

# ENVIRONMENTAL PRODUCT DECLARATION

as per ISO 14025 and EN 15804+A2

Owner of the Declaration	Saarstahl Rail
Publisher	Institut Bauen und Umwelt e.V. (IBU)
Programme holder	Institut Bauen und Umwelt e.V. (IBU)
Declaration number	EPD-SAA-20230151-CBD1-EN
Issue date	14.07.2023
Valid to	13.07.2028

## Pure Steel+ Rail Saarstahl Rail

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## General Information

### Saarstahl Rail

#### Programme holder

IBU – Institut Bauen und Umwelt e.V.  
Hegelplatz 1  
10117 Berlin  
Germany

#### Declaration number

EPD-SAA-20230151-CBD1-EN

#### This declaration is based on the product category rules:

Rails forming a track for vehicles, 01.08.2021  
(PCR checked and approved by the SVR)

#### Issue date

14.07.2023

#### Valid to

13.07.2028



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(Chairman of Institut Bauen und Umwelt e.V.)



Florian Pronold  
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### Pure Steel+ Rail

#### Owner of the declaration

Saarstahl Rail  
Rue du Maréchal Foch 164  
57705 Hayange Cedex  
France

#### Declared product / declared unit

Rail product / 1 metric tonne

#### Scope:

The EPD declaration applies to 1 metric tonne of rail product manufactured at Saarstahl Rail.

The "Pure Steel+" rails from Saarstahl Rail are high-quality rail products from the Saarstahl Rail hot rolling mill in Hayange (France) with EAF based pre-material from Saarstahl Ascoval in St. Valenciennes (France). Both subsidiaries Saarstahl Rail and Saarstahl Ascoval do belong to the Saarstahl group, specialist in steel long products, based in Völklingen (Germany).

The LCA does represent 100% EAF pre-material based rails within the reference year of 2021.

The owner of the declaration shall be liable for the underlying information and evidence; the IBU shall not be liable with respect to manufacturer information, life cycle assessment data and evidences.

The EPD was created according to the specifications of EN 15804+A2. In the following, the standard will be simplified as *EN 15804*.

#### Verification

The standard EN 15804 serves as the core PCR	
Independent verification of the declaration and data according to ISO 14025:2011	
<input type="checkbox"/>	internally
<input checked="" type="checkbox"/>	externally



Prof. Dr. Birgit Grahl,  
(Independent verifier)

## Product

### Product description/Product definition

The products of Saarstahl Rail refer to rails (Vignole rail, tong rail, grooved rail, check rail and piste), that are manufactured and delivered as approximately 100 different profiles and 25 grades from 6 m to 108 m. They are compliant to applicable European and international standards, guidelines and specifications depending on the use and application of the product. The respective national provisions at the place of use apply. The products com from blooms which are reheated and rolled at high temperatures going through a series of stands of rotating cylinders. Steel alloy composition and process parameters are set to guarantee the required grade and profile. Some rails for special applications (heat treated rails) are reheated in an induction furnace line and cooled with pressurized air to increase the hardness of the steel. For the placing on the market in the European Union/European Free Trade Association (EU/EFTA) (with the exception of Switzerland) the following legal provisions apply:

Directive (EU) 2016/797 of the European Parliament and of the Council of 11 May 2016 on the interoperability of the rail system within the European Union, Commission regulation 1299/2014 of 18th November 2014 concerning a technical specification for interoperability relating to the infrastructure subsystem of the rail system in the European Union, and to the Commission Implementing Regulations (EU) 2019/776 and (EU) 2020/387.

and the harmonised standards based on these provisions:

EN 13674-1:2011+A1:2017, Railway applications – Track – Rail – Part 1: Vignole railway rails 46 kg/m and above  
 EN 13674-2:2019, Railway applications – Track – Rail – Part 2: Switch and crossing rails used in conjunction with Vignole railway rails 46 kg/m and above  
 EN 13674-3:2006+A1:2010, Railway applications – Track – Rail – Part 3: Check rails  
 EN 13674-4:2020, Railway applications - Track - Rail - Part 4: Vignole railway rails from 27 kg/m to, but excluding 46 kg/m  
 EN 14811:2019, Railway applications – Track – Special purpose rail – Grooved and associated construction

The CE-marking takes into account the proof of conformity with the respective harmonized standards based on the legal provisions above.

For the application and use the respective national provisions apply.

### Application

Saarstahl rail is specialized in the production of Vignole rail, tong rail, grooved rail, check rail and piste for rubber tire metro at its location of Hayange. Typical applications for the rails manufactured in Hayange are the high-speed lines, national train networks for freight and passenger traffic, urban networks as metro or tramway, heavy haul lines as mining or industrial networks and rail for the manufacturing of switches and

crossings. The steel grades are designed and adapted to the applications.

### Technical Data

The EPD refers to all EAF based products from Saarstahl Rail in a variety of different steel grades, dimensions, shapes and as-delivered conditions.

### Constructional data

Name	Value	Unit
Density	7850	kg/m <sup>3</sup>
Modulus of elasticity	2.07/10 <sup>5</sup>	N/mm <sup>2</sup>
Tensile strength	>680	N/mm <sup>2</sup>
Grade of material according to the delivery standards	R200 R220 R260 R260Mn R260Cr R320Cr R350HT R350LHT R370CrHT R400HT	-

Grade of material according to the delivery standards: EN13674-1; EN13674-2; EN13674-3; EN13674-4; EN14811.

Performance data of the product in accordance with the declaration of performance with respect to its essential characteristics.

### Base materials/Ancillary materials

The "Pure Steel+" products of Saarstahl Rail are manufactured with 100% continuously cast bloom (with about 97% scrap and alloying elements) pre-material produced from EAF at Saarstahl Ascaval. The overall composition of the steel grades does depend on the customer specification and application use of the final product.

The product contains substances in the European Chemicals Agency (ECHA) candidate list/ (15 January 2019) above 0.1 mass %: no.

The product contains further carcinogenic, mutagenic, reprotoxic (CMR) substances of category 1A or 1B that are not in the candidate list, above 0.1 mass % in at least one sub-product: no.

Biocides have been added to the construction product, or the product has been treated with biocides (a treated product pursuant to the Biocidal Product Regulation (EU) No. 528/2012): no.

### Reference service life

The specification of a reference service life of any rail product is based on the multiple purposes and application options (e.g. regarding stress levels (high-speed traffic, mixed traffic, heavy loads, passenger traffic, urban traffic, switch technologies)). The various rail options available, including the optimal choice of rail product or specification, do increase the lifetime drastically. The service life of any rail product can be enhanced by regular maintenance of the user.

## LCA: Calculation rules

### Declared Unit

This environmental product declaration refers to a declared unit of 1 ton of rail.

### Declared unit

Name	Value	Unit
Declared unit	1	t
Density	7850	kg/m <sup>3</sup>
Conversion factor to 1 kg	0,001	-

This EPD covers Saarstahl rails of different profiles and grades considered representative for all Saarstahl rail products. All rails are in the same order of magnitude regarding the grade and

there are no differences in environmental impact regarding the different shapes.

#### System boundary

The life cycle assessment of Saarstahl Rail refers to a cradle-to-gate analysis with options. The following life cycle phases are taken into account:

#### Module A1-A3 (Production Stage)

Module A1-A3 covers the upstream burdens of purchased materials (ferro-alloys, lime, dolomite, etc.) and energies (electricity, natural gas, etc.), their transports and the manufacturing at the production sites Ascoval and Hayange of Saarstahl Rail.

No packaging is needed for the delivery of the product.

#### Module C1-C4 (End-of-Life Stage)

At End-of-Life the steel material leaves the product system in C3 for recycling in the next product system. For the dismantling of the considered product (C1) and the transportation of the dismantled components to their final EoL destination (C2) the data are not robust enough to be considered. As the steel scrap produced End-of-Life reaches the end-of-waste state after

dismantling there is no processing for recycling in C3. There is no disposal (C4) as the considered End-of-Life scenario is 100% recycling.

#### Module D (Benefits and loads beyond the system boundary)

Module D describes the net benefits and loads for substituting primary steel through steel recycling.

#### Geographic Representativeness

Land or region, in which the declared product system is manufactured, used or handled at the end of the product's lifespan: Global

#### Comparability

Basically, a comparison or an evaluation of EPD data is only possible if all the data sets to be compared were created according to *EN 15804* and the building context, respectively the product-specific characteristics of performance, are taken into account. The background database from /GaBi database/ was used to calculate the LCA.

## LCA: Scenarios and additional technical information

#### Characteristic product properties of biogenic carbon

There is no biogenic carbon within the steel product. And there is no packaging needed for the product under study.

#### Information on describing the biogenic carbon content at factory gate

Name	Value	Unit
Biogenic carbon content in product	-	kg C
Biogenic carbon content in accompanying packaging	-	kg C

According to EN 15804+A2 it is requested to declare 100% End-of-Life scenarios (here considered: 100% recycling).

#### End of life (C1 - C4)

Name	Value	Unit
Collected separately waste type	1000	kg
Recycling	1000	kg

#### Reuse, recovery and/or recycling potentials (D), relevant scenario information

Name	Value	Unit
Net flow of steel scrap	-50,41	kg

## LCA: Results

The following table describes the LCA results for a declared unit of 1 ton of average Saarstahl rails.

**DESCRIPTION OF THE SYSTEM BOUNDARY (X = INCLUDED IN LCA; ND = MODULE OR INDICATOR NOT DECLARED; MNR = MODULE NOT RELEVANT)**

Product stage			Construction process stage		Use stage							End-of-life stage				Benefits and loads beyond the system boundaries
Raw material supply	Transport	Manufacturing	Transport from the gate to the site	Assembly	Use	Maintenance	Repair	Replacement	Refurbishment	Operational energy use	Operational water use	De-construction demolition	Transport	Waste processing	Disposal	Reuse-Recovery-Recycling-potential
A1	A2	A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
X	X	X	MND	MND	MND	MND	MNR	MNR	MNR	MND	MND	X	X	X	X	X

### RESULTS OF THE LCA - ENVIRONMENTAL IMPACT according to EN 15804+A2: 1 ton rail

Parameter	Unit	A1-A3	C1	C2	C3	C4	D
Global Warming Potential total (GWP-total)	kg CO <sub>2</sub> eq	7.89E+02	ND	ND	0	0	8.73E+01
Global Warming Potential fossil fuels (GWP-fossil)	kg CO <sub>2</sub> eq	7.87E+02	ND	ND	0	0	8.73E+01
Global Warming Potential biogenic (GWP-biogenic)	kg CO <sub>2</sub> eq	1.25E+00	ND	ND	0	0	-4.46E-02
Global Warming Potential luluc (GWP-luluc)	kg CO <sub>2</sub> eq	1.8E-01	ND	ND	0	0	1.8E-03
Depletion potential of the stratospheric ozone layer (ODP)	kg CFC11 eq	3.39E-09	ND	ND	0	0	1.91E-13
Acidification potential of land and water (AP)	mol H <sup>+</sup> eq	3.14E+00	ND	ND	0	0	1.88E-01
Eutrophication potential aquatic freshwater (EP-freshwater)	kg P eq	6.7E-04	ND	ND	0	0	1.58E-05
Eutrophication potential aquatic marine (EP-marine)	kg N eq	5.3E-01	ND	ND	0	0	3.3E-02
Eutrophication potential terrestrial (EP-terrestrial)	mol N eq	5.64E+00	ND	ND	0	0	2.9E-01
Formation potential of tropospheric ozone photochemical oxidants (POCP)	kg NMVOC eq	1.52E+00	ND	ND	0	0	1.34E-01
Abiotic depletion potential for non fossil resources (ADPE)	kg Sb eq	8.63E-03	ND	ND	0	0	2.18E-04
Abiotic depletion potential for fossil resources (ADPF)	MJ	1.57E+04	ND	ND	0	0	8.02E+02
Water use (WDP)	m <sup>3</sup> world eq deprived	1.89E+02	ND	ND	0	0	1.62E+01

### RESULTS OF THE LCA - INDICATORS TO DESCRIBE RESOURCE USE according to EN 15804+A2: 1 ton rail

Parameter	Unit	A1-A3	C1	C2	C3	C4	D
Renewable primary energy as energy carrier (PERE)	MJ	2.58E+03	ND	ND	0	0	-5.05E+01
Renewable primary energy resources as material utilization (PERM)	MJ	0	ND	ND	0	0	0
Total use of renewable primary energy resources (PERT)	MJ	2.58E+03	ND	ND	0	0	-5.05E+01
Non renewable primary energy as energy carrier (PENRE)	MJ	1.57E+04	ND	ND	0	0	8.02E+02
Non renewable primary energy as material utilization (PENRM)	MJ	0	ND	ND	0	0	0
Total use of non renewable primary energy resources (PENRT)	MJ	1.57E+04	ND	ND	0	0	8.02E+02
Use of secondary material (SM)	kg	1.05E+03	ND	ND	0	0	-5.04E+01
Use of renewable secondary fuels (RSF)	MJ	0	ND	ND	0	0	0
Use of non renewable secondary fuels (NRSF)	MJ	0	ND	ND	0	0	0
Use of net fresh water (FW)	m <sup>3</sup>	7.91E+00	ND	ND	0	0	3.66E-01

### RESULTS OF THE LCA - WASTE CATEGORIES AND OUTPUT FLOWS according to EN 15804+A2: 1 ton rail

Parameter	Unit	A1-A3	C1	C2	C3	C4	D
Hazardous waste disposed (HWD)	kg	9.86E-07	ND	ND	0	0	6.19E-09
Non hazardous waste disposed (NHWD)	kg	2.74E+01	ND	ND	0	0	-1.22E+01
Radioactive waste disposed (RWD)	kg	2.96E+00	ND	ND	0	0	-9.97E-05
Components for re-use (CRU)	kg	0	ND	ND	0	0	0
Materials for recycling (MFR)	kg	0	ND	ND	1E+03	0	0
Materials for energy recovery (MER)	kg	0	ND	ND	0	0	0
Exported electrical energy (EEE)	MJ	0	ND	ND	0	0	0
Exported thermal energy (EET)	MJ	0	ND	ND	0	0	0

### RESULTS OF THE LCA - additional impact categories according to EN 15804+A2-optional: 1 ton rail

Parameter	Unit	A1-A3	C1	C2	C3	C4	D
Incidence of disease due to PM emissions (PM)	Disease incidence	ND	ND	ND	ND	ND	ND
Human exposure efficiency relative to U235 (IR)	kBq U235 eq	ND	ND	ND	ND	ND	ND
Comparative toxic unit for ecosystems (ETP-fw)	CTUe	ND	ND	ND	ND	ND	ND
Comparative toxic unit for humans (carcinogenic) (HTP-c)	CTUh	ND	ND	ND	ND	ND	ND

Comparative toxic unit for humans (noncarcinogenic) (HTP-nc)	CTUh	ND	ND	ND	ND	ND	ND
Soil quality index (SQP)	SQP	ND	ND	ND	ND	ND	ND

Disclaimer 1 – for the indicator “Potential Human exposure efficiency relative to U235”. This impact category deals mainly with the eventual impact of low-dose ionizing radiation on human health of the nuclear fuel cycle. It does not consider effects due to possible nuclear accidents, occupational exposure or radioactive waste disposal in underground facilities. Potential ionizing radiation from the soil, radon and from some construction materials is also not measured by this indicator.

Disclaimer 2 – for the indicators “abiotic depletion potential for non-fossil resources”, “abiotic depletion potential for fossil resources”, “water (user) deprivation potential, deprivation-weighted water consumption”, “potential comparative toxic unit for ecosystems”, “potential comparative toxic unit for humans – cancerogenic”, “Potential comparative toxic unit for humans - not cancerogenic”, “potential soil quality index”. The results of this environmental impact indicator shall be used with care as the uncertainties on these results are high as there is limited experience with the indicator.

## References

### Standards

#### EN 13674-1:2011+A1:2017

Railway applications – Track – Rail – Part 1: Vignole railway rails 46 kg/m and above

#### EN 13674-2:2020

Railway applications – Track – Rail – Part 2: Switch and crossing rails used in conjunction with Vignole railway rails 46 kg/m and above

#### EN 13674-3:2006+A1:2010

Railway applications – Track – Rail – Part 3: Check rails

#### EN 13674-4:2020

Railway applications - Track - Rail - Part 4: Vignole railway rails from 27 kg/m to, but excluding 46 kg/m

#### ISO 14025

EN ISO 14025:2011, Environmental labels and declarations — Type III environmental declarations — Principles and procedures.

#### EN 14811:2019

Railway applications – Track – Special purpose rail – Grooved and associated construction

#### EN 15804

EN 15804:2012+A1 2013, Sustainability of construction works — Environmental Product Declarations — Core rules for the product category of construction products.

#### EN 15804

EN 15804:2012+A2:2019+AC:2021, Sustainability of construction works — Environmental Product Declarations — Core rules for the product category of construction products.

### Further References

#### GaBi Software/Database

GaBi Software System and Database for Life Cycle Engineering, Sphera Solution GmbH, Leinfelden-Echterdingen, 2022 (<https://www.gabi-software.com/support/gabi>)

#### IBU 2023

Institut Bauen und Umwelt e.V.: General Instructions for the EPD programme of Institut Bauen und Umwelt e.V., Version 2.0, Berlin: Institut Bauen und Umwelt e.V., 2023, [www.ibu-epd.com](http://www.ibu-epd.com)

#### IBU Part A

PCR - Part A: Calculation Rules for the Life Cycle Assessment and Requirements on the Project Report according to EN 15804+A2:2019, version 1.3, Institut Bauen und Umwelt e.V., [www.bau-umwelt.com](http://www.bau-umwelt.com), 2022

#### IBU Part B

PCR - Part B: Rails forming a track for vehicles, 01/08/2021 (PCR checked and approved by the SVR), Institut Bauen und Umwelt e.V., [www.bau-umwelt.com](http://www.bau-umwelt.com)

DIRECTIVE (EU) 2016/797 OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL of 11 May 2016 on the interoperability of the rail system within the European Union (recast)

COMMISSION REGULATION (EU) No 1299/2014 of 18 November 2014 on the technical specifications for interoperability relating to the 'infrastructure' subsystem of the rail system in the European Union

Commission regulation 1299/2014 of 18th November 2014 concerning a technical specification for interoperability relating to the infrastructure subsystem of the rail system in the European Union,

COMMISSION IMPLEMENTING REGULATION (EU) 2019/776 of 16 May 2019 amending Commission Regulations (EU) No 321/2013, (EU) No 1299/2014, (EU) No 1301/2014, (EU) No 1302/2014, (EU) No 1303/2014 and (EU) 2016/919 and Commission Implementing Decision 2011/665/EU as regards the alignment with Directive (EU) 2016/797 of the European Parliament and of the Council and the implementation of specific objectives set out in Commission Delegated Decision (EU) 2017/1474

COMMISSION IMPLEMENTING REGULATION (EU) 2020/387 of 9 March 2020 amending Regulations (EU) No 321/2013, (EU) No 1302/2014 and (EU) 2016/919 as regards the extension of the area of use and transition phases

Candidate List of substances of very high concern for Authorisation (published in accordance with Article 59(10) of the REACH Regulation)

<https://echa.europa.eu/de/candidate-list-table>

REGULATION (EU) No 528/2012 OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL of 22 May 2012 concerning the making available on the market and use of biocidal products



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