Environmental Product Declaration No 47/2016

Prefabricated steel elements THYSSEN KRUPP ENERGOSTAL manufactured in Włocławek: Cutting, bending and de-coiling of reinforcing steel

ThyssenKrupp Energostal

Issuance date: 01.02.2016
Validity date: 01.02.2021

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 Energostal 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: www.thyssenkrupp-energostal.pl
E-mail address: zbrojarnie@tk.energostal.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 Advisory Body 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 in accordance with EN 15804 (Cradle to Gate)
The year of preparing the characteristic: 2015
Declared durability: Under normal conditions, ThyssenKrupp Energostal 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 product

Manufacturer and Product Information

THYSSENKRUPP ENERGOSTAL, as one of the leading distributors of metals and plastics in Poland, offers a wide range of products such as carbon steel, stainless steel, non- ferrous metals and plastics. It's offer is extended to special application products, building systems and welding materials. A wide range of materials and services is available directly from warehouses throughout the country. For the building industry offers an extended range of materials and services which include, inter alia, the production of construction reinforcement. Modern rebar equipment allows to make the cut, bend , stirrups of any shape and burns. According to the customer's design, is producing reinforced elements of all shapes, as well as poles' framing. ThyssenKrupp Energostal S.A. offers reinforced elements of all shapes:

- 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 Energostal S.A. All actual technical documents are always available on website http://www.thyssenkrupp-energostal.pl.

Set of products for ThyssenKrupp Energostal under this EPD covers prefabricated steel elements shown in Table 1.

Table 1. Product description and range

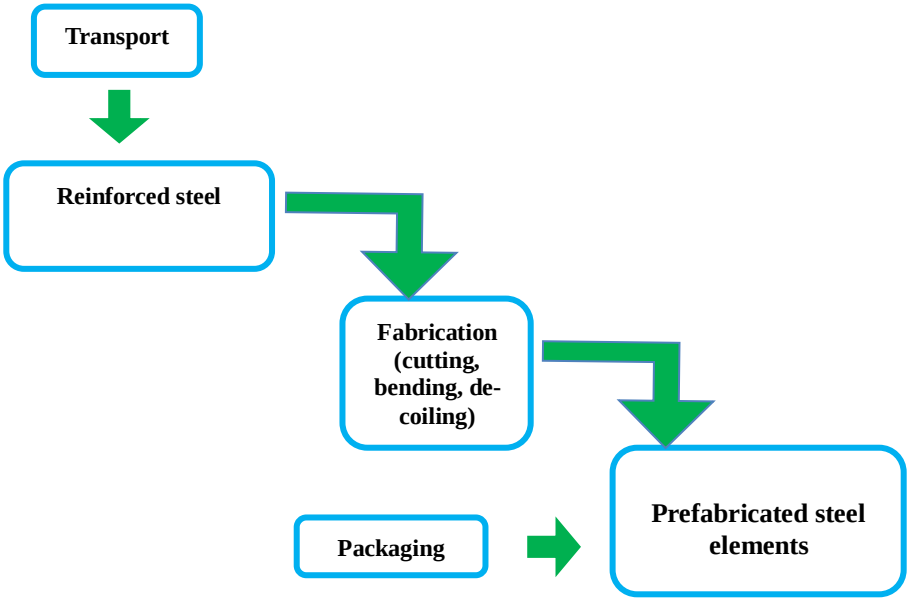
PRODUCT	TYPE	CLASS	STANDARD
Prefab rebar and wire rod ø6-8mm	type B500A	class A	PN-H-93247-1_2008; PN-EN 10080_2007; PN-EN 1992-1-1
Prefab rebar and wire rod ø10-16mm	type B500B and B500C	class B and C	PN-H-93220_2006; PN-EN 10080_2007; DIN-488; PN-EN 1992-1-1
Prefab rebar ø18-32mm	type B500B and B500C	class B and C	PN-H-93220_2006; PN-EN 10080_2007; DIN-488; PN-EN 1992-1-1

A1 and A2 Modules: Reinforcing steel supply and transport

Reinforced steel comes from local (Polish) suppliers from Poland, data for reinforced steel comes from EPD of steel produced in Poland .

Data on transport of the different products to the manufacturing plant are collected and modelled for Włocławek plant by ITB. Means of transport include truck, train and ship, and for Polish and European fuel averages are applied.

A3: Production



Manufacture covers all processes linked to 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 data. The environmental profile of these energy carriers is modelled by ITB for average Polish conditions. 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. In accordance with EN 15804, they are reported and allocated to the modules where the packaging is applied in EPD-ITB no1 and no2. Data on packaging waste created during this step are then generated. 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. Energy (e.g. electricity) are credited using national production averages.

Allocation

The allocation rules used for this EPD are based on ITB-PCR A. The prefab 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 Energostal 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 Energostal factory all sub were included in calculation. Office impacts were also 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. This study also takes into account some material flows of less than 1% and energy flows with a proportion of less than 1 energy-%,. It can be assumed that the total sum of omitted processes does not exceed 5% of all impact categories. In accordance with EN 15804, 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 (prefab reinforced steel) refer to the year 2015. 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 Energostal Włocławek inventory data. This data was verified by ISO auditor and was presented for external auditor.

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 formal conversion factors for carriers.

Databases

The data for LCA comes from the following databases: Reinforcing steel (specific EPD for reinforcing steel produced in Poland), wire rod (Generic- ITB modeled by international EPDs), Energa (Electricity). Specific data quality analysis was a part of external ISO 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 2012-2014 in accordance with formal National Mix published by annual GUS report. Specific data for power production impact - Energa

Note

Specific information on application and other actions with these system products are described in detail in the technical data sheet available on the producers website.

Environmental characteristics (LCA)

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

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	MNA	MNA	MNA

Environmental impacts: 1 Mg					
Indicator	**Unit**	**A1**	**A2**	**A3**	**A1-A3**
Global warming potential	[kg CO_2 eq.] (100 years)	464,19	22,87	12,12	499,18
Depletion potential of the stratospheric ozone layer	[kg CFC 11 eq.]	1,76E-06	6,50E-07	4,60E-08	0,0
Acidification potential of soil and water	[kg SO_2 eq.]	0,72	0,17	1,87E-02	0,91
Eutrophication potential	[kg $(PO_4)^{3-}$ eq.]	0,187	0,03	4,88E-03	0,22
Formation potential of tropospheric ozone	[kg Ethene eq.]	0,20	0,01	5,21E-03	0,2
Abiotic depletion potential (ADP-elements) for non-fossil resources	[kg Sb eq.]	6,50E-04	9,99E-07	0,0	0,0
Abiotic depletion potential (ADP-fossil fuels) for fossil resources	[MJ]	5010,69	193,44	140,14	5344,3
Environmental aspects on resource use: 1 Mg					
Indicator	**Unit**	**A1**	**A2**	**A3**	**A1-A3**
Use of renewable primary energy excluding renewable primary energy resources used as raw materials	[MJ]	1476,99	10,06	11,52	1498,57
Use of renewable primary energy resources used as raw materials	[MJ]	0,73	0,0	0,0	0,73
Total use of renewable primary energy resources (primary energy and primary energy resources used as raw materials)	[MJ]	1477,72	10,06	11,52	1499,3
Use of non-renewable primary energy excluding non-renewable primary energy resources used as raw materials	[MJ]	5956,12	223,62	168,17	6347,91
Use of non-renewable primary energy resources used as raw materials	[MJ]	15,79	0,0	2,23	18,02
Total use of non-renewable primary energy resources (primary energy and primary energy resources used as raw materials)	[MJ]	5971,9	223,62	170,4	6365,92
Use of secondary material	[kg]	265,68	0,0	0,0	265,68
Use of renewable secondary fuels	[MJ]	0,06	0,0	0,0	0,06
Use of non-renewable secondary fuels	[MJ]	240,92	0,0	0,0	240,92
Net use of fresh water	[dm^3]	9,43	1,84	5,65	16,92
Other environmental information describing waste categories: 1Mg					
Indicator	**Unit**	**A1**	**A2**	**A3**	**A1-A3**
Hazardous waste disposed	[kg]	0,0	0,0	0,0	0,0
Non-hazardous waste disposed	[kg]	50,9	0,0	0,41	51,31
Radioactive waste disposed	[kg]	0,0	0,0	0,0	0
Components for re-use	[kg]	0,0	0,0	0,0	0
Materials for recycling	[kg]	52,3	0,0	26,9	79,2
Materials for energy recovery	[kg]	0,0	0,0	0,0	0
Exported energy	[MJ]	0,0	0,0	0,0	0

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. EPD does not have to be recalculated after 5 years, if the underlying data have not changed significantly.

The basis for LCA analysis was EN 15804 and ITB PCR A
Independent verification corresponding to ISO 14025 & 8.3.1. ☒ external ☐ internal
External verification of EPD: PhD. Eng Halina Prejzner LCA, LCI audit and input data verification: M.Sc. Eng. Dominik Bekierski, d.bekierski@itb.pl Verification of LCA: PhD Eng Michał Piasecki, m.piasecki@itb.pl

Normative references

- 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 Warszawa, ul. Filtrowa 1
Zakład Fizyki Cieplnej, Instalacji Sanitarnych i Środowiska
02-656 Warszawa, ul. Ksawerów 21

ŚWIADECTWO nr 047/2016
DEKLARACJI ŚRODOWISKOWEJ III TYPU

Wyroby:

Zbrojenie prefabrykowane
(Zakład Włocławek)

Wnioskodawca:

ThyssenKrupp Energostal S.A.
87-100 Toruń, ul. Grudziądzka 159

potwierdza się poprawność ustalenia danych uwzględnionych przy opracowaniu Deklaracji Środowiskowej III typu oraz zgodność z wymaganiami normy

PN-EN 15804+A1:2014-04
Zrównoważoność obiektów budowlanych.
Deklaracje środowiskowe wyrobów.
Podstawowe zasady kategoryzacji wyrobów budowlanych.

Niniejsze świadectwo, wydane po raz pierwszy 1 lutego 2016 r. jest ważne 5 lat, lub do czasu zmiany wymienionej Deklaracji Środowiskowej

Kierownik
Zakładu Fizyki Cieplnej,
Instalacji Sanitarnych i Środowiska
dr inż. Michał Piasecki

INSTYTUT TECHNIKI BUDOWLANEJ

Zastępca Dyrektora
ds. Badań i Innowacji
dr inż. Krzysztof Kuczyński

Warszawa, luty 2016 r.