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Lighting columns



Owner of the EPD:

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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, C1-C4 and D modules in accordance with EN 15804
(Cradle-to-Gate with options)

The year of preparing the EPD: 2023

Product standard: EN 40-5:2002

Service Life: 35 years for standard product (galvanized)

PCR: ITB-PCR A (PCR v .1.6 based on EN 15804+A2)

Declared unit: 1 ton

Reasons for performing LCA: B2B

Representativeness: Polish, European

Description of the organization:

Tecpoles Sp. z o.o. is a manufacturer and distributor of lighting, catenary, energy, and telecommunication poles made of steel as well as dedicated constructions such as road barriers and structures for solar panels. The portfolio includes standard and special solutions, as well as a variety of services ranging from consulting and project management to economical delivery of orders even in the smallest quantities. The production plant is located in Kragola, Poland. With over 150 employees, the company's annual turnover amounts to over 160 million PLN. In business, Tecpoles combines its over 100 years of experience with the latest technological solutions and practices to be ranked as the leader in steel production. The core values of Tecpoles are consistent quality, safety and sustainability.



Fig. 1. The view of the company headquarters of Tecpoles Sp. z o.o. in Kragola.

PRODUCTS DESCRIPTION AND APPLICATION

The steel columns covered by this EPD are manufactured by Tecpoles Sp. z o.o. in three convergences: 1:10, 1:11 and 1:14. Hot-rolled steel sheet with thicknesses ranging from 2 mm to 4 mm is used for production. The range of pole heights produced includes structures from 3 m to 14 m and a top diameter of more than 60 mm. Three types of lighting columns are produced: CC type (with feet), KLM type (embedded poles) and RSM type (with sleeves). Each of these groups is assigned appropriate dimensional ranges or wall thicknesses defined by standards and mechanical properties met by the Tecpoles production plant.

Lighting columns are structures designed to illuminate any traffic area, on which a luminaire (light source) can be mounted directly or, if required, several luminaires by means of single and multiple extension arms designed according to customer requirements. Other terms for this product are: street lanterns, street lamp posts.

The product range is presented in the product [Katalog produktowy 2023](#) and is described in terms of material, shape, height, taper, together with the conditions of use (passive safety). Depending on the type, the pole is circular or octagonal in cross-section. In addition, the pole can be fitted with single or multi-armed outriggers. The brackets are divided into two types: straight and bent. In addition, they are manufactured at various angles of inclination of the arm to the ground, such as 0°, 5°, 10°, 15°. and a maximum lateral extension arm of 4.5 m (maximum permissible arm length according to EN 40-5).

Lighting columns intended for mounting on prefabricated foundations are equipped with a steel base fastened with a set of anchor bolts embedded in the above-mentioned foundations and a hole with a door, allowing the installation of an electrical connection including lighting control. In the case of poles intended for direct installation in the ground, they are additionally provided with a cable hole allowing the power connection to be inserted into the ground.

Galvanized steel poles are largely resistant to corrosion, resistant to dirt and vandalism. Thanks to their excellent vibration characteristics, they are also very stable. This makes them durable and allows you to reduce the costs of maintenance and early replacement.

LIFE CYCLE ASSESSMENT (LCA) – general rules applied

Declared unit

1 ton of steel product - Lighting columns. Conversion from a page to a piece of product is possible by adopting a conversion factor (ton -> piece) of 0.0527 (52.7 kg is the weight of an average weighted pole).

Allocation

The allocation rules used in this EPD are based on the general rules of ITB PCR A. The production of lighting columns is carried out by Tecpoles Sp. z o. o. at the production plant located in Kragola. The production process carried out at another company's plant is galvanizing, which was included in the calculations. The allocation was made based on the weight of the products. All impacts related to the extraction and processing of raw materials have been assigned in the A1 LCA module. Impacts related to the global linear production of Tecpoles Sp. z o. o. were inventoried and 100% assigned to lighting columns. Water and energy consumption, associated emissions and waste generated have been assigned to module A3. Packaging materials included. The allocation of materials, energy and auxiliary products used in the external galvanization plant is made considering the ratio (in weight) of columns galvanized in the unit/total products galvanized in the unit.

System limits

The life cycle analysis (LCA) of the declared products covers: product stage – modules A1-A5, end of life – modules C1-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. 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 A5, B1-B5 are not assessed. In B1-B5, only marginal maintenance is required.

Modules A1 and A2: *Raw materials supply and transport*

Steel rolls (hot rolled sheet), ancillary materials and packaging materials come from both local and foreign suppliers. Transport is carried out by lorries. For calculation purposes Polish and European fuel averages were applied.

Module A3: *Production*

The diagram of the production process is shown in Fig. 2. Production processes are as follow:

- Cutting sheet metal - the result is a trapezoidal sheet
- Forming - this is bending trapezoidal sheet metal on hydraulic presses; the result is a sheet in the form of an open conical column (without welding the edges of the sheet)
- Laser welding - automatic welding of the longitudinal edges of a pole formed on presses
- Plasma cutting - cutting holes in the pole for doors and possibly holes for cables (for poles buried in the ground)
- Initial arming, etc. – according to the diagram
- Welding of bases, collar (not included in the diagram) - optional, depending on the type of pole being manufactured
- Galvanizing – performed on request by an external company
- Straightening of columns and final reinforcement - according to the diagram

At the customer's request, poles can also be bent.

In addition, the plant produces booms for poles.

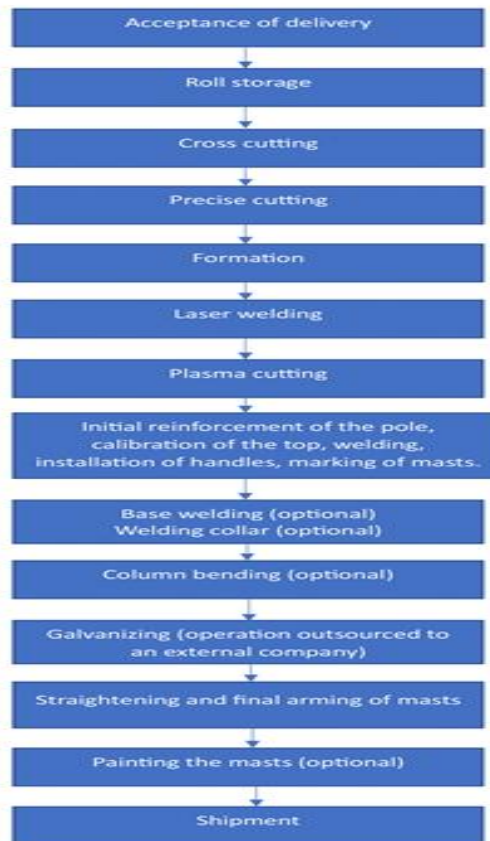


Fig. 2. The scheme of the lighting columns production by Tec poles Sp. z o.o.

Module A4: transport to consumer

Vehicle transport at distance 500 km is considered (emission standard: Euro 5) with 100% load capacity. The product is delivered on the site. Columns are grouped and belted together in batches. For protection, either wooden bars or foam are placed between them.

Modules C1-C4 and D: End-of-life (EoL)

For the end-of-life of the lighting pole it is assumed that the pole is dismantled, and the totality of the components are collected. Five per cent of the materials are mixed with the dismantling waste and ninety-five per cent is separated and sent to recycling. Benefits and loads beyond the system boundary were calculated using a net scrap formulation proposed by World Steel Association in life cycle inventory methodology report (2017), where the net scrap is determined as a difference between the amount of steel recycled at end-of-life and the scrap input from previous product life cycle (assumed as minimum 55%).

Data quality

The values determined to calculate the LCA originate from verified Tecpoles Sp. z o.o. inventory data. The data selected for LCA originate from ITB-LCI questionnaires completed by producer using the inventoried data. ITB uses database and Ecoinvent v.3.9.1. For steel input specific EPDs from delivery companies were used. 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

The data for manufacture of the declared products refer to period between 01.01.2022 – 31.12.2022 (1 year). The life cycle assessments were prepared for Poland and Europe as reference area.

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Assumptions and estimates

The impacts of the lighting columns were aggregated using weighted average. Impacts were inventoried and calculated for all products of the lighting columns.

Calculation rules

LCA was done in accordance with ITB PCR A document. LCA was performed using ITB-LCA tool developed in accordance with EN15804+A2. Emission of greenhouse gases was calculated using the IPCC 2013 GWP method with a 100-year horizon. Emission of acidifying substances, Emission of substances to water contributing to oxygen depletion, Emission of gases that contribute to the creation of ground-level ozone, Abiotic depletion, and ozone depletion emissions where all calculated with the CML-IA baseline method

Data bases

The data for the LCA calculation comes from Ecoinvent v.3.9.1. Specific data quality analysis was a part of an external audit. The carbon footprint of polish electricity used for calculation is 0.704 kg CO₂/kWh.

LIFE CYCLE ASSESSMENT (LCA) – Results

Declared unit

The declaration refers to declared unit (DU) – 1 ton of the lighting columns production by Tecpoles Sp. z o.o.

Table 1. System boundaries for the environmental characteristic of the lighting columns

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	MD	MD	MND	MND	MND	MND	MND	MND	MND	MD	MD	MD	MD	MD	



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Table 2. Life cycle assessment (LCA) results of the lighting columns produced by Tecpoles Sp. z o.o. – environmental impacts (DU: 1 ton)

Indicator	Unit	A1	A2	A3	A1-A3	A4	A5	C1	C2	C3	C4	D
Global Warming Potential	eq. ton CO ₂	2.21E+03	5.54E+01	4.38E+02	2.70E+03	8.34E+01	4.69E-02	7.04E+00	2.21E+01	7.04E+00	1.06E-01	-6.32E+02
Greenhouse potential - fossil	eq. ton CO ₂	1.58E+03	1.31E+02	2.34E+02	1.95E+03	8.31E+01	4.69E-02	7.04E+00	2.20E+01	7.04E+00	1.05E-01	-6.35E+02
Greenhouse potential - biogenic	eq. ton CO ₂	-6.61E+01	6.68E-01	5.20E+00	-6.02E+01	2.84E-01	1.23E-04	1.85E-02	7.52E-02	1.85E-02	2.68E-04	2.54E+00
Global warming potential - land use and land use change	eq. ton CO ₂	5.95E-01	7.83E-02	1.80E-01	8.53E-01	3.26E-02	7.14E-06	1.07E-03	8.64E-03	1.07E-03	9.94E-05	-3.22E-02
Stratospheric ozone depletion potential	eq. ton CFC 11	4.82E-05	2.86E-05	1.66E-05	9.34E-05	1.92E-05	2.51E-10	3.77E-08	5.09E-06	3.77E-08	4.26E-08	-2.22E-05
Soil and water acidification potential	eq. mol H+	4.69E+00	5.10E-01	6.42E+00	1.16E+01	3.37E-01	4.83E-04	7.25E-02	8.93E-02	7.25E-02	9.90E-04	-2.52E+00
Eutrophication potential - freshwater	eq. ton P	5.32E-01	1.28E-02	4.37E-01	9.82E-01	5.59E-03	7.87E-05	1.18E-02	1.48E-03	1.18E-02	9.81E-06	-2.69E-01
Eutrophication potential - seawater	eq. ton N	1.01E+00	1.40E-01	4.61E-01	1.61E+00	1.02E-01	6.84E-05	1.03E-02	2.70E-02	1.03E-02	3.45E-04	-5.51E-01
Eutrophication potential - terrestrial	eq. mol N	1.08E+01	1.40E-01	1.48E+01	2.58E+01	1.11E+00	5.97E-04	8.95E-02	2.94E-01	8.95E-02	3.77E-03	-6.02E+00
Potential for photochemical ozone synthesis	eq. ton NMVOC	4.93E+00	4.77E-01	1.20E+00	6.61E+00	3.40E-01	1.72E-04	2.57E-02	9.01E-02	2.57E-02	1.10E-03	-3.19E+00
Potential for depletion of abiotic resources - non-fossil resources	eq. ton Sb	1.75E-02	8.29E-04	6.14E-02	7.97E-02	2.95E-04	1.72E-08	2.58E-06	7.80E-05	2.58E-06	2.42E-07	-1.23E-02
Abiotic depletion potential - fossil fuels	MJ	2.31E+04	1.91E+03	3.87E+03	2.89E+04	1.23E+03	7.21E-01	1.08E+02	3.27E+02	1.08E+02	2.89E+00	-5.17E+03
Water deprivation potential	eq. m ³	3.68E+02	1.19E+01	1.19E+02	4.99E+02	5.70E+00	1.38E-02	2.07E+00	1.51E+00	2.07E+00	9.16E-03	-7.98E+01

Table 3. Life cycle assessment (LCA) results of the lighting columns produced by Tecpoles Sp. z o.o. – additional impacts indicators (DU: 1 ton)

Indicator	Unit	A1-A5	C1-C4	D
Particulate matter	disease incidence	INA	INA	INA
Potential human exposure efficiency relative to U235	eg. kBq U235	INA	INA	INA
Potential comparative toxic unit for ecosystems	CTU _e	INA	INA	INA
Potential comparative toxic unit for humans (cancer effects)	CTU _h	INA	INA	INA
Potential comparative toxic unit for humans (non-cancer effects)	CTU _h	INA	INA	INA
Potential soil quality index	dimensionless	INA	INA	INA

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Table 4. Life cycle assessment (LCA) results of the lighting columns produced by Tecpoles Sp. z o.o. - the resource use (DU: 1 ton)

Indicator	Unit	A1	A2	A3	A1-A3	A4	A5	C1	C2	C3	C4	D
Consumption of renewable primary energy - excluding renewable primary energy sources used as raw materials	MJ	1.57E+03	4.13E+01	3.82E+02	1.58E+03	1.77E+01	5.93E-02	8.90E+00	4.69E+00	8.90E+00	2.51E-02	-4.36E+02
Consumption of renewable primary energy resources used as raw materials	MJ	4.00E+02	0.00E+00	0.00E+00	4.00E+02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Total consumption of renewable primary energy resources	MJ	1.57E+03	4.13E+01	3.82E+02	2.00E+03	1.77E+01	5.93E-02	8.90E+00	4.69E+00	8.90E+00	2.51E-02	-4.36E+02
Consumption of non-renewable primary energy - excluding renewable primary energy sources used as raw materials	MJ	2.53E+04	1.91E+03	4.00E+03	4.44E+03	1.23E+03	7.21E-01	1.08E+02	3.27E+02	1.08E+02	2.89E+00	-4.95E+03
Consumption of non-renewable primary energy resources used as raw materials	MJ	5.00E+01	0.00E+00	0.00E+00	5.00E+01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Total consumption of non-renewable primary energy resources	MJ	2.53E+04	1.91E+03	4.00E+03	3.12E+04	1.23E+03	7.21E-01	1.08E+02	3.27E+02	1.08E+02	2.89E+00	-4.95E+03
Consumption of secondary materials	ton	5.50E+02	1.01E+00	2.15E-01	2.11E+02	4.14E-01	6.27E-05	9.40E-03	1.10E-01	9.40E-03	6.07E-04	-8.48E+01
Consumption of renew. secondary fuels	MJ	9.72E-01	1.21E-02	9.47E-04	9.85E-01	4.56E-03	3.16E-07	4.75E-05	1.21E-03	4.75E-05	1.59E-05	-1.14E-01
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	0.00E+00	0.00E+00	0.00E+00
Net consumption of freshwater	m ³	2.43E+00	3.16E-01	8.63E+00	1.14E+01	1.55E-01	2.07E-03	3.11E-01	4.11E-02	3.11E-01	3.16E-03	-4.59E+00

Table 5 Life cycle assessment (LCA) results of the lighting columns produced by Tecpoles Sp. z o.o. – waste categories (DU: 1 ton)

Indicator	Unit	A1	A2	A3	A1-A3	A4	A5	C1	C2	C3	C4	D
Hazardous waste	ton	7,61E+00	3,04E+00	1,76E+01	2,83E+01	1,38E+00	5,59E-03	8,38E-01	3,67E-01	8,38E-01	3,07E-03	-6,45E-02
Non-hazardous waste	ton	5,38E+02	5,60E+01	1,11E+03	1,70E+03	2,46E+01	3,76E-01	5,65E+01	6,51E+00	5,65E+01	4,32E-02	-1,03E+02
Radioactive waste	ton	2,17E-02	2,11E-04	9,85E-03	3,17E-02	9,21E-05	1,08E-07	1,62E-05	2,44E-05	1,62E-05	1,92E-05	-1,15E-02
Components for re-use	ton	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	0,00E+00	0,00E+00
Materials for recycling	ton	1,40E-02	7,72E-03	1,43E+02	1,43E+02	3,82E-03	4,84E-06	7,26E-04	1,01E-03	7,26E-04	5,78E-06	0,00E+00
Materials for energy recovery	ton	2,14E-04	5,95E-05	1,00E+01	1,00E+01	3,09E-05	7,78E-09	1,17E-06	8,18E-06	1,17E-06	6,85E-08	0,00E+00
Exported Energy	MJ	7,29E-01	0,00E+00	6,74E+00	7,47E+00	0,00E+00	2,31E-03	3,46E-01	0,00E+00	3,46E-01	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: PhD. Eng. Halina Prejzner LCI verification: Filip Poznański, M.Sc. eng LCA, LCI audit and input data verification: Michał Piasecki, PhD., D.Sc., Eng.

Note 1: The declaration owner has the sole ownership, liability, and responsibility for the 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: Note: 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

- 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
- EN 14889-1:2006 Fibers for concrete. Steel fibers. Definitions, specifications and conformity
- LCI DATA FOR STEEL PRODUCTS at https://www.worldsteel.org/en/dam/jcr:04f8a180-1406-4f5c-93ca-70f1ba7de5d4/LCI%2520study_2018%2520data%2520release.pdf
- <https://ecoinvent.org/>



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CERTIFICATE No 531/2023 of TYPE III ENVIRONMENTAL DECLARATION

Products:

Lighting columns

Manufacturer:

Tecpoles Sp. z o.o.

ul. Kasztelańska 39, 62-571 Krągola, 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.

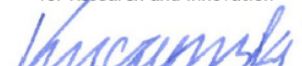
This certificate, issued on 13th October 2023 is valid for 5 years
or until amendment of mentioned Environmental Declaration

Head of the Thermal Physic, Acoustics
and Environment Department


Agnieszka Winkler-Skalna, PhD



Deputy Director
for Research and Innovation


Krzysztof Kuczyński, PhD

Warsaw, October 2023