Type III Environmental Product Declaration No. 785/2025

Issuance date: 04.04.2025
Validation date: 05.05.2025
Validity date: 04.04.2030

Geothermal probes

Owner of the EPD:

ELPLAST+ Sp. z o. o.
Address: Niepodległości 8,
44-336 Jastrzębie-Zdrój, Poland
Tel.: +48 32 4718 040
Website: https://elplastplus.pl/
Contact: elplast@elplastplus.pl

EPD Program Operator:

Instytut Techniki Budowlanej (ITB)
Address: Filtrowa 1,
00-611 Warsaw, Poland
Website: www.itb.pl
Contact: Michał Piasecki
m.piasecki@itb.pl
energia@itb.pl

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-A5, C1-C4 and D modules in accordance with EN 15804
(Cradle-to-Gate with options)

Product standards: PN-EN 12201-2:2024-04, PN-EN ISO 22391-2:2010, PAS1075:2009, National Technical Assessments (KOT), Technical Specifications of the Manufacturer (SPC)

The year of preparing the EPD: 2025

Service Life: 50 years for standard product

PCR: ITB-PCR A

Declared unit: 1 kg

Reasons for performing LCA: B2B

Representativeness: Poland, European, 2023

MANUFACTURER

Figure 1 Street view of ELPLAST+ Sp. z o. o.

ELPLAST+ Sp. z o. o is a Polish family-owned manufacturing company. The production plant and headquarters of the Company are located in Jastrzębie-Zdrój. The company has existed since 1990, and as a Company it has been operating on the market since 1999, selling its products both on the Polish and foreign markets. It operates in the processing and production of plastic products, mainly polyethylene and polypropylene, and has a machine park consisting of 12 production lines for extrusion and rotomoulding processes.
It specializes in the production of pipes, wells and large-size elements for industry, mining, water and sewage networks, telecommunications and energy, as well as a system of floats and pipes for hydrotransport. For several years, it has also been developing a production segment for the recreational industry in the field of selling plastic floating platforms, ports - landing slips for jet skis and kayaks, as well as swimming areas on open waters. The company also produces niche, non-standard products for special orders and customer requirements.
The main scope of activity can be indicated as the production of the following product range:

- pipes, fittings for the construction of networks: water supply, sewage, heating, telecommunications, energy and industrial and mining pipelines with special requirements,
- polyethylene wells for the construction of water and sewage, telecommunications networks,
- modular floating platforms made of plastic, drive-on ports for jet skis and kayaks.

PRODUCTS DESCRIPTION AND APPLICATION

ELPLAST+ manufactures high-quality pipes that have a very wide range of applications. One of them is the production of geothermal probes. They are made as standard from two or four (two probes connected into one whole) polyethylene pipes placed parallel to each other, ending in a "head" at the bottom. The head allows for the reverse direction of the flow of the medium along a circular arc. At the bottom of the head there is an opening for hanging additional weights. Geothermal probes made of polyethylene are designed for vertical exchangers, which are placed in a vertical borehole in the ground, rock mass. The probes are a component of ground heat pump exchangers. The medium inside the probe collects heat from the rock mass and transfers it further to the installation. The probes are supplied as pipes rolled into coils of appropriate length. The basic range includes geothermal probes with a nominal diameter of: DN32mm, DN40mm, DN45mm, DN50 mm, DN 63mm.
They are made of pipes mainly fi32mm, fi40, fi45 mm, fi50mm and DN 63mm.and additional elements (semi-finished products) constituting one product after assembly. Depending on the type of probe (collector), it may consist of: polyethylene pipes, polyethylene elbows, cast iron weight, heat shrink tubing, electrofusion connector, galvanized steel sheet suspension for a double probe, galvanized steel sheet suspension for a single probe, U-pipe.
All additional technical information about the product is available on the manufacturer's website.

LIFE CYCLE ASSESSMENT (LCA) – general rules applied

Unit

The declared unit is 1 kg of product.

System boundary

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.

Allocation

The allocation rules used for this EPD are based on general ITB PCR A. Production of the geothermal probes is a line process conducted in factory of ELPLAST+ Sp. z o. o. located in Jastrzębie-Zdrój (Poland). Allocation was done on product mass basis. All impacts associated with the extraction and processing of raw materials used for the production of the declared product are allocated in module A1 of the LCA. Impacts from the global line production of ELPLAST+ Sp. z o. o. were inventoried and 100% were allocated to geothermal probes production. Water and energy consumption (electrical grid, natural gas, fuel oil, gasoline and diesel), associated emissions and generated wastes are allocated to module A3. Packaging materials were taken into consideration.

System limits

Minimum 99.5% input materials and 100% energy consumption were inventoried in a processing plant and were included in the calculation. In the assessment, all available data from production have been considered, i.e. all raw materials/elements used as per formulation process, utilized thermal energy for heating, and electric power consumption. Thus, material and energy flows contributing less than 1 % of mass or energy have been considered. It can be assumed that the total sum of neglected processes does not exceed 1 % of energy usage and mass per modules A or D. Machines and facilities required during production are neglected. The packaging products (stretch, pallets etc.) are included.

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

Modules A1 and A2 present the extraction and processing of raw materials (PE100 and PE100 RC) and transport to the production site. Additionally, cast iron weights or U-tubes are used for the production of geothermal probes. The PE100, PE100 RC used mainly comes from foreign suppliers. Module A2 (transport) covers truck transport and uses average Polish and European values for fuel data.

Module A3: *Production*

The production of geothermal probes takes place at the ELPLAST+ Sp. z o. o. plant in Jastrzębie-Zdrój. Production includes the receipt of raw material deliveries for production, which are various types of polyethylene in the form of granulates and regranulates. Then the polyethylene is subjected to further processes including heating, melting, mixing, extrusion and cooling of the raw material. This is done using dedicated devices and finally products with specific diameters and lengths are obtained. Finished products are subjected to quality control, then marked and stored. Sold products

are packed and handed over to the recipient. The diagram of the production process is shown in Figure 2.

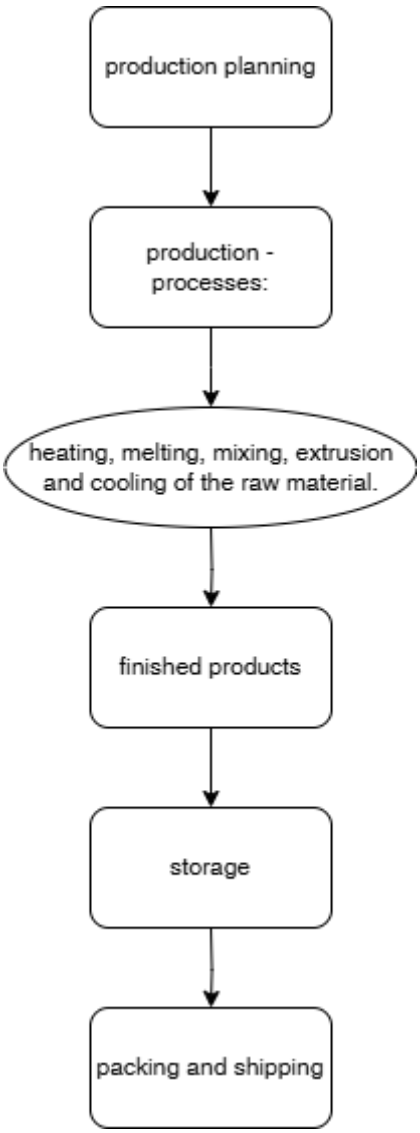

Figure 2. Diagram of the manufacturing process of geothermal probes

Module A4 and A5: *Transport to consumer and installation*

Transport of the PE products from plant to the recipient is carried out using trucks. Vehicle transport at distance 100 km is considered (emission standard: Euro 5) with 100% load capacity. Packaging material is sent for either incineration or recycling according to EUROSTAT data for packaging waste. It was assumed that the products would be installed using electric power tools (approx. 2 kWh/ton).

Modules C and D*: End-of-life (EoL)*

It is assumed that at the end of life, 100 % of PE products are demounted using electric tools. Materials recovered from dismantled products are recycled, incinerated (module C3) and landfilled (module C4) according to the realistic treatment practice (mass allocation) of industrial waste what is presented in Table 5. 50 % of plastic waste processing while the remaining part is forwarded to

landfill in the form of mixed construction and demolition wastes. A potential credits resulting from the recycling of plastic are presented in module D. Utilization of packaging material which constitute less than 0.1 % of the total system flows was not taken into consideration.

Table 1. End-of-life scenario for a plastic profiles and elements

Material	Waste procesing		Landfilling
	Material recovery (reuse, recycling)	**Energy recovery** (incineration)	
Plastic	30%	20%	50%

Data collection period

The data for manufacture of the declared products refer to period between 01.01.2023 – 31.12.2023 (1 year). The life cycle assessments were prepared for Poland and Europe as reference area.

Data quality

The data selected for LCA originate from ITB-LCI questionnaires completed by ELPLAST+ Sp. z o. o. and verified during data audit. No data collected is older than five years and no generic datasets used are older than ten years. The representativeness, completeness, reliability, and consistency is judged as good. The background data for the processes come from the following resources database Ecoinvent v.3.10. Specific (LCI) data quality analysis was a part of the input data verification.

Assumptions and estimates

The impacts of the representative products were aggregated using weighted average.

Calculation rules

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.

Additional information

Polish electricity (Ecoinvent v 3.10 supplemented by actual national KOBiZE data) emission factor used is 0.685 kg CO_2/kWh (National for 2023). As a general rule, no particular environmental or health protection measures other than those specified by law are necessary.

LIFE CYCLE ASSESSMENT (LCA) – Results

Declared unit

The declaration refers to declared unit (DU) – 1 kg of geothermal probes produced in Poland. The following life cycle modules (Table 2) were included in the analysis. The following tables 3-6 show the environmental impacts of the life cycle of selected modules (A1-A3+C1-C4+D).

Table 2 System boundaries for the environmental characteristic of the product.

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	NMD	MND	MD	MD	MD	MD	MD

Table 3 Life cycle assessment (LCA) results of the geothermal probes – environmental impacts (DU: 1 kg)

Indicator	Unit	A1	A2	A3	A1-A3	A4	A5	C1	C2	C3	C4	D
Global Warming Potential	eq. kg CO_2	2.05E+00	1.80E-01	4.47E-01	2.67E+00	1.67E-02	1.37E-03	6.85E-03	1.67E-02	6.56E-01	2.64E-03	-2.31E+00
Greenhouse potential - fossil	eq. kg CO_2	2.07E+00	1.80E-01	4.47E-01	2.69E+00	1.66E-02	1.37E-03	6.85E-03	1.66E-02	6.55E-01	2.63E-03	-2.29E+00
Greenhouse potential - biogenic	eq. kg CO_2	-2.40E-02	1.17E-04	1.28E-03	-2.26E-02	5.68E-05	3.69E-06	1.85E-05	5.68E-05	8.84E-04	6.71E-06	-1.84E-02
Global warming potential - land use and land use change	eq. kg CO_2	1.14E-03	5.89E-05	5.67E-05	1.26E-03	6.52E-06	2.14E-07	1.07E-06	6.52E-06	3.07E-05	2.49E-06	-2.17E-04
Stratospheric ozone depletion potential	eq. kg CFC 11	9.29E-08	3.57E-09	4.47E-09	1.01E-07	3.85E-09	7.53E-12	3.77E-11	3.85E-09	7.96E-01	1.07E-09	-1.22E-07
Soil and water acidification potential	eq. mol H+	6.40E-03	5.63E-04	4.13E-03	1.11E-02	6.75E-05	1.45E-05	7.25E-05	6.75E-05	1.17E-02	2.48E-05	-1.78E-03
Eutrophication potential - freshwater	eq. kg P	3.95E-04	1.20E-05	6.58E-04	1.07E-03	1.12E-06	2.36E-06	1.18E-05	1.12E-06	4.55E-06	2.45E-07	-6.69E-05
Eutrophication potential - seawater	eq. kg N	1.27E-03	1.90E-04	5.90E-04	2.05E-03	2.04E-05	2.05E-06	1.03E-05	2.04E-05	7.70E-03	8.62E-06	-3.56E-04
Eutrophication potential - terrestrial	eq. mol N	1.31E-02	2.06E-03	5.18E-03	2.04E-02	2.22E-04	1.79E-05	8.95E-05	2.22E-04	6.76E-02	9.43E-05	-3.63E-03
Potential for photochemical ozone synthesis	eq. kg NMVOC	1.13E-02	8.81E-04	1.75E-03	1.39E-02	6.80E-05	5.15E-06	2.57E-05	6.80E-05	1.66E-02	2.74E-05	-1.22E-03
Potential for depletion of abiotic resources - non-fossil resources	eq. kg Sb	1.82E-05	5.88E-07	1.66E-07	1.89E-05	5.89E-08	5.16E-10	2.58E-09	5.89E-08	3.11E-07	6.04E-09	-1.77E-06
Abiotic depletion potential - fossil fuels	MJ	6.45E+01	2.53E+00	7.15E+00	7.42E+01	2.47E-01	2.16E-02	1.08E-01	2.47E-01	2.01E-01	7.22E-02	-1.85E+01
Water deprivation potential	eq. m^3	5.54E-01	1.22E-02	1.17E-01	6.83E-01	1.14E-03	4.14E-04	2.07E-03	1.14E-03	2.01E-02	2.29E-04	-4.68E-02

Table 4 Life cycle assessment (LCA) results of the geothermal probes – additional impacts indicators (DU: 1 kg)

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	CTUe	INA	INA	INA
Potential comparative toxic unit for humans (cancer effects)	CTUh	INA	INA	INA
Potential comparative toxic unit for humans (non-cancer effects)	CTUh	INA	INA	INA
Potential soil quality index	dimensionless	INA	INA	INA

Table 5 Life cycle assessment (LCA) results of the geothermal probes - the resource use (DU: 1 kg)

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	1.99E+00	4.28E-02	5.79E-01	2.61E+00	3.54E-03	1.78E-03	8.90E-03	3.54E-03	5.16E-02	6.27E-04	-3.64E-01
Consumption of renewable primary energy resources used as raw materials	MJ	3.17E-01	0.00E+00	0.00E+00	3.17E-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 renewable primary energy resources	MJ	2.31E+00	4.28E-02	5.79E-01	2.93E+00	3.54E-03	1.78E-03	8.90E-03	3.54E-03	5.16E-02	6.27E-04	-3.64E-01
Consumption of non-renewable primary energy - excluding renewable primary energy sources used as raw materials	MJ	2.28E+01	2.53E+00	6.30E+00	3.16E+01	2.47E-01	2.16E-02	1.08E-01	2.47E-01	-2.17E+01	7.22E-02	-3.15E+01
Consumption of non-renewable primary energy resources used as raw materials	MJ	4.17E+01	0.00E+00	8.55E-01	4.25E+01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.19E+01	0.00E+00	-1.11E+01
Total consumption of non-renewable primary energy resources	MJ	6.45E+01	2.53E+00	7.15E+00	7.42E+01	2.47E-01	2.16E-02	1.08E-01	2.47E-01	2.01E-01	7.22E-02	-2.04E+01
Consumption of secondary materials	kg	1.63E-01	1.16E-03	6.85E-04	1.64E-01	8.27E-05	1.88E-06	9.40E-06	8.27E-05	7.75E-04	1.52E-05	-5.18E-01
Consumption of renew. secondary fuels	MJ	1.08E-02	1.46E-05	2.90E-06	1.08E-02	9.11E-07	9.49E-09	4.75E-08	9.11E-07	1.01E-05	3.96E-07	-3.07E-06
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	-1.10E-05
Net consumption of freshwater	m^3	1.45E-02	3.35E-04	1.74E-02	3.22E-02	3.10E-05	6.21E-05	3.11E-04	3.10E-05	3.11E-04	7.90E-05	-1.30E-03

Table 6 Life cycle assessment (LCA) results of the geothermal probes – waste categories (DU: 1 kg)

Indicator	Unit	A1	A2	A3	A1-A3	A4	A5	C1	C2	C3	C4	D
Hazardous waste	kg	7.61E-02	3.64E-03	7.01E-02	1.50E-01	2.77E-04	1.68E-04	8.38E-04	2.77E-04	2.85E-03	7.67E-05	-4.76E-03
Non-hazardous waste	kg	1.85E+01	7.68E-02	3.21E+00	2.18E+01	4.92E-03	1.13E-02	5.65E-02	4.92E-03	5.40E-02	1.08E-03	-4.12E-01
Radioactive waste	kg	4.24E-05	8.05E-07	9.41E-07	4.41E-05	1.84E-08	3.25E-09	1.62E-08	1.84E-08	1.27E-06	4.79E-07	-9.83E-06
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	0.00E+00	0.00E+00	0.00E+00
Materials for recycling	kg	1.45E-01	1.89E-05	1.00E-02	1.55E-01	7.64E-07	1.45E-07	7.26E-07	7.64E-07	2.72E-01	1.44E-07	-2.90E-04
Materials for energy recovery	kg	3.42E-06	1.60E-07	2.01E-05	2.37E-05	6.18E-09	2.33E-10	1.17E-09	6.18E-09	8.08E-08	1.71E-09	-1.78E-07
Exported Energy	MJ	3.93E-02	1.05E-03	4.71E-03	4.51E-02	0.00E+00	6.92E-05	3.46E-04	0.00E+00	3.93E-01	0.00E+00	-1.32E-02

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+A2 and ITB PCR A
Independent verification corresponding to ISO 14025 (subclause 8.1.3.) ☒ external ☐ internal
External verification of EPD: PhD. Eng. Halina Prejzner LCI audit and 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 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: 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 (v 1.6)
- PN-EN 12201-2:2024-04 - Systemy przewodów rurowych z tworzyw sztucznych do przesyłania wody oraz do kanalizacji ciśnieniowej - Polietylen (PE) - Część 2: Rury
- PN-EN 12666-1+A1:2011 - Systemy przewodów rurowych z tworzyw sztucznych do podziemnego bez ciśnieniowgo odwadniania i kanalizacji -- Polietylen (PE) -- Część 1: Specyfikacje rur, kształtek i systemu
- PN-EN ISO 22391-2:2010 - Systemy przewodów rurowych z tworzyw sztucznych do instalacji wody ciepłej i zimnej - Polietylen o podwyższonej odporności termicznej (PE-RT) -- Część 2: Rury
- 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
- KOBiZE Wskaźniki emisyjności CO_2, SO_2, NO_x, CO i pyłu całkowitego dla energii elektrycznej. December 2023
- https://ecoinvent.org/

LCA, LCI, weryfikacja danych
dr hab., inż. Michał Piasecki

Kierownik Zakładu Fizyki Cieplnej, Akustyki i Środowiska
dr inż. Agnieszka Winkler-Skalna

Kwalifikowany podpis elektroniczny

Kwalifikowany podpis elektroniczny

Instytut Techniki Budowlanej

Instytut Techniki Budowlanej
00-611 Warsaw, Filtrowa 1

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

CERTIFICATE № 785/2025
of TYPE III ENVIRONMENTAL DECLARATION

Products:

Geothermal probes

Manufacturer:

Elplast + Spółka z o.o.

ul. Niepodległości 8, 44-336 Jastrzębie Zdrój, 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 4th April 2025 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, April 2025