



Environmental Product Declaration Type III (EPD) ITB number 609/2024



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Environmental Product Declaration Type III (EPD) ITB number 609/2024

## Steel products long and forged-rolled

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## Basic Information



This declaration is a Type III Environmental Product Declaration (EPD) based on the EN 15804 standard and verified according to ISO 14025 by an independent auditor.

It contains information about the environmental impact of the declared construction materials. These aspects have been verified by an independent body in accordance with ISO 14025. In principle, a comparison or evaluation of EPD data is only possible if all data to be compared have been created in accordance with EN 15804 (see section 5.3 of the standard).

**LCA analysis:** A1 - A3, A4, C1 - C4 and D according to EN 15804 (cradle to grave with options)

**Year of EPD development:** 2023

**Declared service life:** -

**PCR:** document ITB-PCR A (based on PN-EN 15804)

**Declared unit:** 1 tonne of product

**Reason for implementation:** B2B

**Representativeness:** Polish products, 2022



## Manufacturer

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Huta Bankowa Sp. z o.o. is a manufacturer of rolled and forged-rolled products. The company's activities are focused on continuously ensuring the quality of the products and reducing the negative impact on the environment.

Huta Bankowa Sp. z o.o. is one of the oldest steelworks in Poland. Its beginnings date back to the years 1834 ÷ 1839, i.e. the period when the first production facilities were built. As one of the oldest steelworks in the Silesian voivodeship, as a result of the technological restructuring process initiated in 1996, it was transformed into a metallurgical processing plant specialising in the production of semi-finished hot-rolled and forged products such as billets for plastic processing, round bars for pipes and cylinders and square bars, angles, flat bars and head sections, forging billets, seamless rolled rings, tram and railway hoops.





Huta Bankowa Sp. z o.o. being a metallurgical processing plant produces products in two departments :

- Long Rolled Products Production Department
- Forged-Rolled Products Production Department

based on high-methane natural gas and electricity.

**The Forged-Rolled Products Production Department** is equipped with a fully automated rolling line from Thyssen Wagner. Computerisation of the production process makes it possible to obtain products with high dimensional repeatability with small machining allowances compared to traditional technologies. The rolling line is complemented by a computerised station for ultrasonic testing of rims, allowing for a significant reduction in testing time and easy analysis of results. The Rings and Hoops Department currently manufactures a wide range of railway hoops, seamless forged rings with rectangular or profiled cross-sections for the Polish market, as well as for foreign markets.

**The Long Rolled Products Production Department** has been continuously modernised over the years. Investments focused on the modernisation of the pusher furnace for the medium section mill and the construction of a state-of-the-art post-heating furnace for heating the COS charge. The investments also focused on the finishing process of the products, especially in the area of offering long products, which was made possible by modern straightening machines and a heat treatment furnace, an automatic line for non-destructive inspection and testing of round and square bars in the size range of 100 to 200 mm, and an automatic line for cutting and packing sections.

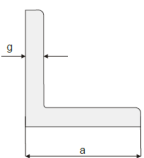
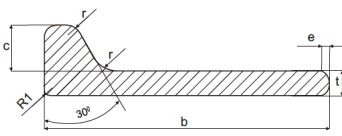
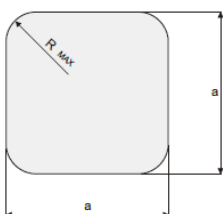
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## Description of products and application

Steel products manufactured at Huta Bankowa are used in the engineering, shipbuilding, railway and construction industries. This declaration covers two product variants: long products and forged rolled products

### Long products

The main products of the hot-rolled long products department are bars and profiles, medium and especially round bars in the 90 - 250 mm range, angle sections, head sections and semi-finished products for forging and pipe works.

Diagram	Type	Manufacturing specifications
	Angles	acc. to PN-H-93010:1991 acc. to EN-10163-3 acc. to EN-10056-1-2 dimensions and tolerances
	Bulb flats	acc. to PN-H-92147:1993 acc. to EN 10067 acc. to the regulations of the Classifying Associations
	Square billets	acc. to PN-H-93020:1981 - dimensions acc. to PN-H-93021:1989 - die forging acc. to PN-H-93022:1989 - rolling and forging acc. to PN-H-93000:1984 - ordinary steel for mechanical treatment acc. to PN-H-93001:1985 - quality steel for mechanical treatment DFFWRWKHFHUWLgFDWLRQV(1VWDQG DUG

	<p>Round bars</p>	<p>acc. to PN-H-93000:1994 - bars of ordinary steel acc. to PN-H-93001:1985 - bars of quality steel acc. to the certifications EN standard</p>
	<p>Square rods</p>	<p>acc. to PN-H-93011:1996 acc. to VdTÜV-Werkstoffblatt 311-12.89 acc. to VdTÜV-Werkstoffblatt 342-06.96</p>

### Forged-rolled products

The Rings and Rim Division currently manufactures a wide range of railway hoops, seamless forged rings with rectangular or profiled cross-sections for the Polish market as well as for foreign markets.

Diagram	Type	Manufacturing specifications
	<p>Railway wheel tyres</p>	<p>acc. to PN-K-91032:1991 - dimensions and profiles acc. to PN-K-91042:1993 - specifications and testing acc. to PN- H-84027-06:1984 - grades of steel acc. to UIC 810-1 - specifications and testing acc. to UIC 810-2 - tolerances of dimensions acc. to BS 5892 cz.4/1992 - manufacturing and testing acc. to GOST 398-2010 - specifications and testing acc. to DSTU 3717-98 - dimensions and profiles acc. to GOST R 52366-2005 - dimensions and profiles acc. to GOST 5000-83 - dimensions and profiles</p>

	<p>Tram tyres</p>	<p>acc. to BN-91/3554-06 acc. to UIC 810-1 ed.V</p>
	<p>Flat flanges</p>	<p>PN-EN 1092-1 Flanges and fittings. Round flanges for tubes, fittings, connectors with PN marking (2,5; 6; 10; 16, 25; 40; 63; 100) PN-ISO 7005-1 Steel flanges (PN 2,5;6;10; 16; 20; 25; 40; 50; 110; 150; 260) PN-87/H-74710/02 do 08 Neck flanges for welding for nominal pressure 0,63; 1; 1,6; 2,5; 4; 6,3; 10 MPa PN-87/H-74731 Fittings and pipelines. Flat flanges for welding for nominal pressure 0,25-1,6 MPa PN-88/H-74738 - Fittings and pipelines. Slack flanges with neck rings for welding for nominal pressure 0,25-10 MPa ANSI and DIN Standards</p>
	<p>Bulb flanges</p>	<p>PN-EN 1092-1 Flanges and fittings. Round flanges for tubes, fittings, connectors with PN marking (2,5; 6; 10; 16, 25; 40; 63; 100) PN-ISO 7005-1 Steel flanges (PN 2,5;6;10; 16; 20; 25; 40; 50; 110; 150; 260) PN-87/H-74710/02 do 08 Neck flanges for welding for nominal pressure 0,63; 1; 1,6; 2,5; 4; 6,3; 10 MPa PN-87/H-74731 Fittings and pipelines. Flat flanges for welding for nominal pressure 0,25-1,6 MPa PN-88/H-74738 - Fittings and pipelines. Slack flanges with neck rings for welding for nominal pressure 0,25-10 MPa ANSI and DIN Standards</p>
	<p>Seamless rolled rings</p>	<p>acc. to PN-H-94004:1984 - forgings for general purposes acc. to PN-H-94009:1992 - forgings for pressure equipment acc. to PN-H-94023:2000 - seamless rolled rings from non-alloy and alloy steels acc. to EN 10222 - (1 ÷ 2) forgings for pressure equipment acc. to EN 10250 - (1 ÷ 4) forgings for general purposes</p>

## Life cycle assessment (LCA) - general principles



### Declared unit

The declared unit is the production of 1 tonne of long and forged-rolled products used in the engineering, shipbuilding, railway and construction industries.

### Allocation

The allocation in this study was made in accordance with the ITB PCR A guidelines. The production and storage of the products covered in this declaration take place at the production plant of Huta Bankowa Sp. z o.o. at 24 Sobieskiego Street in Dąbrowa Górnicza. Input data and emissions were collected for the entire plant. All impacts from raw material extraction are allocated in module A1. Production of products is based on raw and recycled materials. Approximately 39% of recycled raw material is used in steel production. 100% of the inflows from the production lines were inventoried and allocated to the product manufacturing. Module A2 includes the transport of raw materials from Polish and

foreign distributors to the production plant in Dąbrowa Górnicza. Electricity, natural gas, district heat, water, fuels use, waste and emissions for the entire production process was inventoried and included in module A3.

### System boundaries

The life cycle analysis of the declared products covers phases A1 - A3, A4, C1-C4+D ('cradle to grave with options') according to EN 15804 and ITB PCR A.

### System limits

100% of input materials and 100% of electricity, natural gas, district heat, water, fuels consumption, waste and emissions were inventoried at the Dąbrowa Górnicza production plant. All relevant parameters from the collected production data are included in the assessment, i.e. all materials used in production and media consumption.





### **Modules A1 and A2 Extraction and transport of raw materials**

Raw materials for production such as iron ore and recycled material are transported to the plant from Poland and other European countries (Germany, Czech Republic, Ukraine, Italy). Module A1 shows the production impact of raw materials used further in the manufacture of steel products. Data on the transport of raw materials are recorded by the plant. Means of transport include trucks and rail. For the calculation of module A2, global fuel averages were used.

### **Module A3 Production**

The production process is illustrated in the diagram on page 12.

In the Long Products Production Department, the ingots used in the production of products are heated in a walking beam furnace. Once heated, the material undergoes plastic processing on rolling mills. The forming process transforms the heated ingots into strips with specific profiles. The rolling process is followed by band splitting with saws and a free cooling process in the cold storage. The cooled material is subjected to heat treatment after which the material acquires the required properties. The material is then subjected to the processes of straightening and quality control, if any, and then transferred to the warehouse.

In the Forged-Rolled Products Production Department, the charge material (ingots) is cold-cut into blocks and then transported to the rotary furnace where the charge is heated. The heated charge is subjected to plastic processing through axial and radial rolling until a product of the required dimensions is achieved. Once the product has cooled down, it undergoes additional heat treatment on shaft furnaces and a furnace with a two-sided moving shaft, during which tempering, normalising and annealing processes are carried out in order to achieve the required properties. The material prepared in this way is subjected to the processes of possible straightening, possible shot-blasting of the product surface and quality control, and then transferred to storage.

The process consumes electricity, high-methane natural gas and water.

### **Module A4 Transport**

Transport to the place of installation takes place from the plant in Dąbrowa Górnicza. The finished products are transported by trucks. The average transport distance is calculated in proportion to the weight transported to each customer. The largest order receivers are located in Lithuania, Germany, Slovakia and Spain. The fuel used is diesel. The average transport distance is 940 km for long products and 958 for forged-rolled products.



### **Module C1 Deconstruction and demolition**

The declaration covers a wide range of products for different purposes. Due to the lack of data on demolition technology, the amount of energy and fuel required for deconstruction was assumed on the basis of the literature: 0.7 kWh of electricity and 48.4 l of diesel per tonne of product.

### **Module C2 Transport**

It is assumed that the end-of-life product will be transported by truck to the nearest steelworks (truck, diesel) within 100 km, where it will be used as scrap for the production of new steel.

### **Module C3 Waste treatment**

It was assumed that 97% of the products would be reprocessed in the smelter at the end of operation.

### **Module C4 Disposal**

It has been assumed that at the end of life 3% of the products will be sent to landfill.

### **Module D External impacts beyond system boundaries**

To obtain a net post-consumer scrap score from the product system, the contribution of post-consumer scrap present in the product being assessed is subtracted from the post-consumer scrap to be recycled at the end of life. Module D shows the burdens and benefits of recycling this net residual scrap. Benefits are assessed at the point of functional equivalence, i.e. where there is a substitution of virgin raw material.

### **Data collection period**

The input data of the declared products concern the period from January to December 2022. The life cycle assessment has been prepared for Poland as a reference area.

### **Data quality**

The data for the LCA calculation of modules A1-A4 came from verified LCI inventory data from the plant. In accordance with Annex E of EN 15804 + A2, a data quality assessment was carried out. For technical representativeness, processes with a quality level of 'very good' represent 99% of the values for the climate change indicators. For geographical and temporal representativeness, a process evaluation level of "very good" was obtained.

### **Assumptions and estimates**

The impacts of the representative products were aggregated using a weighted average. The results obtained for the representative products can be applied proportionally to all types of Huta Bankowa Sp. z o.o. products.

### **Calculation principles**

LCA was made in accordance with PN-EN 15804+A2 standard and ITB PCR A (v1.6. 2023) document.

### **Databases**

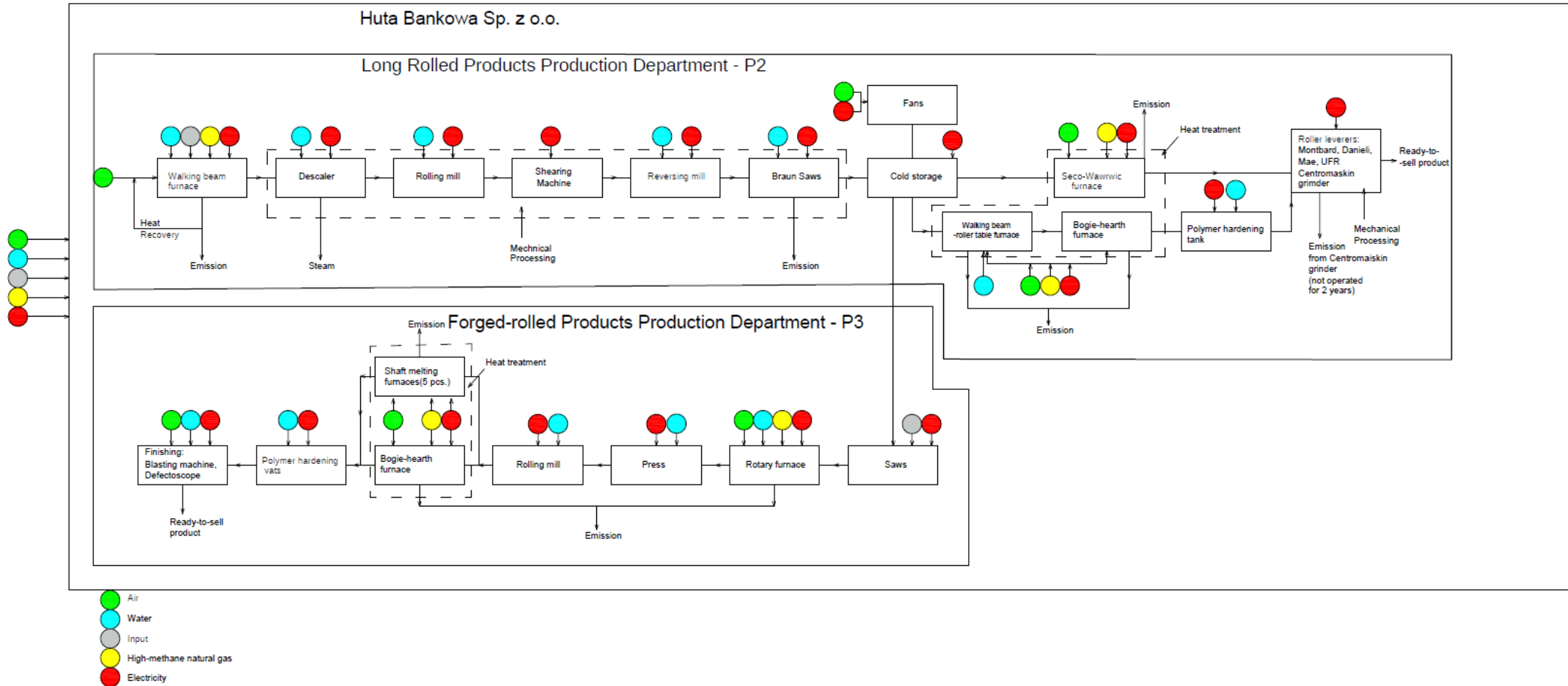
The data for the calculations came from Ecoinvent v. 3.6. Ecoinvent v. 3.8 and from databases available in Bionova OneClickLCA



software. Emission factors for electricity have been supplemented with actual KOBIZE data. The characterisation factors are CML ver. 4.2 based on EN 15804+A2.



### Production scheme of steel products



# Life cycle assessment (LCA) - results

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Declared unit

The declared unit is 1 tonne of steel products manufactured by Huta Bankowa Sp. z o.o. The following indicates which LCA assessment modules were included in the assessment:

Information on system boundaries (MA = module assessed, MNA = module not assessed)																
Product stage			Construction stage		Use stage							End of life				Benefits and loads beyond the system boundaries
Raw material supply	Transport	Manufacturing	Transport to construction site	Construction and installation process	Use	Maintenance	Repair	Replacement	Refurbishment	Operational energy use	Operational water use	Deconstruction / demolition	Transport	Waste processing	Disposal	Potential for reuse, recovery or recycling
A1	A2	A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
MA	MA	MA	MA	MNA	MNA	MNA	MNA	MNA	MNA	MNA	MNA	MA	MA	MA	MA	MA

## Results for long products

### Environmental impacts

Indicator	Unit	A1	A2	A3	A4	C1	C2	C3	C4	D
Global warming potential- total	kg CO2 eq.	1.35E+03	9.26E+01	3.14E+02	8.47E+01	5.16E+02	9.10E+00	1.03E+01	1.98E+00	7.01E+02
Global warming potential- fossil	kg CO2 eq.	1.35E+03	9.24E+01	3.14E+02	8.54E+01	5.16E+02	9.09E+00	1.56E+01	1.98E+00	6.95E+02
Global warming potential- biogenic	kg CO2 eq.	1.38E+00	1.11E-01	3.93E-03	6.20E-02	1.68E-02	6.60E-03	-5.29E+00	4.94E-04	5.12E+00
Global warming potential- LULAC	kg CO2 eq.	6.05E-01	3.57E-02	1.62E-02	2.57E-02	6.75E-03	2.74E-03	1.77E-02	8.07E-04	1.07E+00
Depletion potential of the stratospheric ozone layer	kg CFC 11 eq.	5.99E-05	2.13E-05	1.98E-05	2.01E-05	3.40E-05	2.14E-06	8.87E-07	4.52E-07	3.85E-05
Acidification potential	mol H+ eq.	5.67E+00	4.29E-01	8.38E-01	3.59E-01	2.53E-01	3.82E-02	9.33E-02	2.00E-02	3.13E+00
Eutrophication aquatic freshwater	kg Pe	6.09E-02	1.06E-03	9.73E-03	6.95E-04	2.57E-04	7.39E-05	7.54E-04	8.66E-06	5.01E-02
Eutrophication aquatic marine	kg N eq.	1.13E+00	1.32E-01	9.71E-02	1.08E-01	3.20E-02	1.15E-02	2.69E-02	8.67E-03	9.86E-01
Eutrophication terrestrial	kg N eq.	1.31E+01	1.46E+00	1.08E+00	1.19E+00	3.51E-01	1.27E-01	2.27E-01	9.50E-02	6.39E+00
Formation potential of tropospheric ozone	kg NMVOC eq.	5.99E+00	4.56E-01	3.68E-01	3.84E-01	1.42E-01	4.08E-02	6.11E-02	2.62E-02	2.43E+00
Abiotic depletion potential for non-fossil resources	kg Sb eq.	2.03E-02	1.49E-03	1.82E-04	1.46E-03	2.55E-05	1.55E-04	6.72E-04	1.56E-06	1.98E-03
Abiotic depletion potential for fossil resources	MJ	1.36E+04	1.45E+03	3.40E+03	1.33E+03	2.02E+03	1.41E+02	1.53E+02	2.89E+01	7.87E+03
Water use	m <sup>3</sup>	3.75E+02	6.26E+00	2.30E+01	4.94E+00	5.24E+01	5.26E-01	4.51E+00	9.15E-02	5.39E+02

### Environmental aspects related to resource use

Indicator	Unit	A1	A2	A3	A4	C1	C2	C3	C4	D
Renewable primary energy as an energy carrier	MJ	1.38E+03	2.74E+01	9.92E+01	1.67E+01	5.98E+00	1.78E+00	2.59E+01	2.02E-01	6.13E+02
Renewable primary energy for material use	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	0.00E+00
Completely renewable primary energy	MJ	1.38E+03	2.74E+01	9.92E+01	1.67E+01	5.98E+00	1.78E+00	2.59E+01	2.02E-01	6.13E+02
Non-renewable primary energy as an energy source	MJ	1.36E+04	1.43E+03	8.64E+02	1.33E+03	2.75E+02	1.41E+02	1.53E+02	2.89E+01	7.87E+03
Non-renewable primary energy for material use	MJ	0.00E+00	2.54E+01	2.54E+03	0.00E+00	1.74E+03	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Completely non-renewable primary energy	MJ	1.36E+04	1.45E+03	3.40E+03	1.33E+03	2.02E+03	1.41E+02	1.53E+02	2.89E+01	7.87E+03
Use of secondary raw materials	kg	1.28E+02	1.34E-03	3.39E-01	0.00E+00	9.21E-02	0.00E+00	2.85E-01	1.12E-02	4.63E+02
Renewable secondary fuels	MJ	1.57E-01	2.42E-05	3.10E-03	0.00E+00	1.61E-03	0.00E+00	2.34E-02	5.99E-05	5.65E-02
Non-renewable secondary fuels	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	0.00E+00
Use of fresh water resources	m <sup>3</sup>	8.29E+00	3.16E-01	6.01E+00	2.77E-01	5.51E-02	2.94E-02	1.22E-01	6.29E-03	-6.69E+00

### Other environmental information describing the waste categories

Indicator	Unit	A1	A2	A3	A4	C1	C2	C3	C4	D
Hazardous waste destined for landfill	kg	5.90E+02	1.83E+00	4.04E+00	1.29E+00	5.78E-01	1.37E-01	0.00E+00	3.86E-02	2.13E+02
Non-hazardous waste destined for disposal	kg	2.53E+03	1.57E+02	4.38E+02	1.43E+02	1.03E+01	1.52E+01	0.00E+00	6.34E-01	1.21E+03
Radioactive waste for disposal	kg	2.59E-02	9.88E-03	1.00E-03	9.12E-03	1.45E-02	9.70E-04	0.00E+00	2.01E-04	2.31E-02
Components to be reused	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	0.00E+00
Materials to be recycled	kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	9.70E+02	0.00E+00	0.00E+00
Materials destined 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	0.00E+00
Electricity exported	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	0.00E+00

## Results for forged-rolled products

### Environmental impacts

Indicator	Unit	A1	A2	A3	A4	C1	C2	C3	C4	D
Global warming potential- total	kg CO2 eq.	1.49E+03	1.02E+02	7.28E+02	8.63E+01	5.16E+02	9.10E+00	1.03E+01	1.98E+00	6.48E+02
Global warming potential- fossil	kg CO2 eq.	1.49E+03	1.02E+02	7.28E+02	8.71E+01	5.16E+02	9.09E+00	1.56E+01	1.98E+00	6.42E+02
Global warming potential- biogenic	kg CO2 eq.	1.52E+00	1.22E-01	9.74E-02	6.32E-02	1.68E-02	6.60E-03	-5.29E+00	4.94E-04	4.73E+00
Global warming potential- LULAC	kg CO2 eq.	6.69E-01	3.95E-02	3.43E-02	2.62E-02	6.75E-03	2.74E-03	1.77E-02	8.07E-04	9.90E-01
Depletion potential of the stratospheric ozone layer	kg CFC 11 eq.	6.63E-05	2.35E-05	5.35E-05	2.05E-05	3.40E-05	2.14E-06	8.87E-07	4.52E-07	3.56E-05
Acidification potential	mol H+ eq.	6.27E+00	4.74E-01	2.03E+00	3.66E-01	2.53E-01	3.82E-02	9.33E-02	2.00E-02	2.89E+00
Eutrophication aquatic freshwater	kg Pe	6.74E-02	1.17E-03	2.41E-02	7.08E-04	2.57E-04	7.39E-05	7.54E-04	8.66E-06	4.62E-02
Eutrophication aquatic marine	kg N eq.	1.25E+00	1.46E-01	2.32E-01	1.10E-01	3.20E-02	1.15E-02	2.69E-02	8.67E-03	9.10E-01
Eutrophication terrestrial	kg N eq.	1.45E+01	1.61E+00	2.56E+00	1.22E+00	3.51E-01	1.27E-01	2.27E-01	9.50E-02	5.90E+00
Formation potential of tropospheric ozone	kg NMVOC eq.	6.62E+00	5.04E-01	9.05E-01	3.91E-01	1.42E-01	4.08E-02	6.11E-02	2.62E-02	2.25E+00
Abiotic depletion potential for non-fossil resources	kg Sb eq.	2.24E-02	1.65E-03	3.44E-04	1.49E-03	2.55E-05	1.55E-04	6.72E-04	1.56E-06	1.83E-03
Abiotic depletion potential for fossil resources	MJ	1.50E+04	1.61E+03	8.96E+03	1.35E+03	2.02E+03	1.41E+02	1.53E+02	2.89E+01	7.27E+03
Water use	m <sup>3</sup>	4.15E+02	6.92E+00	3.44E+01	5.04E+00	5.24E+01	5.26E-01	4.51E+00	9.15E-02	4.98E+02

### Environmental aspects related to resource use

Indicator	Unit	A1	A2	A3	A4	C1	C2	C3	C4	D
Renewable primary energy as an energy carrier	MJ	1.53E+03	3.03E+01	2.43E+02	1.70E+01	5.98E+00	1.78E+00	2.59E+01	2.02E-01	5.66E+02
Renewable primary energy for material use	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	0.00E+00
Completely renewable primary energy	MJ	1.53E+03	3.03E+01	2.43E+02	1.70E+01	5.98E+00	1.78E+00	2.59E+01	2.02E-01	5.66E+02
Non-renewable primary energy as an energy source	MJ	1.50E+04	1.58E+03	2.02E+03	1.35E+03	2.75E+02	1.41E+02	1.53E+02	2.89E+01	7.27E+03
Non-renewable primary energy for material use	MJ	0.00E+00	2.54E+01	6.94E+03	0.00E+00	1.74E+03	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Completely non-renewable primary energy	MJ	1.50E+04	1.61E+03	8.96E+03	1.35E+03	2.02E+03	1.41E+02	1.53E+02	2.89E+01	7.27E+03
Use of secondary raw materials	kg	1.41E+02	1.34E-03	6.65E-01	0.00E+00	9.21E-02	0.00E+00	2.85E-01	1.12E-02	4.27E+02
Renewable secondary fuels	MJ	1.74E-01	2.42E-05	4.20E-03	0.00E+00	1.61E-03	0.00E+00	2.34E-02	5.99E-05	5.22E-02
Non-renewable secondary fuels	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	0.00E+00
Use of fresh water resources	m <sup>3</sup>	9.17E+00	3.49E-01	6.30E+00	2.82E-01	5.51E-02	2.94E-02	1.22E-01	6.29E-03	-6.17E+00

### Other environmental information describing the waste categories

Indicator	Unit	A1	A2	A3	A4	C1	C2	C3	C4	D
Hazardous waste destined for landfill	kg	6.53E+02	2.02E+00	8.56E+00	1.32E+00	5.78E-01	1.37E-01	0.00E+00	3.86E-02	1.97E+02
Non-hazardous waste destined for disposal	kg	2.80E+03	1.74E+02	1.08E+03	1.46E+02	1.03E+01	1.52E+01	0.00E+00	6.34E-01	1.12E+03
Radioactive waste for disposal	kg	2.87E-02	1.09E-02	2.14E-03	9.30E-03	1.45E-02	9.70E-04	0.00E+00	2.01E-04	2.13E-02
Components to be reused	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	0.00E+00
Materials to be recycled	kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	9.70E+02	0.00E+00	0.00E+00
Materials destined 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	0.00E+00
Electricity exported	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	0.00E+00

## Verification

The verification process for this EPD is in accordance with ISO 14025 and ISO 21930. Once verified, this EPD is valid for a period of 5 years. There is no need to recalculate after 5 years if the inputs have not changed significantly.

EN 15804 serves as the basis for ITB PCR-A  
Independent verification according to ISO 14025 (subsection 8.1.3.)  
 internal  external

External verification of EPDs: Michał Piasecki, Professor ITB, m.piasecki@itb.pl  
Input data verification, LCI audit, LCA: Zuzanna Gondek, JWA, z.gondek@jw-a.pl  
LCA verification: Michał Piasecki, ITB professor, m.piasecki@itb.pl

Note 1: The declaration owner has the sole ownership, liability, and responsibility for the information provided and contained in EPD. Declarations of construction products may not be comparable if they do not comply with EN 15804+A2. For further information about comparability, see EN 15804+A2 and ISO 14025.

Note 2: ITB is a public Research Organization and Notified Body (EC Reg. no 1488) to the European Commission and to other Member States of the European Union designated for the tasks concerning the assessment of building products' performance. ITB acts as the independent, third-party verification organization (ISO 17025/17065/17029). ITB-EPD program is recognized and registered member of The European Platform - Association of EPD program operators and ITB-EPD declarations are registered and stored in the international ECO-PORTAL.

## Normative references

### General:

- ITB PCR A General Product Category Rules for Construction Products
- ISO 14025:2006 Environmental labels and declarations - Type III environmental declarations - Principles and procedures
- ISO 21930:2017 Sustainability in buildings and civil engineering works - Core rules for environmental product declarations of construction products and services
- ISO 14044:2006 Environmental management - Life cycle assessment - Requirements and guidelines
- EN 15804 +A2 Sustainability of construction works - Environmental product declarations - Core rules for the product category of construction products

### Long products:

- EN 10273:2016 - Hot-rolled bars of weldable steels with specified properties at elevated temperatures for pressure equipment
- EN ISO 683-1:2018 - Steels for heat treatment, alloy steels and auto steels -- Part 1: Non-alloy steels for quenching and tempering





- EN ISO 683-2:2018 - Steels for heat treatment, alloyed steels and auto steels -- Part 2: Alloyed steels for quenching and tempering
- EN ISO 683-3:2022 - Steels for heat treatment, alloyed steels and automatic steels -- Part 3: Steels for carburising
- EN ISO 683-5:2021 - Steels for heat treatment, alloyed and automatic steels -- Part 5: Steels for nitriding
- EN 10025-1:2004 - Hot-rolled products of structural steels -- Part 1: General technical delivery conditions
- EN 10025-2:2019 - Hot-rolled products of structural steels -- Part 2: Technical delivery conditions for non-alloy structural steels
- EN 10025-3:2019 - Hot-rolled products of structural steels -- Part 3: Technical delivery conditions for normalized/standardized weldable fine grain structural steels
- EN 10084:2008 - Steels for carburizing -- Technical delivery conditions
- EN 10083-2:2006 - Steels for quenching and tempering -- Part 2: Technical delivery conditions for non-alloy steels
- EN 10083-3:2006 - Steels for quenching and tempering -- Part 3: Technical delivery conditions for alloyed steels
- EN 10083-1:2006 - Steels for quenching and tempering -- Part 1: Technical delivery conditions
- EN 10085:2001 - Steels for nitriding -- Technical delivery conditions
- EN 10250-3:1999 - Forged general purpose steel forgings - Part 3: Special alloy steels
- EN 10250-2:1999 Free-forged steel forgings for general use -- Part 2: Non-alloy quality and special steels
- ASTM A105/A105M-21 - Standard conditions for carbon steel forgings for piping
- ASTM A350/A350M-18 - Standard specification for carbon and low alloy carbon steel forgings
- DIN 17100 - General construction steels
- DIN 17243 - Steel for hot-rolled forgings. Technical delivery conditions.
- DIN 17212 - Steels for flame and induction hardening; Quality regulations.
- DIN 17200 - Steels for quenching and tempering. Technical delivery conditions.
- PN-H-84019:1993 - Non-alloy steels for surface hardening and quenching and tempering -- Grades
- PN-H-84020:1988 - Non-alloy structural steel for general purposes -- Grades
- PN-H-84027-04:1988 - Steel for railways -- Coupling device forgings -- Grades
- PN-H-84030-04:1989 - Structural alloy steel -- Steels for quenching and tempering -- Grades
- PN-H-84027-06:1984/Az1:1999 - Steel for railway operations -- Rims for railway vehicle wheels -- Grades
- BS 970-1:1983 Wrought steel for mechanical applications

#### **Forged-rolled products:**

- UIC 810-1 Technical delivery requirements for rolled steel raw rims for running and trailing stock
- PN-ISO 1005-1 Railway products -- Part 1: Rolled raw rims for power and trailing stock -- Technical delivery conditions
- DSTU GOST 398:2016 - Carbon steel wheels for broad-gauge railway and metro rolling stock



- DSTU 3678-98 - Unmachined carbon steel rims for tramway sets. Technical conditions
- GOST 5257-98 - Rough rims for tramway sets
- PN-H-84027-06:84/Az1:99 - Steel for railways -- Rims for wheels of railway vehicles -- Grades
- PN-H-84019:1993 - Non-alloy steel for surface hardening and quenching -- Grades
- ASTM A105/A105M-01 - Standard conditions for carbon steel forgings for piping
- ASTM A551/A55108(Reapp18) - Standard specification for steel rims for railway applications
- EN 10025-2 - Hot-rolled products of structural steels -- Part 2: Technical delivery conditions for non-alloy structural steels
- EN 10025:1990/A1:1993 - Hot-rolled products of non-alloy structural steels - Technical delivery conditions
- EN 10083-2:2006 - Steels for quenching and tempering -- Part 2: Technical delivery conditions for non-alloy steels
- EN 10083-3:2006 - Steels for quenching and tempering -- Part 3: Technical delivery conditions for alloy steels
- EN 10028-2 - Flat products made of steels for pressure purposes -- Part 2: Non-alloy and alloy steels with specified elevated temperature properties
- EN 10222-4 - Steel forgings for pressure purposes -- Part 4: Weldable fine grain steels with high yield strength
- ISO 683-1 - Steels for heat treatment, alloyed steels and automatic steels -- Part 1: Non-alloy steels for quenching and tempering
- ISO 683-2 - Steels for heat treatment, alloyed and automatic steels -- Part 2: Alloyed steels for quenching and tempering
- DIN 17100 - General construction steels
- BS 5892-4:1992- Rolling stock materials. Material for railway wheels