



Prefabricated steel elements manufactured in Włocławek: cutting, bending and de-coiling of reinforcing steel



First issuance date: 01.02.2016. Verification after 5 years: January 2021. Validity date: 01.02.2026

EPD program operator:

Building Research Institute (ITB), 00-611 Warsaw, Filtrowa 1

www.itb.pl; www.zb.itb.pl/epd

ITB is the member of The European Platform for EPD program operators. www.eco-platform.org

Manufacturer

thyssenkrupp Materials Poland S.A.

Office: Grudziądzka 159, 87-100 Toruń

Factory: Zbrojarnia Włocławek, Al. Kazimierza Wielkiego 7, 87-800 Włocławek

Telephone number: +48 56 611 94 94

Fax number: +48 56 611 95 75

Internet address: <https://www.thyssenkrupp-materials.pl>

E-mail address: biuro@tkmaterials.pl

Basic information

This declaration is the type III Environmental Product Declaration (EPD) based on EN 15804 and verified according to ISO 14025 by external auditor. It contains the information on the impacts of declared construction materials on environment and their aspects verified by the independent verifier according to ISO 14025. Basically, a comparison or evaluation of EPD data is possible only if all the compared data were created according to EN 15804 (see point 5.3 of the standard).

Life cycle: A1-A3 modules + C3 and D in accordance with EN 15804 (Cradle to Gate with Options)

The year of first EPD issuance: 2015 (EPD no 47/2016)

The year of re-validation: 2021

Declared durability: Under normal conditions. thyssenkrupp Materials Poland products are expected to last the service life of a building (60 years)

PCR: ITB PCR A (PCR based on EN 15804)

Declared unit: 1 tonne of prefabricated steel elements: steel for reinforcement of concrete, prefabricated wire rod

Reasons for performing LCA: B2B

Representativeness: Polish products, year 2020

Environmental Product Declaration No 180/2021

Manufacturer and Product Information

thyssenkrupp Materials Poland S.A. is the leading supplier of steel products in Poland. According to the customer's design is producing reinforced steel elements of all shapes. as well as poles' framing including;

- Straight bars
- Cut and bend
- Big diameter pile cages
- Diaphragm wall reinforcement
- Assembly on site

Centrally managed logistics guarantees the safety of supplies both domestically and abroad. A full range of solutions is available to meet specific performance specifications (see http://www.thyssenkrupp-energostal.pl/building_industry.html).

The subject of this EPD is based on the actual technical documents for factory Włocławek of thyssenkrupp Materials Poland S.A. All actual technical documents are available on producer's website <https://www.thyssenkrupp-materials.pl>

Set of products for thyssenkrupp Materials Poland under this EPD covers prefabricated steel elements shown in Table 1.

Table 1. Product description and range

PRODUCT	TYPE	CLASS	STANDARD
Prefab rebar and wire rod \varnothing 6-8mm	type B500A	class A	PN-H-93247-1_2008; PN-EN 10080_2007; PN-EN 1992-1-1
Prefab rebar and wire rod \varnothing 10-16mm	type B500B and B500C	class B and C	PN-H-93220_2006; PN-EN 10080_2007; DIN-488; PN-EN 1992-1-1
Prefab rebar \varnothing 18-32mm	type B500B and B500C	class B and C	PN-H-93220_2006; PN-EN 10080_2007; DIN-488; PN-EN 1992-1-1

Environmental Product Declaration No 180/2021

A1 and A2 Modules: Reinforcing steel supply and transport

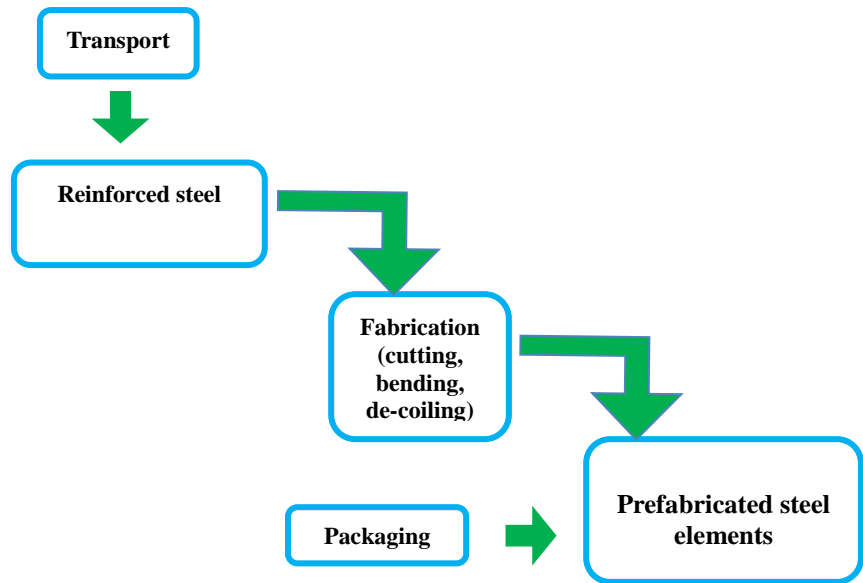
Reinforced steel is produced by a local suppliers and input data for reinforced steel environmental impacts comes from specific EPDs. For the purposes of this EPD declaration it was assumed that 95% of the steel comes from the arc furnaces production (EAF). EAF - an electric furnace in which the charge is heated with an electric arc reaching a temperature of several thousand degrees Celsius, which enables the melted charge to be heated to temperatures from 1400 ° C to 2000 ° C. Data on transport of the different products to the manufacturing plant are collected by producer and modelled for Włocławek plant by ITB. Means of transport include truck. Polish and European fuel averages are applied.

A3: Production

Manufacture covers all processes linked to the production, which comprises various related operations besides on-site activities, including; cutting, bending and de-coiling of steel, finishing, packaging and internal transportation.

The manufacturing process also yields data on the combustion of refinery products such as diesel and gasoline related to the production process. Use of electricity, fuels and auxiliary materials in the production of reinforced steel products is taken into account using national specific data. The environmental profile of the energy carriers is modelled by ITB for average Polish conditions based on relevant Kobize 2019 data. Packaging-

related flows in the production process and all upstream packaging are included in the manufacturing module. i.e. stretch foil. Apart from production of packaging material. the supply and transport of packaging material are also considered in the LCA model. It is assumed that packaging waste generated in the course of production and up-stream processes is 100% collected and incinerated based on a multi-input and multi-output process specific to the elementary composition of the waste.



C4 and D - End of life scenarios

The end-of-life scenario for all products has been generalized. Steel is considered as infinitely recyclable material. Typically is recovered by demolition contractors, who sell the recovered steel as ferrous scrap. Materials recovered from dismantled products are recycled (100%). The reuse, recovery and recycling potential for a new product system is considered beyond the system boundaries (module D) based on World Steel recommendations (net scrap approach).

Table 2. End of life scenarios for products

Progress products	Recycling
Steel products	100%

Environmental Product Declaration No 180/2021

Allocation

The allocation rules used for this EPD are based on ITB-PCR A. The prefabricated steel reinforcing system production is a single line process without co-products. All impacts from raw materials extraction and production of reinforcing steel (outside Włocławek factory) are allocated in production of reinforcing steel and taken into consideration in A1 module of EPD. 100% of impacts from line production were inventoried and allocated to prefab reinforcing system in module A3. Municipal waste and waste water of whole factory were allocated to module A3. Electricity was inventoried for whole production process. Emissions are measured separately as well and presented in A3 module.

System limits

The life cycle analysis of the examined products covers "Product Stage". A1-A3 modules (Cradle to Gate) in accordance with EN 15804+A1 and ITB-PCR A. Details on systems limits are provided in product specific ITB-EPDs. For example for thyssenkrupp Materials Poland prefabs system includes production of reinforced steel outside of Włocławek factory(upstream process), transport to the factory and production stage in Włocławek. All materials and energy consumption inventoried in thyssenkrupp Materials Poland factory all sub were included in calculation. Office impacts were taken into consideration. In the assessment, all significant parameters from gathered production data are considered. i.e. all material used per formulation, utilised thermal energy, internal fuel and electric power consumption, direct production waste and all available emission measurements. It can be assumed that the total sum of omitted processes does not exceed 5% of all impact categories. The machines and facilities (capital goods) required for and during production are excluded. as is transportation of employees.

Data collection period

The data for manufacture of the examined products (reinforced steel products) refer to the year 2020. The life cycle assessments were prepared for Poland as the reference area.

Data quality

The values determined to calculate the LCIA originate from verified LCI thyssenkrupp Materials Poland Włocławek inventory data. This data was verified.

Assumptions and estimates

Impacts for each product and factory process were inventoried and calculated separately. All raw material consumption. emission water used were specific and presented in specific EPD. Emission into air from energy carriers was estimated using national conversion factors for carriers.

Databases

The data for LCA comes from the following databases: steel rods and wires (specific EPDs for EAF steel produced). Kobize 2019 (electricity). Specific data quality analysis was a part of external audit. Characterization factors are CML ver. 4.2 based on EN 15804:2013+A1 version. (PN EN 15804+A1:2014-04)

Calculation rules

LCA was done in accordance to PCR A document.

Power Mix

Selection of the power mix for 2019 in accordance with formal National Mix published by annual GUS report. Specific data for power production impact - KOBIZE.

Environmental Product Declaration No 180/2021

Environmental characteristics (LCA)

The declaration refers to declared unit (DU) – 1 ton (Mg) of the reinforced steel product (Table 4).

Table 3. System boundaries (life stage modules included) in a product environmental assessment

Environmental assessment information (MNA – Module not assessed, MD – Module Declared, INA – Indicator Not Assessed)																
Product stage			Construction process		Use stage							End of life				Benefits and loads beyond the system boundary
Raw material supply	Transport	Manufacturing	Transport to construction site	Construction-installation process	Use	Maintenance	Repair	Replacement	Refurbishment	Operational energy use	Operational water use	Deconstruction 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
MD	MD	MD	MNA	MNA	MNA	MNA	MNA	MNA	MNA	MNA	MNA	MNA	MNA	MD	MNA	MD

Environmental Product Declaration No 180/2021

Table 4. Environmental characteristic for Prefabricated rebar and wire (1 Mg)

Environmental impacts: 1 Mg						
Indicator	Unit	A1	A2	A3	C3	D
Global warming potential	[kg CO ₂ eq.] (100 years)	6.41E+02	2.16E+01	1.73E+01	4.28E+02	-1.78E+01
Depletion potential of the stratospheric ozone layer	[kg CFC 11 eq.]	1.25E-07	6.50E-07	2.59E-07	1.24E-09	-7.93E-11
Acidification potential of soil and water	[kg SO ₂ eq.]	2.64E+00	1.58E-01	5.52E-02	1.98E-02	-6.80E-02
Formation potential of tropospheric ozone	[kg Ethene eq.]	1.58E-01	1.15E-02	6.90E-02	1.80E-03	-9.96E-03
Eutrophication potential	[kg (PO ₄) ³⁻ eq.]	2.07E-01	2.78E-02	1.61E-03	2.50E-03	-5.30E-03
Abiotic depletion potential (ADP-elements) for non-fossil resources	[kg Sb eq.]	2.20E-04	9.45E-07	0.173/1000	1.40E-06	-1.46E-06
Abiotic depletion potential (ADP-fossil fuels) for fossil resources	[MJ]	7.01E+03	1.83E+02	1.73E+02	4.28E+00	-1.50E+02
Environmental aspects on resource use: 1 Mg						
Indicator	Unit	A1	A2	A3	C3	D
Use of renewable primary energy excluding renewable primary energy resources used as raw materials	[MJ]	INA	INA	INA	INA	INA
Use of renewable primary energy resources used as raw materials	[MJ]	INA	INA	INA	INA	INA
Total use of renewable primary energy resources (primary energy and primary energy resources used as raw materials)	[MJ]	1.24E+03	9.51E+00	1.04E+01	1.22E+01	-8.71E+00
Use of non-renewable primary energy excluding non-renewable primary energy resources used as raw materials	[MJ]	INA	INA	INA	INA	INA
Use of non-renewable primary energy resources used as raw materials	[MJ]	INA	INA	INA	INA	INA
Total use of non-renewable primary energy resources (primary energy and primary energy resources used as raw materials)	[MJ]	9.12E+03	2.11E+02	2.21E+02	6.44E+01	-1.59E+02
Use of secondary material	[kg]	1.11E+03	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Use of renewable secondary fuels	[MJ]	0.00E+00	0.00E+00	3.45E-01	0.00E+00	0.00E+00
Use of non-renewable secondary fuels	[MJ]	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Net use of fresh water	[dm ³]	3.23E+00	1.74E+00	6.90E-03	1.97E-02	-1.2E+00
Other environmental information describing waste categories: 1 Mg						
Indicator	Unit	A1	A2	A3	C3	D
Hazardous waste disposed	[kg]	2.45E-02	0.00E+00	1.34E-02	1.00E-06	-2.25E-07
Non-hazardous waste disposed	[kg]	2.56E+01	0.00E+00	1.73E+00	1.50E-02	-2.50E-01
Radioactive waste disposed	[kg]	4.30E-02	0.00E+00	4.30E-02	5.00E-03	-2.00E-03
Components for re-use	[kg]	0.00E+00	0.00E+00	0.00E+00	8.50E+02	0.00E+00
Materials for recycling	[kg]	0.00E+00	0.00E+00	2.54E+01	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
Exported energy	[MJ]	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00

Environmental Product Declaration No 180/2021

Verification

The process of verification of this EPD is in accordance with EN ISO 14025, clause 8 and ISO 21930, clause 9. After verification, this EPD is valid for a 5-year-period.

The basis for LCA analysis was EN 15804 and ITB PCR A
Independent verification corresponding to ISO 14025 & 8.3.1. <input checked="" type="checkbox"/> external <input type="checkbox"/> internal
External verification of EPD: PhD. Eng Halina Prejzner LCA, LCI data verification: PhD D.SC. Eng Michał Piasecki. m.piasecki@itb.pl Verification of LCA: PhD. Eng Justyna Tomaszewska, j.tomaszewska@itb.pl

Normative references

- LCI DATA FOR STEEL PRODUCTS at https://www.worldsteel.org/en/dam/jcr:04f8a180-1406-4f5c-93ca-70f1ba7de5d4/LCI%2520study_2018%2520data%2520release.pdf
- KOBiZE Wskaźniki emisyjności CO₂, SO₂, NO_x, CO i pyłu całkowitego dla energii elektrycznej, grudzień 2019
- World Steel Association 2017 Life Cycle inventory methodology report for steel products
- ITB PCR A- General Product Category Rules for Construction Products
- ISO 14025:2006. Environmental management – Type III environmental declarations – Principles and procedure
- ISO 21930:2007. Sustainability in building and construction – Environmental declaration of building products
- ISO 14044:2006. Environmental management – Life cycle assessment – Requirements and guidelines
- ISO 15686-1:2000. Buildings and constructed assets — Service life planning — Part 1: General principles
- ISO 15686-8:2008. Buildings and constructed assets – Service life planning – Part 8: Reference service life
- EN 15804:2012+A1:2013. Sustainability in construction works – Environmental product declarations – Core rules for the product category of construction products.
- EN15942:2011. Sustainability of construction- Environmental product declarations. Communication format business-to-business



Building Research Institute

00-611 Warszawa, ul. Filtrowa 1



Instytut Techniki Budowlanej

00-611 Warsaw, Filtrów 1

Thermal Physics, Acoustics and Environment Department

02-656 Warsaw, Ksawerów 21

**CERTIFICATE No 180/2021
of TYPE III ENVIRONMENTAL DECLARATION**

Products:

Steel reinforcement prefabricates

Manufacturer:

Thyssenkrupp Materials Poland S.A.

Grudziądzka 159, 87-100 Toruń, Poland

confirms the correctness of the data included in the development of
Type III Environmental Declaration and accordance with the requirements of the standard

PN-EN 15804

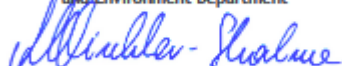
Sustainability of construction works.

Environmental product declarations.

Core rules for the product category of construction products.

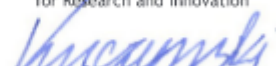
This certificate, issued on 1st February 2021 is valid for 5 years
or until amendment of mentioned Environmental Declaration

Acting Head of the Thermal Physic, Acoustics
and Environment Department


Agnieszka Winkler-Skalna, PhD



Deputy Director
for Research and Innovation


Krzysztof Kuczyński, PhD

Warsaw, February 2021