed LCA Content 2022.2 databases and are representative for the years 2018-2023.

Allocation:

Allocation of different sizes / profiles was carried out on a mass basis so there is no difference in per tonne impact.

Primary data are allocated using the partitioning approach developed by Worldsteel/EUROFER. Steel production generates a number of co-products from the coke oven, the BF, and the BOF. They are reused internally or sold to and used by other industries. The co-products include slags, process gases and organic products from coke making. The processes that produce these co-products cannot be further sub-divided into sub-processes related to each product, inducing some allocations required.

Coke Oven

For the plants of Aviles, products and co-products from coke making, namely coke, coke oven gas, tar, benzene and sulphur are allocated on the basis of total energy content expressed in terms of net calorific value.

BF and BOF

The standard allocation applied is the economic allocation, allocating 99% of the input and output flows to the hot metal produced, 1% to the blast furnace slag, which is a co-product.

CO gas, BF and BOF Gases balances

As several plants is considered, the amount of CO, BF and BOF gases are respectively allocated on a mass basis, considering the total input of hot metal to the rolling mills associated to each BOF site, compared to the total outcome of continuous casting for each site.

Electricity and Process steam produced by power plant

Once the processes have been allocated following the rules described, system expansion is carried out for the steam and electricity, because they are partly used internally and partly get to be exported out of the system boundary. Where these internal flows are consumed, no additional burden needs to be considered for them as these have been produced on site and thus the impact of their production has already been included. Only the net amount of the co-product exported outside of the system boundaries needs to have a credit assigned to it. The credit is included then under boiler / power plant process step as a whole.

Mill scales and other potential co-products

Considering the relatively small volumes and low value of mill scales, dusts and sludge generated during steelmaking, these by-products have been treated as waste, with no environmental burdens allocated to them.

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	NR	NR	NR	NR	NR	NR	NR	NR	NR	X	X	X	X	X
Geography	EU	EU	EU	-	-	-	-	-	-	-	-	-	GLO	GLO	GLO	GLO	GLO
Specific data used	>95%			-	-	-	-	-	-	-	-	-	-	-	-	-	-
Variation – products	0%			-	-	-	-	-	-	-	-	-	-	-	-	-	-
Variation – sites	<10%			-	-	-	-	-	-	-	-	-	-	-	-	-	-

NR- Not reported. MNR- Module not declared.

Content information

Rails

Product content	Weight, kg	Post-consumer material, weight ¹	Biogenic material, weight
Steel	1000	4.1 %	0% and 0 kg C / kg
Chemical composition			
Iron	> 971.8		
Carbon	< 2.00	-	-
Manganese	< 17.00	-	-
Silicon	< 5.50	-	-
Copper	< 5.50	-	-
Other	< 2.2	-	-

¹the average recycled content, which includes pre- and post-consumer recycled scrap and additional sources of Fe (such as Ferro alloys), is approximately 12.2 %.

The products do not contain any of the substances of very high concern (SVHC) regulated by the Regulation (EC) No 1907/2006 (REACH) or the Regulation (EC) No 1272/2008 of European parliament. No packaging is considered in the scenario.

Results of the environmental performance indicators

The environmental performance of the functional unit of one metric ton of Rails are reported below using the parameters and units as specified in PCR 2019:14 v1.3.3.

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.

Mandatory impact category indicators according to EN 15804+A2:2019

Results per one metric tonne of Rails							
Indicator	Unit	A1-A3	C1	C2	C3	C4	D
GWP-total	kg CO ₂ eq.	2.56E+03	4.35E+01	2.13E+01	1.53E+00	1.45E-01	-1.71E+03
GWP-fossil	kg CO ₂ eq.	2.55E+03	4.32E+01	2.11E+01	1.53E+00	1.49E-01	-1.71E+03
GWP-biogenic	kg CO ₂ eq.	1.77E+00	1.83E-03	1.53E-02	4.83E-03	-4.42E-03	2.74E+00
GWP-luluc	kg CO ₂ eq.	5.03E-01	2.82E-01	1.45E-01	9.15E-04	2.75E-04	-4.59E-01
ODP	kg CFC 11 eq.	4.82E-10	1.33E-11	2.12E-12	1.99E-11	3.51E-13	4.74E-09
AP	mol H ⁺ eq.	5.22E+00	2.46E-01	1.27E-01	3.77E-03	1.06E-03	-4.69E+00
EP-freshwater	kg P eq.	1.08E-03	1.52E-04	7.70E-05	4.47E-06	2.53E-07	-3.05E-04
EP-marine	kg N eq.	1.03E+00	1.19E-01	6.20E-02	1.03E-03	2.71E-04	-9.79E-01
EP-terrestrial	mol N eq.	1.13E+01	1.32E+00	6.87E-01	1.11E-02	2.97E-03	-1.06E+01
POCP	kg NMVOC eq.	4.09E+00	2.31E-01	1.20E-01	2.83E-03	8.22E-04	-3.27E+00
ADP-minerals&metals*	kg Sb eq.	2.98E-04	4.45E-06	2.17E-06	3.85E-07	1.53E-08	3.77E-05
ADP-fossil*	MJ	2.15E+04	5.82E+02	2.83E+02	2.68E+01	1.95E+00	-1.27E+04
WDP*	m ³	4.09E+01	6.26E-01	2.41E-01	3.12E-01	1.64E-02	3.58E+01
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. We discourage the use of the results of modules A1-A3 without considering the results of module C.

Resource use indicators according to EN 15804+A2:2019

Results per one metric tonne of Rails							
Indicator	Unit	A1-A3	C1	C2	C3	C4	D
PERE	MJ	6.61E+02	4.44E+01	1.96E+01	1.39E+01	2.93E-01	1.85E+03
PERM	MJ	-5.48E-07	2.10E-10	8.61E-11	-6.77E-10	6.51E-12	3.03E-08
PERT	MJ	6.61E+02	4.44E+01	1.96E+01	1.39E+01	2.93E-01	1.85E+03
PENRE	MJ	2.16E+04	5.85E+02	2.84E+02	2.68E+01	1.96E+00	-1.29E+04
PENRM	MJ	7.19E-02	2.47E-02	1.23E-02	1.98E-03	6.16E-05	5.14E-01
PENRT	MJ	2.16E+04	5.85E+02	2.84E+02	2.68E+01	1.96E+00	-1.29E+04
SM	kg	1.22E+02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
RSF	MJ	2.47E-05	0.00E+00	1.89E-07	4.12E-08	3.20E-09	1.72E-05
NRSF	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
FW	m ³	1.69E+00	5.04E-02	2.27E-02	1.32E-02	4.97E-04	-1.11E+00
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 according to EN 15804+A2:2019

Results per one metric tonne of Rails							
Indicator	Unit	A1-A3	C1	C2	C3	C4	D
Hazardous waste disposed	kg	1.73E-06	4.07E-09	1.50E-09	1.20E-07	1.00E-10	6.36E-07
Non-hazardous waste disposed	kg	4.02E+00	1.03E-01	4.63E-02	1.88E-02	1.00E+01	-2.43E+01
Radioactive waste disposed	kg	1.16E-01	2.86E-03	5.27E-04	3.95E-03	2.17E-05	2.13E-01

Output flow indicators according to EN 15804+A2:2019

Results per one metric tonne of Rails							
Indicator	Unit	A1-A3	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
Material for recycling	kg	0.00E+00	0.00E+00	0.00E+00	9.90E+02	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
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	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00

Other environmental performance indicators according to EN 15804+A2:2019

Results per one metric tonne of Rails							
Indicator	Unit	A1-A3	C1	C2	C3	C4	D
GWP-GHG	kg CO ₂ eq.	2.55E+03	4.35E+01	2.13E+01	1.53E+00	1.49E-01	-1.71E+03
Biogenic carbon content in product	kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Biogenic carbon content in packaging	kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00

References

- General Programme Instructions of the International EPD® System. Version 4.0.
- PCR 2019:14. Construction Products, Version 1.3.3
- Sustainability of construction works - Environmental product declarations - Methodology for selection and use of generic data; CEN/TR 15941:2010
- CPR: Regulation (EU) No 305/2011 of the European parliament and of the council of 9 March 2011 laying down harmonised conditions for the marketing of construction products and repealing Council Directive 89/106/EEC.
- EN 15804: EN 15804:2012+A2:2019: Sustainability of construction works -Environmental Product Declarations - Core rules for the product category of construction products.
- EN ISO 14025: EN ISO 14025:2011-10 Environmental labels and declarations - Type III environmental declarations - Principles and procedures
- EN ISO 14040: EN ISO 14040:2009-11 Environmental management - Life cycle assessment - Principles and framework
- EN ISO 14044: EN ISO 14044:2006-10 Environmental management - Life cycle assessment - Requirements and guidelines.
- LCA FE: LCA FE Software System and Database for Life Cycle Engineering, Sphera Solution GmbH, Leinfelden-Echterdingen, 2022 (<https://www.gabi-software.com/support/gabi>)
- ASTM A572 / A572M-21e1:2021, Standard: Specification for High-Strength Low-Alloy Columbium- Vanadium Structural Steel, ASTM International, West Conshohocken, PA, 2021.
- ASTM A6 / A6M-22:2022, Standard: Specification for General Requirements for Rolled Structural Steel Bars, Plates, Shapes, and Sheet Piling, ASTM International, West Conshohocken, PA, 2022.
- CSA G40.20:2013, General requirements for rolled or welded structural quality steel. Canadian Standard Association.
- CSA G40.21:2013, General requirements for structural quality steel. Canadian Standard Association.
- ISO 9001: 2015, Quality management systems — Requirements
- ISO 45001:2018, Occupational health and safety management systems — Requirements with guidance for use
- ISO 14001:2015, Environmental management systems — Requirements with guidance for use
- ISO 50001: 2018, Energy Management
- European Commission Technical Steel Research/Sansom, M.and Meijer, J.: Life-cycle assessment 5 Environmental Product Declaration ArcelorMittal – Rails for transport, tramways, rail track devices and cranes (LCA) for steel construction, European Commission technical steel research, 2001-12
- /German Ministry of Environmental Affairs/ “Instrumente zur Wiederverwendung von Bauteilen und hochwertigen Verwertung von Baustoffen“, (Umweltforschungsplan des Bundesministeriums für Umwelt, Naturschutz, Bau und Reaktorsicherheit; Forschungskennzahl 3712 32 319; UBA-FB 002208)

