Type III Environmental Product Declaration No. 482/2023

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Polios PET 2562

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 in accordance with EN 15804+A2 (Cradle-to-Gate)
The year of preparing the EPD: 2023
Service Life: N/A
PCR: ITB-PCR A
Declared unit: 1 kg
Reasons for performing LCA: B2B
Representativeness: Poland, European, 2022

MANUFACTURER

Purinova is the manufacturer of polyester polyols and polyurethane systems. For many years, company has developed own know-how and implemented modern technologies in international markets. The specific products are used in the construction, refrigeration and automotive industries. Continuous development of the designed or acquired technologies, as well as expansion of the manufacturing base, allows to supply customers with high quality products. The manufacturing site – located in Bydgoszcz (Poland) – apart from the machinery stock itself, is comprised primarily of a team endowed with extensive experience in the polyurethane industry. Automation of manufacturing processes of polyester polyols gives the opportunity to finalize orders in a short time. The total capacity of active apparatuses is as much as 800 m³. Purinova is able to simultaneously produce many variants of products. Separate production lines ensure production continuity.

Purinova has extensive experience in servicing domestic and international transport. Company provides road, air, sea and intermodal transport (LTL, FTL, FCL, LCL). The warehouses in Europe and the USA (Houston, New Jersey, Bydgoszcz, Tarnów) gives us the potentiality to appropriate coordinate the activities in the supply chain. Company is cooperating with specialized custom agencies - this fact gives all customers a guarantee of proper provision of export services also outside the European Union.

PRODUCTS DESCRIPTION

Polios PET 2562 covered by this EPD is an intermediate product used in the production of sandwich panels. The further course of the life cycle of this product, including the end of its life cycle, determines for the production of a panel of what design it will be used. The product has a certificate number 326/2022 Environmental Declaration of Type II issued by the Building Research Institute confirming that the product contains a minimum of 45% recycled raw material.. The basic properties are presented in the below table.

State of concentration	Liquid
Color	From straw to yellow
Flammability of the material	Supports combustion
Solubility	Insoluble in water, soluble in ketones and esters
Hydroxyl number	240 – 260 [mg KOH/g]
Acid number	2,0 – 3,0 [mg KOH/g]
Water content no more than	0,1 [%]
Viscosity at 25 °C	2500 – 4500 [m Pa s]
Renewable and recycled content	min. 50 %

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 of Polios PET 2562.

System boundary

Modules A1-A3 are taken into consideration in the LCA: A1 Production of preliminary products, A2 Transport to plant, A3 Production (incl. provision of energy, production of packaging as well as auxiliaries and consumables, waste treatment). The declaration is therefore from "cradle to gate". According to the standard EN 15804, products used for the production of other products should be declared at the production stage. Energy and water consumption, emissions as well as information on generated wastes were inventoried and were included in the calculation. 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's document PCR A (EN 15804+A2). Input and output data from the production is inventoried and allocated to the production on the mass basis. The declared product recipe was used for the calculations, based on specific substances included in the production.

System limits

All raw materials submitted for the formulations and production data were taken into consideration. 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. Machines and facilities required during production are neglected. The production of etiquettes/printing was not considered.

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

Typically, the products covered by this EPD contain the following base materials: reycled PET colorless transparent flake, PET flakes (raw material) are 100% recycled material from PET bottles. Aromatic polyester polyol is obtained using recycled PET. Raw materials come from Polish and international suppliers. Data on transport of the different products to the manufacturing plant is collected and modelled for factory by assessor. Means of transport include trucks and Polish and European fuel averages are applied. More detailed information is available in the respective manufacturer's documentation (e.g. product data sheets).

Module A3: *Production*

The production/formulation is done by Purinova plants in Poland. The production takes place in stages. In the first stages as presented in Figure 1. Packagings are the light drums with a capacity of 50, 200 dm^3 or stainless steel cisterns.

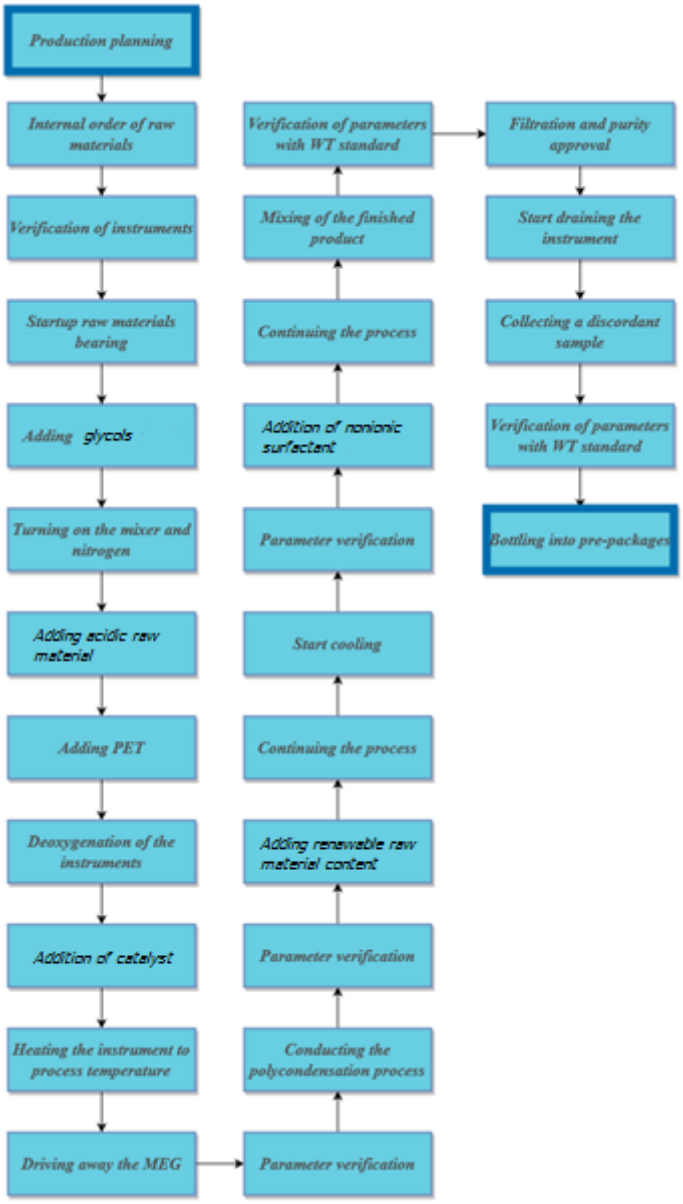

Figure 1. Manufacturing process scheme

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.

Data quality

The data selected for LCA originate from ITB-LCI questionnaires completed by Purinova 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.3.9.1. Specific (LCI) data quality analysis was a part of the input data verification. Where no background data was available, data gaps were complemented by manufacturer information and literature research.

Assumptions and estimates

The impacts of the representative products were aggregated using weighted average. The compositions for the External product and Internal foil were averaged on the basis of recipes.

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 (Eocinvent v 3.9.1 supplemented by actual national Kobize data) emission factor used is 0.702 kg CO_2/kWh. As a general rule, no particular environmental or health protection measures other than those specified by law are necessary.

Health aspects

Does not contain CFC, HCFC.

LIFE CYCLE ASSESSMENT (LCA) – Results

Declared unit

The declaration refers to declared unit (DU) – 1 kg of Polios PET 2562 produced in Poland. The following life cycle modules (table 1) were included in the analysis. The following tables 2-5 show the environmental impacts of the life cycle of selected modules (A1-A3).

Table 1. 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	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND

Table 2. Life cycle assessment (LCA) results of the product – environmental impacts (DU: 1 kg)

Indicator	Unit	A1	A2	A3	A1-A3
Global Warming Potential	eq. kg CO_2	1.39E+00	3.61E-02	8.24E-02	1.51E+00
Greenhouse potential - fossil	eq. kg CO_2	1.49E+00	3.60E-02	8.22E-02	1.60E+00
Greenhouse potential - biogenic	eq. kg CO_2	-9.81E-02	2.42E-05	1.87E-04	-9.79E-02
Global warming potential - land use and land use change	eq. kg CO_2	6.61E-03	1.01E-09	1.16E-05	6.62E-03
Stratospheric ozone depletion potential	eq. kg CFC 11	1.91E-08	6.99E-04	3.88E-09	6.99E-04
Soil and water acidification potential	eq. mol H+	6.03E-03	7.80E-07	8.45E-04	6.88E-03
Eutrophication potential - freshwater	eq. kg P	3.43E-03	1.75E-04	1.10E-04	3.72E-03
Eutrophication potential - seawater	eq. kg N	2.06E-03	1.93E-03	1.67E-04	4.16E-03
Eutrophication potential - terrestrial	eq. mol N	1.25E-02	5.22E-04	1.66E-03	1.47E-02
Potential for photochemical ozone synthesis	eq. kg NMVOC	5.04E-03	2.28E-08	4.55E-04	5.50E-03
Potential for depletion of abiotic resources - non-fossil resources	eq. kg Sb	1.08E-05	2.89E-01	3.24E-08	2.89E-01
Abiotic depletion potential - fossil fuels	MJ	3.66E+01	8.15E-04	1.23E+00	3.78E+01
Water deprivation potential	eq. m^3	1.32E+00	2.03E-03	1.98E-02	1.34E+00

Table 3. Life cycle assessment (LCA) results of the product – additional impacts indicators (DU: 1 kg)

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

Table 4. Life cycle assessment (LCA) results of the the product - the resource use (DU: 1 kg)

Indicator	Unit	A1	A2	A3	A1-A3
Consumption of renewable primary energy - excluding renewable primary energy sources used as raw materials	MJ	3.26E+00	6.71E-45	8.40E-02	3.35E+00
Consumption of renewable primary energy resources used as raw materials	MJ	2.34E+00	2.03E-03	0.00E+00	2.34E+00
Total consumption of renewable primary energy resources	MJ	5.61E+00	2.89E-01	8.40E-02	5.98E+00
Consumption of non-renewable primary energy - excluding renewable primary energy sources used as raw materials	MJ	4.26E+00	0.00E+00	1.23E+00	5.48E+00
Consumption of non-renewable primary energy resources used as raw materials	MJ	3.26E+01	2.89E-01	0.00E+00	3.29E+01
Total consumption of non-renewable primary energy resources	MJ	3.68E+01	1.36E-04	1.23E+00	3.80E+01
Consumption of secondary materials	kg	9.71E-01	2.96E-07	1.74E-04	9.71E-01
Consumption of renew. secondary fuels	MJ	4.34E-05	0.00E+00	7.26E-07	4.41E-05
Consumption of non-renewable secondary fuels	MJ	0.00E+00	1.60E-05	0.00E+00	1.60E-05
Net consumption of freshwater	m3	2.91E-02	1.55E-04	2.91E-03	3.21E-02

Table 5. Life cycle assessment (LCA) results of the product – waste categories (DU: 1 kg)

Indicator	Unit	A1	A2	A3	A1-A3
Hazardous waste	kg	3,44E-02	3,15E-03	8,76E-03	4,63E-02
Non-hazardous waste	kg	2,66E+00	3,14E-08	5,29E-01	3,19E+00
Radioactive waste	kg	4,87E-05	0,00E+00	1,67E-07	4,89E-05
Components for re-use	kg	0,00E+00	3,15E-05	0,00E+00	3,15E-05
Materials for recycling	kg	7,13E-04	4,96E-09	2,05E-03	2,77E-03
Materials for energy recovery	kg	8,52E-04	2,12E-05	1,56E-08	8,73E-04
Exported Energy	MJ	1,66E-01	5,42E-02	1,75E-03	2,22E-01

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 (sub clause 8.1.3.) [x] external [ ] internal
External verification of EPD: Halina Prejzner, PhD. Eng. LCI data collection: M.Sc. eng. Michał Chwedaczuk LCA, LCI audit and input data verification: Michał Piasecki, PhD., D.Sc., Eng.

Note: 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 construction products may not be comparable if they do not comply with EN 15804. For further information about comparability, see EN 15804 and ISO 14025. Depending on the application, a corresponding conversion factor such as the specific weight per surface area must be taken into consideration.

Normative references

- ITB PCR A v 1.6. 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

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CERTIFICATE № 482/2023
of TYPE III ENVIRONMENTAL DECLARATION

Products:

Polios PET 2562

Manufacturer:

Purinova Sp. z o.o.

ul. Fordońska 74, 85-719 Bydgoszcz, 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 14th July 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, July 2023