

# ENVIRONMENTAL PRODUCT DECLARATION

as per /ISO 14025/ and /EN 15804/

Owner of the Declaration	ArcelorMittal Europe – Long Products
Programme holder	Institut Bauen und Umwelt e.V. (IBU)
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Rails for transport, tramways, rail track devices and cranes  
**ArcelorMittal**

[www.ibu-epd.com](http://www.ibu-epd.com) / <https://epd-online.com>



## General Information

### ArcelorMittal Europe – Long Products

#### Programme holder

IBU - Institut Bauen und Umwelt e.V.  
Panoramastr. 1  
10178 Berlin  
Germany

#### Declaration number

EPD-ARC-20180155-CCD1-EN

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

Rails forming a track for vehicles, 06.2018  
(PCR checked and approved by the SVR)

#### Issue date

14/03/2019

#### Valid to

13/03/2024



Prof. Dr.-Ing. Horst J. Bossenmayer  
(President of Institut Bauen und Umwelt e.V.)



Dr. Alexander Röder  
(Head of Board IBU)

### Rails for transport, tramways, rail track devices and cranes

#### Owner of the declaration

ArcelorMittal Commercial RPS  
Edificio de Energías, 2ª P.  
33691 GIJÓN | SPAIN

#### Declared product / declared unit

1 metric ton of rails

#### Scope:

The declared unit is 1 metric ton of rails produced by ArcelorMittal.

The Life Cycle Assessment is based on data collected from the plants involved in the production:

Steel production sites are Aviles-Gijon (Spain) and Dabrowa (Poland); The rolling takes place in four plants across Europe (Veriña in Spain, Dabrowa and Krolewska in Poland and Rodange in Luxembourg)

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.

#### Verification

The standard /EN 15804/ serves as the core PCR

Independent verification of the declaration and data according to /ISO 14025:2010/

☐ internally ☒ externally



Dr.-Ing. Wolfram Trinius  
(Independent verifier appointed by SVR)

## Product

### Product description / Product definition

A rail is a hot rolled steel product used for forming a track for wheeled vehicles or cranes. This Environmental Product Declaration applies to 1 metric ton of hot rolled steel rails.

### Application

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.

### Technical Data

This Environmental Product Declaration is valid for rail products of varied 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.

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.

### Base materials / Ancillary materials

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.

### Reference service life

A reference service life for rails is not declared. 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.

### Further information

Additional information on steel rails can be found at <http://rails.arcelormittal.com/rails/>.

## LCA: Calculation rules

### Declared Unit

The declaration refers to the functional unit of 1 metric ton of rails as specified in Part B: Requirements on the EPD for Rails forming a track for vehicles.

### Declared unit

Name	Value	Unit
Declared unit	1	t
Conversion factor to 1 kg	0.001	-
Density	7850	kg/m <sup>3</sup>

### System boundary

Type of the EPD: cradle-to-gate - with options. Module A1-A3, Module C3 and module D were considered.

**Modules A1-A3** of the production include the following:

- The provision of resources, additives, and energy
- Transport of resources and additives to the production site
- Production processes on-site including energy, production of additives, disposal of production residues, and consideration of related emissions
- Recycling of production/manufacturing scrap. Steel scrap is assumed to reach the end-of-waste status once is shredded and sorted,

thus becomes input to the product system in the inventory.

**Module C3** takes into account the sorting and shredding of after-use steel that is recycled, as well as the non-recovered scrap due to sorting efficiency which is landfilled. A conservative value of 1% landfill is considered.

**Module D** refers to the End-of-Life, including reuse and recycling.

In module D the recycled material gets a credit in accordance to the "value of scrap" methodology by /Worldsteel/ and the reused material receives a credit as avoided manufacturing of rails.

### 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.

All relevant background datasets are taken from the 2018 version of the /GaBi Database/. Regarding foreground data, this study is based on high quality of primary data, collected by ArcelorMittal. The GaBi-database contains consistent and documented datasets which can be viewed in the online GaBi-documentation /GaBi Documentation/..

## LCA: Scenarios and additional technical information

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.

The assumption for the end-of-life for this study is based upon a collecting rate of 99%, taking into account 1% going into landfill due to unforeseen losses after the removal of the rails.

### End of life (C3)

Name	Value	Unit
Landfilling	1	%

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

Name	Value	Unit
Recycling	99	%



## LCA: Results

### DESCRIPTION OF THE SYSTEM BOUNDARY (X = INCLUDED IN LCA; MND = MODULE NOT DECLARED)

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	MND	MND	X	MND	X

### RESULTS OF THE LCA - ENVIRONMENTAL IMPACT: 1 metric ton of rail

Parameter	Unit	A1-A3	C3	D
Global warming potential	[kg CO <sub>2</sub> -Eq.]	2.66E+3	1.84E+0	-1.74E+3
Depletion potential of the stratospheric ozone layer	[kg CFC11-Eq.]	4.37E-9	6.85E-12	3.41E-10
Acidification potential of land and water	[kg SO <sub>2</sub> -Eq.]	4.24E+0	5.84E-3	-4.19E+0
Eutrophication potential	[kg (PO <sub>4</sub> ) <sup>3</sup> -Eq.]	4.35E-1	6.69E-4	-3.59E-1
Formation potential of tropospheric ozone photochemical oxidants	[kg ethene-Eq.]	7.59E-1	4.01E-4	-5.38E-1
Abiotic depletion potential for non-fossil resources	[kg Sb-Eq.]	1.29E-4	8.92E-7	1.78E-4
Abiotic depletion potential for fossil resources	[MJ]	2.29E+4	2.04E+1	-1.38E+4

### RESULTS OF THE LCA - RESOURCE USE: 1 metric ton of rail

Parameter	Unit	A1-A3	C3	D
Renewable primary energy as energy carrier	[MJ]	5.37E+2	1.09E+1	1.26E+3
Renewable primary energy resources as material utilization	[MJ]	0.00E+0	0.00E+0	0.00E+0
Total use of renewable primary energy resources	[MJ]	5.37E+2	1.09E+1	1.26E+3
Non-renewable primary energy as energy carrier	[MJ]	2.32E+4	3.22E+1	-1.30E+4
Non-renewable primary energy as material utilization	[MJ]	0.00E+0	0.00E+0	0.00E+0
Total use of non-renewable primary energy resources	[MJ]	2.32E+4	3.22E+1	-1.30E+4
Use of secondary material	[kg]	7.75E+1	0.00E+0	0.00E+0
Use of renewable secondary fuels	[MJ]	0.00E+0	0.00E+0	0.00E+0
Use of non-renewable secondary fuels	[MJ]	0.00E+0	0.00E+0	0.00E+0
Use of net fresh water	[m³]	8.59E+0	1.49E-2	6.09E-1

### RESULTS OF THE LCA – OUTPUT FLOWS AND WASTE CATEGORIES:

#### 1 metric ton of rail

Parameter	Unit	A1-A3	C3	D
Hazardous waste disposed	[kg]	1.25E-5	1.81E-7	-9.12E-6
Non-hazardous waste disposed	[kg]	4.02E+0	1.00E+1	-2.76E+1
Radioactive waste disposed	[kg]	1.18E-1	4.67E-3	3.10E-1
Components for re-use	[kg]	0.00E+0	0.00E+0	0.00E+0
Materials for recycling	[kg]	0.00E+0	9.90E+2	0.00E+0
Materials for energy recovery	[kg]	0.00E+0	0.00E+0	0.00E+0
Exported electrical energy	[MJ]	0.00E+0	0.00E+0	0.00E+0
Exported thermal energy	[MJ]	0.00E+0	0.00E+0	0.00E+0

The following example illustrates the net scrap calculation for this model:

77,5 kg scrap is used in the manufacturing of 1 ton of rails. After use, 990 kg steel is recycled, 10 kg is landfilled. The potential environmental impact calculated for module D depends on the net amount of scrap left in the system, which is  $990 - 77,5 = 912,5$  kg.

## References

#### /IBU 2016/

IBU (2016): General Programme Instructions for the Preparation of EPDs at the Institut Bauen und Umwelt e.V., Version 1.1 Institut Bauen und Umwelt e.V., Berlin.  
[www.ibu-epd.de](http://www.ibu-epd.de)

#### /ISO 14025/

DIN EN /ISO 14025:2011-10/, Environmental labels and declarations — Type III environmental declarations — Principles and procedures

#### /EN 15804/

/EN 15804:2012-04+A1 2013/, Sustainability of construction works — Environmental Product Declarations — Core rules for the product category of construction products

/PCR 2018, Part B/ Requirements on the EPD for Rails forming a track for vehicles - Institut Bauen und Umwelt e.V., Berlin (pub.): From the range of Environmental Product Declarations of Institute Construction and Environment e.V. (IBU), 2018

/European Commission Technical Steel Research/ Sansom, M. and Meijer, J.: Life-cycle assessment

(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)

**/GaBi ts Software/**

GaBi ts. Software and Databases for Life Cycle Engineering. IABP, University of Stuttgart und thinkstep AG, 2018.

**/GaBi ts Documentation/**

GaBi ts: Documentation of the GaBi datasets for Life Cycle Engineering. IABP, University of Stuttgart and thinkstep AG, 2018. <http://documentation.gabi-software.com>

**/Rails/** ArcelorMittal Europe Long products - Rails & Special Sections. <http://rails.arcelormittal.com>

**/Worldsteel/** Life cycle assessment (LCA)

methodology report  
<http://www.worldsteel.org/publications/>

**Publisher**

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