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Hot rolled steel profiles



Owner of the EPD:

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



Basic information

This declaration is the Type III Environmental Product Declaration (EPD) based on EN 15804+A2 and verified according to ISO 14025 by an external auditor. It contains the information on the impacts of the declared construction materials on the environment and their aspects verified by the independent body according to ISO 14025. Basically, comparison or evaluation of EPD data is possible only if all the compared data were created according to EN 15804+A2.

Life cycle analysis (LCA): A1-A3, C2-C4 and D modules in accordance with EN 15804 (Cradle-to-Gate with options)

The year of preparing the EPD: 2022

Products standards: see Table 1

Service Life: 100 years

PCR: ITB-PCR A

Declared unit: 1 ton

Reasons for performing LCA: B2B

Representativeness: Polish, European

MANUFACTURER

Walcownie Ostrowieckie WOST S.A. company is a Polish and European producer of hot-rolled profiles, established in 2015 and offering products and services has been developed based on the current market needs. The Ostrowiec production plant boasts over 200 years of rolling process experience, knowledge and tradition. The rolling mill provides customers with a wide range of products of various grades and parameters what make them applicable in many areas of activity like construction, road engineering and power industry.

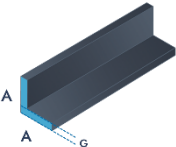
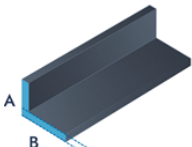


Fig. 1. A view of the rolling mill of Walcownie Ostrowieckie WOST S.A.

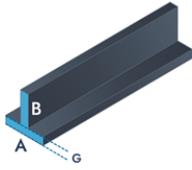
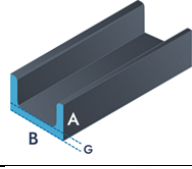
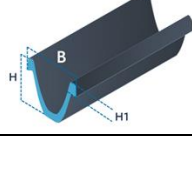
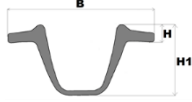
PRODUCTS DESCRIPTION AND APPLICATION

The hot rolled steel profiles are made of steel bloom produced in electric arc furnace (EAF) process using 100% of iron scrap. The profiles constitute intermediate products commonly used for construction of power poles, roads, steel structures, supporting structures for buildings, load-bearing structures of buildings such industrial halls and warehouses as well as in railway, mining and shipbuilding industry. The range of hot rolled steel profiles manufactured by Walcownie Ostrowieckie WOST S.A. is listed in Table 1.

Table 1. The range of hot rolled steel profiles manufactured by Walcownie Ostrowieckie WOST S.A.

Typ of profiles	View	Length range, mm	Standards
Equal angles		3000 – 15300	PN-EN 10025-5:2019 PN-EN 10028-1:2017-09 PN-EN 10028-2:2017-09 PN-EN10025-1:2007 PN-EN10025-2:2019-11 PN-EN10056-2:1998
Unequal angles		3000 – 15300	PN-EN 10025-5:2019 PN-EN 10028-1:2017-09 PN-EN 10028-2:2017-09 PN-EN10025-1:2007 PN-EN10025-2:2019-11 PN-EN10056-2:1998

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T-bars		3000 – 15300	DIN 1024 PN-EN 10025-5:2019 PN-EN10025-1:2007 PN-EN10025-2:2019-11 PN-EN10055:1999
UPN channels-		3000 – 15300	PN-EN 10025-5:2019 PN-EN10025-1:2007 PN-EN10025-2:2019-11 PN-EN10279:2003
Th&V Profiles		3000 – 15300	DIN21544:1990-07 PN-H-84042:2009+Az1:2012 PN-H-93441-1:2013-12 PN-H-93441-3:2004 WT-1/19
J-profiles		3000 – 15300	PN-H-84042:2009+Az1:2012 WT-1/J36/18

LIFE CYCLE ASSESSMENT (LCA) – general rules applied

Allocation

The allocation rules used for this EPD are based on general ITB PCR A v. 1.5. Production of the hot rolled steel profiles is a line process conducted in the rolling mill of Walcownie Ostrowieckie WOST S.A., located in Ostrowiec Świętokrzyski (Poland). All impacts from raw materials extraction and processing are allocated in module A1 of the LCA. Impacts from the global line production of Walcownie Ostrowieckie WOST S.A. were inventoried and 100% was allocated to the production of the hot rolled steel profiles based on the products mass basis. Water and energy consumption, associated emissions and generated wastes are allocated to module A3.

System limits

The life cycle analysis (LCA) of the declared products covers: product stage – modules A1-A3, end of life – modules C2-C4 and benefits and loads beyond the system boundary – module D (cradle-to-gate with options) in accordance with EN 15804+A2 and ITB PCR A v. 1.5. Energy and water consumption, emissions as well as information on generated wastes were inventoried and were included in the calculations. It can be assumed that the total sum of omitted processes does not exceed 5% of all impact categories. In accordance with EN 15804+A2, machines and facilities (capital goods) required for the production as well as transportation of employees were not included in LCA.

Modules A1 and A2: Raw materials supply and transport

Steel blooms used to produce hot rolled profiles come from local as well as foreign mills using electric arc furnace (EAF) process, thus the total recycled content in the declared products amounts to 100%. Means of transport include trains and lorries. European standards for average combustion were used for calculations.

Module A3: Production

A scheme of the hot rolled steel profiles production is presented in Fig. 2.

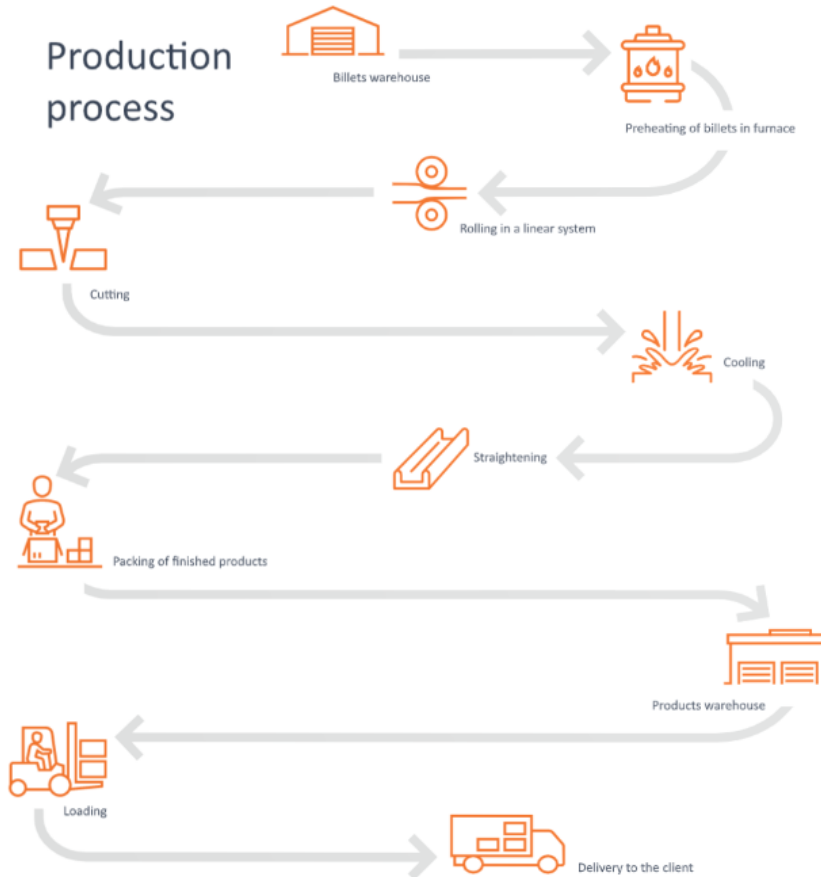


Fig. 2. A scheme of the hot rolled steel profiles production the rolling mill of Walcownie Ostrowieckie WOST S.A.

Modules C2-C4 and D: End-of-life (EoL)

The hot rolled steel profiles constitutes intermediate products. Versatile application on the hot rolled steel profiles excludes the possibility of precise modeling of the impacts occurring at the de-construction stage thus the module C1 is not declared within this EPD. In the adapted end-of-life scenario, the de-constructed hot rolled steel profiles are transported to a steel mill distant by 150 km on > 16t lorry EURO 5, where are used as steel scrap to produce new steel. Module D presents credits resulting from the recycling of the primary steel scrap (0%), calculated in accordance with the net scrap approach developed by World Steel Associated.

Table 2. End-of-life scenario for the hot rolled steel profiles manufactured by Walcownie Ostrowieckie WOST S.A.

Material	Material recovery	Recycling	Landfilling
Steel scrap	100%	98%	2%

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Data quality

The data selected for LCA originate from ITB-LCI questionnaires completed by Walcownie Ostrowieckie WOST S.A. using the inventoried data at the rolling mill, ITB database and Ecoinvent v.3.8. No specific data collected is older than five years and no generic datasets used are older than ten years. The representativeness, completeness, reliability, and consistency are judged as good.

Data collection period

Primary data provided by Walcownie Ostrowieckie WOST S.A. covers a period from 01.01.2020 to 31.12.2020 (1 year). The life cycle assessments were prepared for Poland and Europe as reference area.

Assumptions and estimates

The impacts of the representative hot rolled steel profiles were aggregated using weighted average. Impacts were inventoried and calculated for all hot rolled steel profiles manufactured by Walcownie Ostrowieckie WOST S.A.

Calculation rules

LCA was performed using ITB-LCA tool developed in accordance with EN15804+A2.

Databases

The data for the LCA calculation comes from specific EPDs (steel blooms), Ecoinvent v.3.8 (steel blooms from EAF process) and ITB Database. Specific data quality analysis was a part of an external audit.

LIFE CYCLE ASSESSMENT (LCA) – Results

Declared unit

The declaration refers to declared unit (DU) – 1 ton of the hot rolled steel profiles manufactured by Walcownie Ostrowieckie WOST S.A.

Table 3. System boundaries for the environmental characteristic of the hot rolled steel profiles.

Environmental assessment information (MD – Module Declared, MND – Module Not 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	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MD	MD	MD	MD

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Table 4. Life cycle assessment (LCA) results of the hot rolled steel profiles manufactured by Walcownie Ostrowieckie WOST S.A. – environmental impacts (DU: 1 ton)

Indicator	Unit	A1	A2	A3	A1-A3	C2	C3	C4	D
Global Warming Potential	eq. kg CO2	5.54E+02	1.31E+00	1.21E+02	6.77E+02	1.08E+00	1.72E+00	1.06E-01	0.00E+00
Greenhouse gas potential - fossil	eq. kg CO2	5.25E+02	1.31E+00	1.20E+02	6.47E+02	1.07E+00	4.91E-01	1.05E-01	0.00E+00
Greenhouse gas potential - biogenic	eq. kg CO2	2.86E+01	5.30E-03	1.03E+00	2.97E+01	4.35E-03	4.21E-04	2.68E-04	0.00E+00
Global warming potential - land use and land use change	eq. kg CO2	6.99E-01	6.14E-04	1.58E-02	7.15E-01	5.04E-04	4.86E-05	9.94E-05	0.00E+00
Stratospheric ozone depletion potential	eq. kg CFC 11	3.07E-05	2.93E-07	7.45E-06	3.85E-05	2.41E-07	1.04E-07	4.26E-08	0.00E+00
Soil and water acidification potential	eq. mol H+	2.36E+00	5.19E-03	6.18E-01	2.98E+00	4.26E-03	2.45E-03	9.90E-04	0.00E+00
Eutrophication potential - freshwater	eq. kg P	3.42E-01	1.03E-04	9.47E-02	4.37E-01	8.42E-05	1.51E-05	9.81E-06	0.00E+00
Eutrophication potential - seawater	eq. kg N	4.94E-01	1.52E-03	9.07E-02	5.86E-01	1.24E-03	9.52E-04	3.45E-04	0.00E+00
Eutrophication potential - terrestrial	eq. mol N	4.92E+00	1.65E-02	8.06E-01	5.74E+00	1.36E-02	1.04E-02	3.77E-03	0.00E+00
Potential for photochemical ozone synthesis	eq. kg NMVOC	1.41E+00	5.08E-03	2.53E-01	1.66E+00	4.17E-03	2.95E-03	1.10E-03	0.00E+00
Potential for depletion of abiotic resources - non-fossil resources	eq. kg Sb	1.57E-03	6.06E-06	1.21E-04	1.70E-03	4.98E-06	2.54E-07	2.42E-07	0.00E+00
Abiotic depletion potential - fossil fuels	MJ	7.48E+03	1.91E+01	1.75E+03	9.24E+03	1.57E+01	6.55E+00	2.89E+00	0.00E+00
Water deprivation potential	eq. m ³	3.02E+02	1.00E-01	1.77E+01	3.20E+02	8.21E-02	1.76E-02	9.16E-03	0.00E+00

Table 5. Life cycle assessment (LCA) results of the hot rolled steel profiles manufactured by Walcownie Ostrowieckie WOST S.A. – additional impacts indicators (DU: 1 ton)

Indicator	Unit	A1	A2	A3	A1-A3	C2	C3	C4	D
Particulate matter	disease incidence	INA	INA	INA	INA	INA	INA	INA	INA
Potential human exposure efficiency relative to U235	eg. kBq U235	INA	INA	INA	INA	INA	INA	INA	INA
Potential comparative toxic unit for ecosystems	CTUe	INA	INA	INA	INA	INA	INA	INA	INA
Potential comparative toxic unit for humans (cancer effects)	CTUh	INA	INA	INA	INA	INA	INA	INA	INA
Potential comparative toxic unit for humans (non-cancer effects)	CTUh	INA	INA	INA	INA	INA	INA	INA	INA
Potential soil quality index	dimensionless	INA	INA	INA	INA	INA	INA	INA	INA

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Table 6. Life cycle assessment (LCA) results of the hot rolled steel profiles manufactured by Walcownie Ostrowieckie WOST S.A. - the resource use (DU: 1 ton)

Indicator	Unit	A1	A2	A3	A1-A3	C2	C3	C4	D
Consumption of renewable primary energy - excluding renewable primary energy sources used as raw materials	MJ	INA	INA	INA	INA	INA	INA	INA	INA
Consumption of renewable primary energy resources used as raw materials	MJ	INA	INA	INA	INA	INA	INA	INA	INA
Total consumption of renewable primary energy resources	MJ	1.02E+03	3.29E-01	6.33E+01	1.08E+03	2.70E-01	3.76E-02	2.51E-02	0.00E+00
Consumption of non-renewable primary energy - excluding renewable primary energy sources used as raw materials	MJ	INA	INA	INA	INA	INA	INA	INA	INA
Consumption of non-renewable primary energy resources used as raw materials	MJ	INA	INA	INA	INA	INA	INA	INA	INA
Total consumption of non-renewable primary energy resources	MJ	7.48E+03	1.91E+01	1.89E+03	9.39E+03	1.57E+01	7.09E+00	2.89E+00	0.00E+00
Consumption of secondary materials	kg	1.13E+03	7.86E-03	1.38E-01	1.13E+03	6.45E-03	2.56E-03	6.07E-04	0.00E+00
Consumption of renewable secondary fuels	MJ	9.97E-02	9.08E-05	5.36E-04	1.00E-01	7.45E-05	8.38E-06	1.59E-05	0.00E+00
Consumption of 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
Net consumption of freshwater resources	m ³	9.66E+00	2.69E-03	2.87E-01	9.95E+00	2.21E-03	1.18E-04	3.16E-03	0.00E+00

Table 7. Life cycle assessment (LCA) results of the hot rolled steel profiles manufactured by Walcownie Ostrowieckie WOST S.A. waste categories (DU: 1 ton)

Indicator	Unit	A1	A2	A3	A1-A3	C2	C3	C4	D
Hazardous waste. neutralized	kg	3.98E+02	2.49E-02	8.32E-03	3.98E+02	2.05E-02	1.83E-05	3.07E-03	0.00E+00
Non-hazardous waste. neutralised	kg	1.37E+03	4.51E-01	5.98E+00	1.37E+03	3.70E-01	8.91E-03	4.32E-02	0.00E+00
Radioactive waste	kg	4.49E-02	1.31E-04	9.30E-04	4.60E-02	1.07E-04	4.63E-05	1.92E-05	0.00E+00
Components for re-use	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
Materials for recycling	kg	4.64E-02	6.60E-05	1.08E+02	1.08E+02	5.42E-05	9.80E+02	5.78E-06	0.00E+00
Materials for energy recovery	kg	1.67E-04	5.25E-07	1.39E-05	1.81E-04	4.31E-07	1.40E-07	6.85E-08	0.00E+00
Energy exported	MJ per energy carrier	4.47E+01	2.33E-02	2.88E+00	4.76E+01	1.91E-02	2.86E-02	0.00E+00	0.00E+00

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Verification

The process of verification of this EPD is in accordance with ISO 14025 and ISO 21930. 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 (subclause 8.1.3.) <input checked="" type="checkbox"/> external <input type="checkbox"/> internal
External verification of EPD: Halina Prejzner, PhD Eng LCA, LCI audit and input data verification: Justyna Tomaszewska, PhD Eng, j.tomaszewska@itb.pl Verification of LCA: Michał Piasecki, PhD, DSc, Eng

Normative references

- 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
- ISO 15686-1:2011 Buildings and constructed assets – Service life planning – Part 1: General principles and framework
- ISO 15686-8:2008 Buildings and constructed assets – Service life planning – Part 8: Reference service life and service-life estimation
- EN 15804:2012+A2:2019 Sustainability of construction works – Environmental product declarations – Core rules for the product category of construction products
- ISO 14067:2018 Greenhouse gases — Carbon footprint of products — Requirements and guidelines for quantification
- PN-EN 15942:2012 Sustainability of construction works – Environmental product declarations – Communication format business-to-business
- ISO 20915:2018 Life cycle inventory calculation methodology for steel products
- KOBiZE Wskaźniki emisyjności CO₂, SO₂, NO_x, CO i pyłu całkowitego dla energii elektrycznej. Grudzień 2021
- World Steel Association 2017 Life Cycle inventory methodology report for steel products

Z-ca KIEROWNIKA
Zakładu Fizyki Ciepłej, Akustyki i Środowiska
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Thermal Physics, Acoustics and Environment Department
02-656 Warsaw, Ksawerów 21

CERTIFICATE No 360/2022
of TYPE III ENVIRONMENTAL DECLARATION

Product:

Hot rolled steel profiles

Manufacturer:

Walcownie Ostrowieckie WOST S.A.

ul. Centralnego Okręgu Przemysłowego 12A, 27-400 Ostrowiec Świętokrzyski, 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

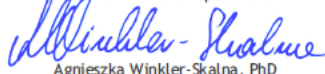
Sustainability of construction works.

Environmental product declarations.

Core rules for the product category of construction products.

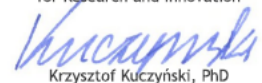
This certificate, issued for the first time on 20th August 2022 is valid for 5 years
or until amendment of mentioned Environmental Declaration

Head of the Thermal Physics, Acoustics
and Environment Department


Agnieszka Winkler-Skalna, PhD



Deputy Director
for Research and Innovation


Krzysztof Kuczyński, PhD

Warsaw, August 2022