Type III Environmental Product Declaration No. 518/2023

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POLYETHYLENE FOAM BASED PRODUCTS

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, A4-A5 and D modules in accordance with EN 15804+A2
(Cradle-to-Gate with options)

The year of preparing the EPD: 2023

Product standard: Requirements are defined in customer specifications

Service Life: 50 years

PCR: ITB-PCR A

Declared unit: 1 kg

Reasons for performing LCA: B2B

Representativeness: Poland, European, 2022

MANUFACTURER

Fair Packaging Sp. z o. o. Sp. k. has been producing and processing products made of foamed polyethylene for over 20 years. The beginnings of the company's activity were mainly the production of simple industrial packaging. Today, thanks to intensive R&D work, Fair Packaging supplies leading brands from the automotive, electronics, household appliances, furniture and construction industries.

Figure 1 Fair Packaging production plant in Buszewo, Poland

The company's success is primarily due to quality, confirmed by annual audits conducted by the largest clients, speed of response to the changing market, especially in the automotive and electronics industries, as well as ensuring the availability of products upon request to customers.

The company's offer includes packaging and packaging materials with such unique properties as non-staining PE foam, laminates that eliminate micro-scratches occurring during land transport, anti-electrostatic materials with a precisely defined surface resistance, and protective bags for the transport of modern OLED TVs with anti-electrostatic properties, made of laminate. foam and metalized foil (so-called alu bags).

In 2011 the company started the production of floor underlays. The establishment of Fair Underlay was our natural development path and was a response to market demand. The more than 10 years of experience in PE processing that we brought with us from Fair Packaging allowed us from our very beginning to produce underlays that met the most stringent standards set by market organizations. Today, we already supply to 24 countries, have an extensive customer portfolio and our products are on the shelves of the largest DIY chains in the world.

PRODUCTS DESCRIPTION

This product is a flexible material made mainly of polyethylene. It is soft and elastic, it gives the impression of a soundproofing and shock-absorbing material. The foamed polyethylene packaging protects against scratches and damage during transport and against the harmful effects of moisture, including sea moisture. The foam also has insulating properties, which means it protects against heat loss. Polyethylene foam products are produced in the form of rolls, sheets and bags. Optionally combined with various types of foil, such as LDPE, MDPE, HDPE, metalized BOPP, metalized PET (Al or Au)/PE. Products may be subject to minor modifications according to the customer's needs and include, for example, double-sided adhesive tapes and prints. The dimensions (thickness, width, length, density) and colors of the products are adapted to the customer's needs. All additional technical information about the product is available on the website and in the manufacturer's catalogues.

LIFE CYCLE ASSESSMENT (LCA) – general rules applied

Unit
The declared unit is 1 kg of polyethylene foam based products produced in Buszewo (Poland).

System boundary

The life cycle analysis of the declared products covers “Product Stage” A1-A3, A4, C2-C4+D modules in accordance with EN 15804+A2 and ITB PCR A v.1.6 (cradle to gate with options). 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. Production of the polyethylene foam based products is a direct process (as presented in Figure 2) conducted in the manufacturing plant located in Buszewo (Poland). Input and output data from the production is inventoried and allocated to the production on the mass basis. The declaration covers a wide range of polyethylene foam based products. Their production resources and processing stages are basicly similar, so it is possible to average the production by product weight.

System limits
Minimum 99.0% input materials and 100% energy consumption (electricity, gas, other) were inventoried in a processing plant and were included in the calculation. In the assessment, all significant parameters from gathered production data are considered, i.e. all material used per formulation, utilized thermal energy, and electric power consumption, direct production waste and available emission measurements. Tires consumption for transport was not considered. Substances with a percentage share of less than 0.1% of total mass were excluded from the calculations. The packaging products (wooden pallets) are included.

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

The modules A1 and A2 represent the extraction and processing of raw materials (mainly LDPE granulate) and transport to the production site. LDPE granules and films are intermediates commonly used in the production of polyethylene foam products. For A2 module (transport) European averages for fuel data are applied.

Module A3: *Production*

The production process for polyethylene foam products is shown in detail in Figure 2. The first stage is the production of polyethylene foam in the form of a 'big' roll. Foamed polyethylene is produced in an extrusion line by physical foaming. The foaming agent is isobutane gas. In the following steps, the foam can be:

- laminated with different types of foil on laminating machines,
- covered with cast film,
- cut into sheets,
- sealed (production of bags),
- rewound into rolls of the appropriate length.

The final products can be produced in various configurations.
Simpler products skip some of the steps of scheme 2.
For the most part, the waste from production is put through the recycling process at the plant.

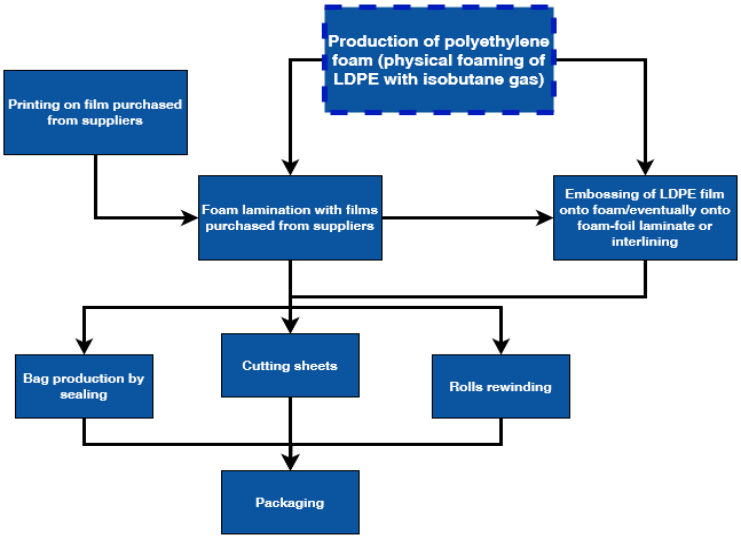

Figure 2 Manufacturing process scheme (A3)

Module A4-A5: transport to consumer, installation

Vehicle transport at distance 500 km is considered (emission standard: Euro 5) with 100% load capacity. No special tools, nor specific protection is necessary. The recommendations how to use the product is described in the application manuals or videos.

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

The end-of-life scenario for all products has been generalized based on actual state of the art. It is assumed that in the end of life stage (C1), some electric/mechanical energy is needed to remove products from installation place, the transport distance for waste to waste processing (C2) is 100 km on > 10t loaded lorry with 75% capacity utilization and fuel consumption of 20 l per 100 km. At the end of life, the PE products are dismantled and the materials recycled according to the national treatment practice of waste what is presented in Table 1. It is assumed that 20% of the product can be recovered in the recycling process. The remaining 40% may be designated for incineration and the remaining 40% for landfill. The reuse, recovery and recycling stage are considered beyond the system boundaries (D) (reuse potential and incineration –gained heat – incineration and recycled content). The end of life scenario for at end-of-life (module C) has been modelled using an average Polish electricity mix as the location where the product reaches end-of-life is unknown.

Table 1. End-of-life scenario (C modules)

Parameter	Contribution
Collection rate	100%
Recycling	20%
Incineration	40%
Landfilling	40%

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 Fair Packaging Sp. z oxo. Sp. k. 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 are judged as good. The background data for the processes come from the following resources database Eco invent v.3.9.1 (granulate LDPE, trichloropropane, isobutane, PET, BOPP, butyl, printing ink, foil, EUR-flat pallet, paper, boxboard carton). 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.

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 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.

LIFE CYCLE ASSESSMENT (LCA) – Results

Declared unit

The declaration refers to declared unit (DU) – 1 kg of polyethylene foam based products produced in Europe. 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-A5+C1-C4+D).

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**	**MD**	**MD**	**MND**	**MND**	**MND**	**MND**	**MND**	**MND**	**MND**	**MD**	**MD**	**MD**	**MD**	**MD**

Table 2 Life cycle assessment (LCA) results for specific product – 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	2.33E+00	1.73E-01	2.71E-01	2.77E+00	8.34E-02	3.52E-05	5.28E-03	1.10E-02	1.13E+00	1.28E-02	-1.32E+00
Greenhouse potential - fossil	eq. kg CO_2	2.38E+00	1.73E-01	2.60E-01	2.81E+00	8.31E-02	3.52E-05	5.28E-03	1.10E-02	1.13E+00	1.26E-02	-1.32E+00
Greenhouse potential - biogenic	eq. kg CO_2	-4.93E-02	4.88E-04	1.13E-02	-3.76E-02	2.84E-04	1.33E-06	2.00E-04	3.76E-05	1.16E-03	1.27E-04	-4.44E-03
Global warming potential - land use and land use change	eq. kg CO_2	1.32E-03	7.90E-05	1.19E-04	1.52E-03	3.26E-05	1.60E-08	2.40E-06	4.32E-06	2.72E-05	1.28E-05	-2.09E-04
Stratospheric ozone depletion potential	eq. kg CFC 11	4.67E-06	3.89E-08	9.68E-09	4.72E-06	1.92E-08	9.33E-13	1.40E-10	2.55E-09	1.43E-09	3.84E-09	-5.91E-08
Soil and water acidification potential	eq. mol H+	9.23E-03	1.06E+01	3.49E-03	1.06E+01	3.37E-04	5.07E-07	7.60E-05	4.47E-05	2.23E-02	1.07E-04	-3.26E-03
Eutrophication potential - freshwater	eq. kg P	4.76E-04	1.05E-05	5.86E-04	1.07E-03	5.59E-06	8.67E-08	1.30E-05	7.40E-07	5.47E-06	3.67E-06	-9.27E-05
Eutrophication potential - seawater	eq. kg N	1.66E-03	4.36E-04	7.01E-04	2.80E-03	1.02E-04	7.33E-08	1.10E-05	1.35E-05	1.17E-02	3.68E-05	-5.74E-04
Eutrophication potential - terrestrial	eq. mol N	1.70E-02	4.80E-03	4.36E-03	2.62E-02	1.11E-03	6.20E-07	9.30E-05	1.47E-04	1.28E-01	4.00E-04	-6.11E-03
Potential for photochemical ozone synthesis	eq. kg NMVOC	1.01E-02	1.31E-03	1.22E-03	1.26E-02	3.40E-04	1.73E-07	2.60E-05	4.50E-05	3.16E-02	1.16E-04	-3.02E-03
Potential for depletion of abiotic resources - non-fossil resources	eq. kg Sb	1.20E-05	5.41E-07	1.57E-06	1.41E-05	2.95E-07	2.23E-10	3.34E-08	3.90E-08	3.95E-07	4.28E-08	-3.74E-06
Abiotic depletion potential - fossil fuels	MJ	8.11E+01	2.49E+00	5.47E+00	8.91E+01	1.23E+00	7.73E-04	1.16E-01	1.63E-01	1.85E-01	2.92E-01	-3.69E+01
Water deprivation potential	eq. m^3	1.24E+00	1.08E-02	1.53E-01	1.40E+00	5.70E-03	1.60E-05	2.40E-03	7.55E-04	2.88E-02	1.69E-03	-2.97E-01

Table 3 Life cycle assessment (LCA) results for specific product – additional impacts indicators (DU: 1 kg)

Indicator	Unit	A1-A3	A4-A5	C1-C4	D
Particulate matter	disease incidence	INA	INA	INA	INA
Potential human exposure efficiency relative to U235	eg. kBq U235	INA	INA	INA	INA
Potential comparative toxic unit for ecosystems	CTUe	INA	INA	INA	INA
Potential comparative toxic unit for humans (cancer effects)	CTUh	INA	INA	INA	INA
Potential comparative toxic unit for humans (non-cancer effects)	CTUh	INA	INA	INA	INA
Potential soil quality index	dimensionless	INA	INA	INA	INA

Table 4 Life cycle assessment (LCA) results for specific product - 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	2.55E+00	3.26E-02	3.92E-01	2.98E+00	1.77E-02	5.73E-05	8.60E-03	2.34E-03	6.72E-02	0.00E+00	-4.13E-01
Consumption of renewable primary energy resources used as raw materials	MJ	6.33E-01	0.00E+00	0.00E+00	6.33E-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	3.18E+00	3.26E-02	3.93E-01	3.61E+00	1.77E-02	5.73E-05	8.60E-03	2.34E-03	6.72E-02	5.12E-03	-4.31E-01
Consumption of non-renewable primary energy - excluding renewable primary energy sources used as raw materials	MJ	3.48E+01	2.49E+00	5.23E+00	4.25E+01	1.23E+00	7.76E-04	1.16E-01	1.63E-01	-2.91E+01	0.00E+00	-1.60E+01
Consumption of non-renewable primary energy resources used as raw materials	MJ	4.63E+01	0.00E+00	0.00E+00	4.63E+01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.93E+01	0.00E+00	-1.31E+01
Total consumption of non-renewable primary energy resources	MJ	8.11E+01	2.49E+00	5.51E+00	8.91E+01	1.23E+00	7.76E-04	1.16E-01	1.63E-01	1.85E-01	3.15E-01	-3.78E+01
Consumption of secondary materials	kg	1.00E-01	8.85E-04	8.71E-04	1.02E-01	4.14E-04	7.07E-08	1.06E-05	5.48E-05	9.97E-04	0.00E+00	8.00E-01
Consumption of renew. secondary fuels	MJ	2.15E-02	8.16E-06	3.18E-06	2.16E-02	4.56E-06	3.94E-10	5.91E-08	6.03E-07	1.29E-05	0.00E+00	-1.14E-05
Consumption of non-renewable secondary fuels	MJ	0.00E+00	0.00E+00	4.13E-03	4.13E-03	0.00E+00	6.26E-07	9.39E-05	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Net consumption of freshwater	m^3	3.02E-02	2.87E-04	2.15E-02	5.20E-02	1.55E-04	2.10E-07	3.15E-05	2.05E-05	3.42E-04	4.55E-05	-7.38E-03

Table 5 Life cycle assessment (LCA) results for specific product – waste categories (DU: 1 ton)

Indicator	Unit	A1	A2	A3	A1-A3	A4	A5	C1	C2	C3	C4	D
Hazardous waste	kg	4.55E-02	2.89E-03	1.64E-03	5.01E-02	1.38E-03	8.00E-09	1.20E-06	1.83E-04	3.81E-03	4.59E-07	9.52E-03
Non-hazardous waste	kg	2.52E+00	4.59E-02	2.32E-02	2.59E+00	2.46E-02	4.16E-07	6.24E-05	3.25E-03	5.65E-02	1.20E+00	3.63E-01
Radioactive waste	kg	6.03E-05	1.65E-07	5.05E-06	6.55E-05	9.21E-08	5.80E-10	8.70E-08	1.22E-08	1.25E-06	1.77E-06	1.19E-05
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	5.14E-04	5.34E-05	1.00E-01	1.01E-01	3.82E-06	8.00E-10	1.20E-07	5.06E-07	3.62E-01	0.00E+00	9.70E-05
Materials for energy recovery	kg	1.61E-06	6.24E-08	5.54E-08	1.73E-06	3.09E-08	7.00E-12	1.05E-09	4.09E-09	1.01E-07	0.00E+00	2.27E-07
Exported Energy	MJ	6.51E-02	5.30E-04	1.79E-02	8.36E-02	0.00E+00	2.31E-06	3.46E-04	0.00E+00	4.40E-01	0.00E+00	8.12E-03

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 audit and verification: Michał Chwedaczuk, 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 I 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
- EN 14313 : 2015 Thermal Insulation products for building equipment. Factory made polyethylene foam
- 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
- KOBiZE Wskaźniki emisyjności CO_2, SO_2, NO_x, CO i pyłu całkowitego dla energii elektrycznej. December 2021

Signature Not Verified
Dokument podpisany przez Michał Piasecki; ITB
Data: 2023.10.17 15:57:12 CEST

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CERTIFICATE № 518/2023
of TYPE III ENVIRONMENTAL DECLARATION

Products:

Polyethylene foam based products

Manufacturer:

Fair Packaging Sp. z o.o. Sp. k.
ul. Buszewo 10, 62-045 Pniewy, 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 8th September 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, September 2023