Environmental Product Declaration Type III (EPD) ITB number 512/2023

Steel structures

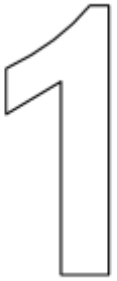
ITB cooperates with other operators of EPD programmes through the ECO-PLATFORM, (http://www.eco-platform.org/) in order to coordinate efforts to support industrial sectors while reducing verification efforts in different countries.

EPD owner:
INSTALBUD Sp. z o.o.
ul. Kościelna 4
16-020 Czarna Białostocka, Poland
www.instalbudczarna.net.pl

Programme owner:
Instytut Techniki Budowlanej (ITB)
ul. Filtrowa 1
00 - 611 Warszawa, Poland
e-mail: energia@itb.pl
www.itb.pl

Issuance date: 25.08.2023 | Validity date: 25.08.2028

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 i D according to EN 15804 (cradle to grave with options)
Year of EPD development: 2023
Declared service life: 100 years
PCR: document ITB-PCR A (based on PN-EN 15804)
Declared unit: 1 t of product
Reason for implementation: B2B
Representativeness: Polish products, 2022

Manufacturer

2

Instalbud is one of the leading companies in the steel construction industry in Poland. It offers comprehensive and professional customer service at every stage of the investment, from its technical consultancy, through designing, to general contracting of various building structures.

Instalbud has been on the Polish market since 2001 - during this time it has carried out more than 400 investments all over the country and abroad, including the Scandinavian market. It offers services in the field of concept development, structural design, valuation and execution of investments. Instalbud deals with the implementation of the following types of structures: engineering structures and bridges, footbridges, steel shelters, sports and recreational facilities, sports and entertainment halls, canopies for sports facilities, high storage facilities, production and storage halls, commercial facilities, public utility facilities, towers and masts (steel and radar trusses) and process lines. In addition, Instalbud deals with stainless steel gallantry, performance of anti-corrosion and fire protection.

The highest quality of Instalbud's steel structures is ensured by the use of state-of-the-art technologies and production systems, as well as well trained, competent and experienced engineering and technical staff.

Description of products and application

3

The structural steel elements covered in this study are applied in numerous types of constructions. They are used to construct inter alia: engineering structures, bridges, footbridges, steel shelters, sports and recreational facilities, sports and entertainment halls, canopies for sports facilities, high storage facilities, production halls, warehouse halls, commercial facilities, public utility facilities, towers and masts (steel and radar trusses) and process lines.

The products described are used, among other things, as beams, frames, columns, trusses, plate girders, tubular elements or structures for cranes.

The steel elements covered in the study are manufactured in many variants, which differ from each other, e.g. in steel grade, geometry or the way the elements are joined. Steel products are custom manufactured, they are tailored as closely as possible to the requirements of specific projects.

Life cycle assessment (LCA) - general principles

Declared unit

The declared unit of product is 1 t of steel structures for various purposes.

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 INSTALBUD Sp. z o.o. at 4 Kościelna Street in Czarna Białostocka. Input data and emissions were collected for the entire plant, where only the production of the products covered in this study takes place. All impacts from raw material extraction are allocated in module A1. Production of products is based on raw and recycled materials. Steel for the production of products is supplied from Poland and other European countries. The core material in products is steel produced by steel mills. In the steel mills, steel is obtained from new raw materials and from recycled components, i.e. remeltied scrap. The share of raw steel was assumed to be 10% and recycled steel 90%. 100% of the inflows from the production lines were inventoried and allocated to the product manufacturing. Module A2 includes the transport of steel from Polish and foreign distributors (mainly Italy, Czech Republic) to the production plant in Czarna Białostocka. Energy, fuel and waste supplies for the entire production process were inventoried and included in module A3.

System boundaries

The life cycle analysis of the declared products includes the Production Stage (modules A1 - A3) and modules A4, C1-C4+D ("from cradle to grave with options") according to EN 15804 and ITB PCR A.

System limits

100% of input materials and 100% of energy, gas and fuel consumption were inventoried at the Czarna Białostocka production plant. All relevant parameters from the collected production data are included in the assessment, i.e. all materials used in production (including recycled raw materials), direct production waste, fuels , electricity and gas consumption.

Modules A1 and A2 Extraction and transport of raw materials

Raw materials for production, such as steel, welding wires, and paints are transported from various European countries: Poland, Italy, Czech Republic, Spain, Bulgaria, Ukraine, Germany and Romania. Module A1 shows the impact of the production of the raw materials (mainly steel) further used in the production of steel structures. Raw material transport data is recorded by the plant. Means of transport include trucks. Global fuel averages (Euro 5) were used for the calculation of module A2.

Module A3 Production

The production process is illustrated in the diagrams on page 8. Once the raw materials have been delivered, processing takes place. Profiles are cut on a saw and then drilling and bevelling takes place. Sheets are CNC machined and then drilled and bevelled. Sheets and profiles are picked, integrated into products. Other machining operations include welding, grinding, straightening and painting. The finished products are stored in the warehouse yard, from where they are dispatched to customers. During the process electricity and gasses (acetylene, argon, nitrogen, oxygen and carbon dioxide) are used. Internal transport includes electrically powered cranes and diesel-powered forklifts.

The table below shows the composition of the steel products:

Percentage composition of steel products:

Materials	Percentage share of product
Steel	96,5%
Welding wire	2,5%
Corrosion protection paint	1,0%

Module A4 Transport

Transport to the place of installation takes place from the plant in Czarna Białostocka. The finished products are packed on the truck without packaging. Transport is ordered by the customer and both road and sea transport are used. The largest recipients of orders are in Sweden. The fuel used is diesel. It is assumed that the vast majority of products are transported to Sweden. The total distance is 2,000 km, covered by truck to the port and then on to the ferry. Transport is by sea. After disembarking from the ferry, the remainder of the journey is by road transport to the construction site.

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 fuels needed for deconstruction was assumed on the basis of the literature.

Module C2 Transport

It is assumed that the end-of-life product will be transported by truck to the nearest waste treatment facility (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 steel mill 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 result 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 steel products.

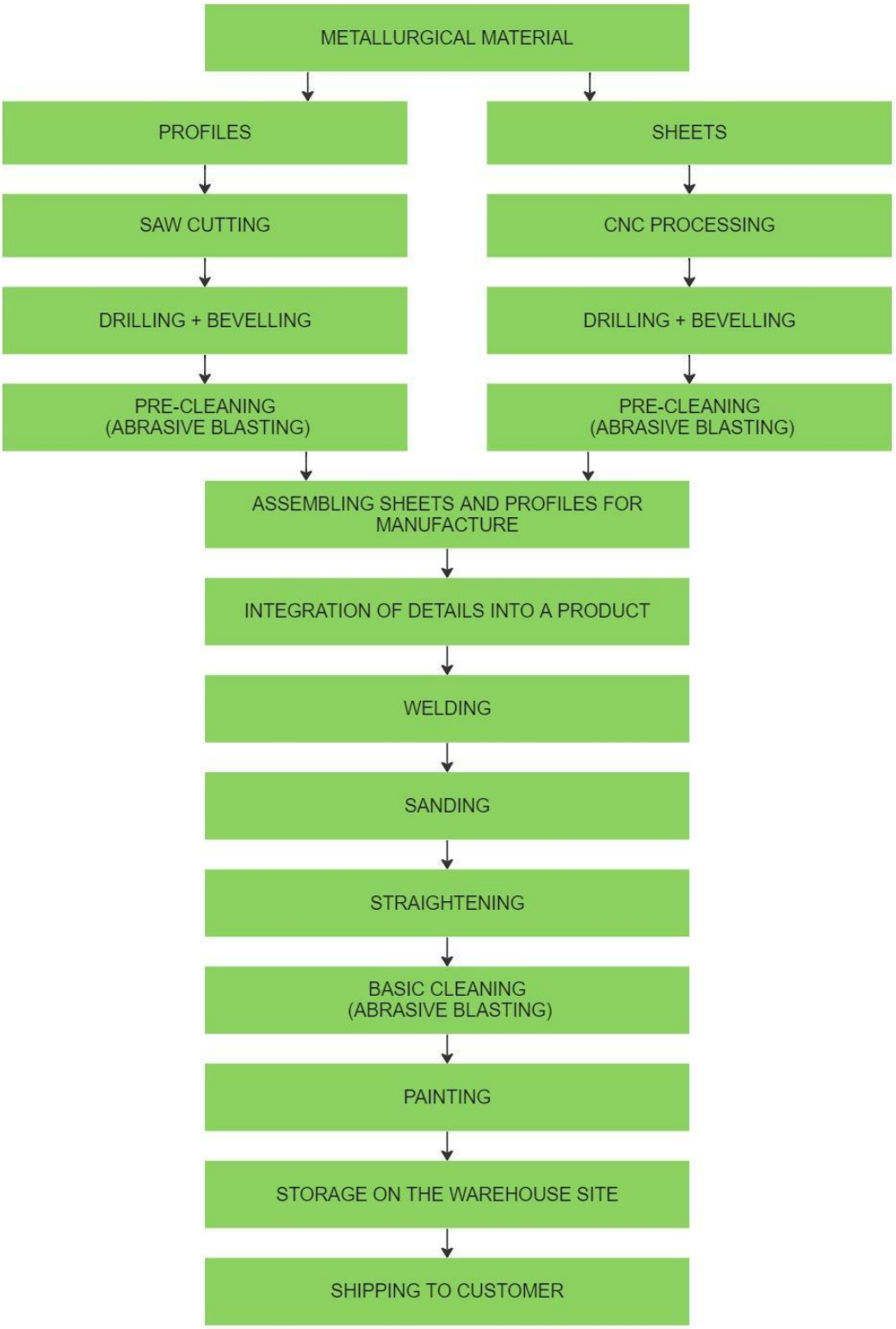
Calculation principles

The LCA was performed in accordance with the PN-EN 15805 standard and the ITB PCR A 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. The characterisation factors are CML ver. 4.2 based on EN 15804+A2.

Production scheme of steel structures



Life cycle assessment (LCA) - results

5

Declared unit

The declared unit is 1 t of steel structures manufactured by INSTALBUD 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	Refurbishmentt	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 steel structures

Environmental impacts

Indicator	Unit	A1	A2	A3	A4	C1	C2	C3	C4	D
Global warming potential- total	kg CO2 eq.	1.19E+03	8.15E+01	2.21E+02	1.88E+02	2.08E+01	9.10E+00	5.58E+01	1.98E+00	-8.99E+01
Global warming potential- fossil	kg CO2 eq.	1.18E+03	8.15E+01	2.11E+02	1.88E+02	2.08E+01	9.09E+00	5.58E+01	1.98E+00	-9.02E+01
Global warming potential- biogenic	kg CO2 eq.	-1.07E+01	5.92E-02	9.93E+00	1.03E-01	1.66E-02	6.60E-03	1.02E-02	4.94E-04	1.51E-01
Global warming potential- LULAC	kg CO2 eq.	1.75E+01	2.45E-02	4.35E-02	6.76E-02	6.76E-03	2.74E-03	5.56E-03	8.07E-04	9.84E-02
Depletion potential of the stratospheric ozone layer	kg CFC 11 eq.	7.30E-05	1.92E-05	4.99E-06	4.30E-05	3.41E-05	2.14E-06	1.19E-05	4.52E-07	-2.44E-06
Acidification potential	mol H+ eq.	6.08E+00	3.40E-01	2.03E+00	1.79E+00	2.53E-01	3.82E-02	5.80E-01	2.00E-02	-3.34E-01
Eutrophication aquatic freshwater	kg Pe	3.97E-03	6.63E-04	1.25E-02	1.39E-03	1.91E-04	7.39E-05	1.85E-04	8.66E-06	-7.03E-04
Eutrophication aquatic marine	kg N eq.	1.15E+00	1.03E-01	2.56E-01	4.81E-01	3.20E-02	1.15E-02	2.57E-01	8.67E-03	-1.85E-04
Eutrophication terrestrial	kg N eq.	1.22E+01	1.14E+00	3.10E+00	5.33E+00	3.52E-01	1.27E-01	2.82E+00	9.50E-02	-9.27E-01
Formation potential of tropospheric ozone	kg NMVOC eq.	4.97E+00	3.66E-01	7.68E-01	1.51E+00	1.42E-01	4.09E-02	7.74E-01	2.62E-02	-5.16E-01
Abiotic depletion potential for non-fossil resources	kg Sb eq.	5.80E-03	1.39E-03	3.15E-04	2.84E-03	2.59E-05	1.55E-04	2.79E-05	1.56E-06	-2.85E-03
Abiotic depletion potential for fossil resources	MJ	1.72E+04	1.27E+03	2.37E+03	2.82E+03	2.02E+03	1.41E+02	7.51E+02	2.89E+01	-7.45E+02
Water use	m^3	8.47E+02	4.71E+00	5.06E+01	9.69E+00	2.71E+00	5.30E-01	2.02E+00	9.15E-02	3.75E+01

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	1.43E+03	1.60E+01	1.97E+02	3.27E+01	5.29E+00	1.78E+00	4.29E+00	2.02E-01	-1.10E+02
Renewable primary energy for material use	MJ	1.27E+02	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	1.55E+03	1.60E+01	1.97E+02	3.27E+01	5.29E+00	1.78E+00	4.29E+00	2.02E-01	-1.10E+02
Non-renewable primary energy as an energy source	MJ	1.99E+04	1.27E+03	2.37E+03	2.82E+03	2.76E+02	1.41E+02	7.51E+02	2.89E+01	-7.45E+02
Non-renewable primary energy for material use	MJ	1.95E+02	0.00E+00	7.68E-01	0.00E+00	1.74E+03	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Completely non-renewable primary energy	MJ	2.01E+04	1.27E+03	2.37E+03	2.82E+03	2.02E+03	1.41E+02	7.51E+02	2.89E+01	-7.45E+02
Use of secondary raw materials	kg	9.16E+02	0.00E+00	2.85E-02	0.00E+00	9.212E-02	0.00E+00	2.939E-01	1.119E-02	6.32E+01
Renewable secondary fuels	MJ	9.18E-03	0.00E+00	1.35E-04	0.00E+00	1.61E-03	0.00E+00	9.61E-04	5.99E-05	-1.27E-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^3	2.30E+01	2.64E-01	1.43E+00	5.35E-01	6.77E-02	2.94E-02	4.56E-02	6.29E-03	-2.53E+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	9.72E+00	1.23E+00	1.13E+01	2.80E+00	5.70E-01	1.37E-01	0E+0	3.86E-02	-5.66E+01
Non-hazardous waste destined for disposal	kg	2.83E+02	1.36E+02	5.26E+02	2.61E+02	7.25E+00	1.52E+01	0E+0	6.37E-01	-1.83E+02
Radioactive waste for disposal	kg	5.86E-02	8.70E-03	3.20E-03	1.95E-02	1.46E-02	9.70E-04	0E+0	2.01E-04	1.56E-04
Components to be reused	kg	0E+0	0E+0	0E+0	0E+0	0E+0	0E+0	0E+0	0E+0	0E+0
Materials to be recycled	kg	4.34E+00	0E+0	3.10E+00	0E+0	0E+0	0E+0	9.70E+02	0E+0	0E+0
Materials destined for energy recovery	kg	2.63E-10	0E+0	0E+0	0E+0	0E+0	0E+0	0E+0	0E+0	0E+0
Electricity exported	MJ	0E+0	0E+0	0E+0	0E+0	0E+0	0E+0	0E+0	0E+0	0E+0

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 [X] external**
External verification of EPDs: Michał Piasecki, Professor ITB, m.piasecki@itb.pl **Input data verification, LCI audit, LCA: Agnieszka Kaczmarek, JW+A, a.kaczmarek@jw-a.pl** **LCA verification: Michał Piasecki, ITB professor, m.piasecki@itb.pl**

The declaration owner has the sole ownership, liability, and responsibility for the declaration. Declarations within the same product category but from different programmes may not be comparable. Declarations of products may not be comparable if they do not comply with EN 15804. For further information about comparability, see EN 15804 and ISO 14025.

Normative references

- ITB PCR A General Product Category Rules for Construction Products (ITB, 2023)
- 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
- PN-EN 1057 Miedź i stopy miedzi. Rury miedziane okrągłe bez szwu do wody i gazu stosowane w instalacjach sanitarnych i ogrzewania
- ISO 20915:2018 Life cycle inventory calculation methodology for steel products
- World Steel Association 2017 Life Cycle inventory methodology report for steel products

Signature Not Verified
Dokument podpisany przez
Michał Piasecki; ITB
Data: 2023.08.29 10:38:03 CEST

Instytut Techniki Budowlanej
00-611 Warsaw, Filtrowa 1

Thermal Physics, Acoustics and Environment Department
02-656 Warsaw, Ksawerów 21

CERTIFICATE № 512/2023
of TYPE III ENVIRONMENTAL DECLARATION

Products:

Steel structures

Manufacturer:

INSTALBUD Sp. z o.o.

ul. Kościelna 4, 16-020 Czarna Białostocka, Poland

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

EN 15804+A2

Sustainability of construction works.
Environmental product declarations.
Core rules for the product category of construction products.

This certificate, issued on 25th August 2023 is valid for 5 years
or until amendment of mentioned Environmental Declaration

Head of the Thermal Physic, Acoustics
and Environment Department
Agnieszka Winkler-Skalna, PhD

INSTYTUT TECHNIKI BUDOWLANEJ

Deputy Director
for Research and Innovation
Krzysztof Kuczyński, PhD

Warsaw, August 2023