

# Expanded polystyrene boards (EPS) produced by TERMO ORGANIKA



**Termo Organika**  
Think: Warm

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## EPD program operator:

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ITB is the verified member of The European Platform for EPD program operators and LCA practitioners. [www.eco-platform.org](http://www.eco-platform.org)



## Manufacturer headquarters:

**Termo Organika Sp. z o.o.**  
ul. Bolesława Prusa 33, 30-117 Kraków  
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Technical Contact: Krzysztof Krzemień  
kkrzemien@termoorganika.pl

## Production plants

**Termo Organika Sp. z o.o.**  
**Division Mielec**  
ul. Wojska Polskiego 3, 39-300 Mielec  
**Division Głogów**  
ul. Południowa 12, 67-200 Głogów  
**Division Siedlce**  
ul. Brzeska 97 A, 08-110 Siedlce

## Basic information

This declaration is the type III Environmental Product Declaration (EPD) based on EN 15804 and verified according to ISO 14025 by external auditor. It contains the information on the impacts of declared construction materials on environment and their aspects verified by the independent Body according to ISO 14025. Basically, a comparison or evaluation of EPD data is possible only if all the compared data were created according to EN 15804 (see point 5.3 of the standard).

**Life cycle:** A1-A3 modules in accordance with EN 15804 (Cradle to Gate)

**The year of preparing the EPD:** 2021

**Declared durability:** Under normal conditions, expanded polystyrene boards (EPS) are expected to last the service life of a building (30 years)

**Product standard:** PN-EN 13163+A2:2016-12 - Thermal insulation products for buildings - Factory made expanded polystyrene (EPS) products - Specification

**PCR:** EN 16783:2017, ITB PCR A (PCR based on EN 15804)

**Declared unit:** 1 m<sup>3</sup>

**Reasons for performing LCA:** B2B

**Representativeness:** Polish product



## Manufacturer Information

Termo Organika is a Poland manufacturer of expanded polystyrene boards. It produces HOT DOTTED EXPANDED POLYSTYRENE – insulation material with high guaranteed quality, containing graphite composite which enhances the insulation properties of expanded polystyrene.

Termo Organika has launched a modern laboratory which regularly checks the characteristics of insulation materials. All products comply with EN 13163 standard.

Termo Organika manufactures and sells primarily insulation expanded polystyrene boards made to any dimension and thickness and offers all types of pre-forms, claddings and profiles.

In 2006, the composition of HOT DOTTED expanded polystyrene was modified by introducing specialty designed refiners, which contributed to the generation of an entirely new category of EPS boards and an extension of the range of products the company offers. The polystyrene by Termo Organika is inimitable. Its originality can be checked in ultraviolet light.

The company was founded in 1997 in Mielec and currently has four plants – in Mielec, Głogów, Siedlce and Rypin and a building chemistry production plant in Pyrzyce. It covers the whole country, having a widely developed network of points of sale.

## Product Information and application of expanded polystyrene boards

### Building and Construction

EPS is widely used in building and construction industry thanks to its insulation properties, chemical inertness, bacterial & pest resistance, etc. Its closed cell structure allows only little water absorption. It is durable, strong and can be used as insulated panel systems for facades, walls, roofs and floors in buildings, as flotation material in the construction of marinas and pontoons and as a lightweight fill in road and railway construction.

Termo Organika offers a wide range of EPS boards intended for insulation. Basic characteristic is shown in table 1.

**Table 1.** Basic characteristic of EPS insulation boards\* produced by Termo Organika.

Application	Declared thermal conductivity $\lambda_d$ [W/mK]	Tensile strength perpendicular to faces [kPa]	Bending strength [kPa]	Compressive stress at 10% deformation CS (10) [kPa]	Water absorption at long-term total immersion
Façade	0.031-0.044	80 -100	75-115	-	-
Roof-floor	0.031-0.040	-	100-150	60-100	-
Parking	0.031	-	150-200	100-150	-
Foundation	0.031	-	150-200	100-150	WL (T) 3.5-4%

\*All specific product characteristics are available on Termo Organika website: [www.termoorganika.pl/styropian](http://www.termoorganika.pl/styropian)

Expanded polystyrene insulation offers numerous environmental advantages, including:

- Reduced energy consumption through stable indoor temperature of properly insulated buildings. A constant comfortable inside temperature can be maintained without excessive heating or air conditioning costs and related environmental burden,
- Recycled content and recyclability
- Localized distribution,
- Improved indoor air quality through mold growth reduction and reduction of VOCs emission of properly insulated and ventilated buildings.

Environmental characteristics (LCA) for Termo Organika expanded polystyrene boards are presented as weighed average from three production plants localized in Głogów, Mielec and Siedlce.

LIFE CYCLE ASSESSMENT (LCA) – general rules applied

Allocation

The allocation rules used for this EPD are based on general ITB-PCR A and EN 16783. This EPD covers EPS production in Termo Organika plants in Głogów, Mielec and Siedlce.

Impacts related to the extraction and processing of raw materials, including the production of polystyrene, n-pentane, flame retardants, packaging materials (foil), energy carriers and water were allocated to module A1 (production of raw materials). About 98% of all impacts from production lines have been inventoried and assigned to the production of EPS polystyrene boards. The calculations also took into account the disposal of packaging materials and amount of the recycled content – 14.6%. Module A2 (transport) covers the transport of raw materials such as EPS, auxiliary materials from suppliers to production plants. Municipal and technological wastes of factories have been assigned to module A3 (factory production). Energy resources were inventoried for all factories and 100% allocated to the production of EPS products. Factory emissions have been estimated using national conversion factors (KOBIZE - 2019) and assigned to module A3.

System limits

The life cycle analysis of the examined products covers “Product Stage”, A1-A3 modules (Cradle to Gate) in accordance with EN 15804+A1 and ITB-PCR A. Details on systems limits are provided in product specific report. All materials and energy consumption inventoried in factories were included in calculation. Office impacts were not taken into consideration. In the assessment, all significant parameters from gathered production data are considered, i.e. all material used per formulation, utilised thermal energy, internal fuel and electric power consumption, direct production waste and all available emission measurements. This study also takes into account some material flows of less than 1% and energy flows with a proportion of less than 1%. It can be assumed that the total sum of omitted processes does not exceed 5% of all impact categories. In accordance with EN 15804, machines and facilities (capital goods) required for and during production are excluded, as is transportation of employees.

A1 and A2 Modules: Raw materials supply and transport

Polystyrene granulate, which is an intermediate in

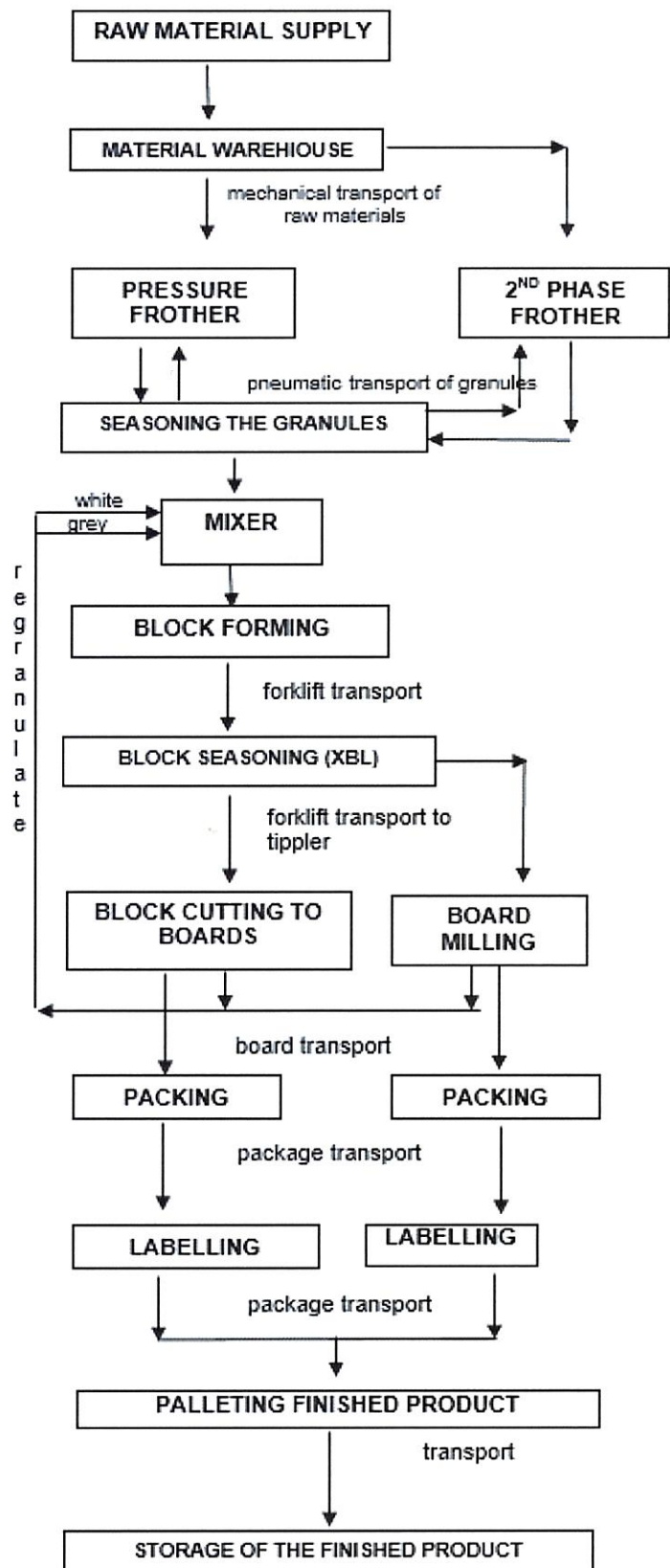


Figure. 1 Production scheme for EPS in Termo Organika Sp. z o.o.

the production of e.g. expanded polystyrene boards, is in the form of hard, glassy granules with a diameter of 0.2 to 2.5 mm. It is transported to the plants producing polystyrene products in special containers. EPS insulation is a foamed porous plastic and is free from chlorofluorocarbons (CFCs), hydrofluorocarbons (HFCs) and hydrochlorofluorocarbons (HCFCs). All components used for LCA calculations come from the LCI questionnaires and the Ecoinvent v 3.7 database. Data on transport of the different products to the manufacturing plants is collected and modelled for factory by assessor. Means of transport include truck, train and ship, and Polish and European fuel averages are applied. Packaging materials like foil and etiquettes have been also included.

### **A3: Production**

Thermal insulation polystyrene boards intended for construction applications are made in a multi-stage process. Pre-foaming is the process of softening raw material granules (polystyrene) using steam at a temperature above 90°C. This process takes 2 to 5 minutes. During this time, the polystyrene granules expand, increasing their volume from 15 to 65 times. Directly after foaming, the process of cooling the foamed particles takes place. The resulting particles of expanded polystyrene must undergo the seasoning stage in airy silos before further processing. In this way, by diffusion, air enters their interior, giving them the stability necessary in the following stages. The granules of pre-expanded polystyrene are poured into large cuboidal forms and expanded again using steam at a temperature of 110°C to 120°C, under the influence of which they combine to form a closed, foam structure. After cooling, the polystyrene blocks are taken out of the molds and seasoned. Cutting blocks into boards of the desired dimensions is carried out using thermal-mechanical devices. Additional edge profiling is performed by milling. The waste (cuttings) generated during the cutting of blocks into boards are subject to internal recycling and re-used in the production cycle. The block diagram in Figure 1 shows the basic elements of the technological process of an EPS production in Termo Organika plants in Głogów, Mielec and Siedlce.

### **Recycled material content**

Recycled content in expanded polystyrene boards (EPS) produced by Termo Organika is on the average 14.6%. Recycled content calculation is based on the product weight and calculated according to ISO 14021:2016 using the 2019 raw material and production data.

### **Data collection period**

The data for manufacture of the examined products and analysed production plants refer to period between dates 01.01.2019-31.12.2019. The life cycle assessments were prepared for locations in Poland as reference area.

### **Data quality**

The values determined to calculate the LCA originate from verified Termo Organika Sp. z o.o. inventory data.

### **Assumptions and estimates**

The impacts of the representative Termo Organika products for each EPS product were aggregated using weighted average. Impacts were inventoried and calculated for all products in EPS product group for three production plants in Siedlce, Głogów and Mielec. Environmental impacts of this EPD present the weighted average for mentioned production plants.

### **Calculation rules**

LCA was done in accordance to PCR A and EN 16783 document.

### **Databases**

The data for the processes come from the following databases: Ecoinvent, ITB-Data. Specific data quality analysis was a part of external ISO 14001 audit. Characterization factors are CML ver. 4.2 based on EN 15804:2012+A1:2013 version (PN-EN 15804+A1:2014).



## LIFE CYCLE ASSESSMENT (LCA) - Results

### Declared unit

The declaration refers to declared unit (DU) - 1 m<sup>3</sup> of Termo Organika expanded polystyrene boards (EPS) manufactured in Siedlce, Głogów and Mielec.

**Table 2.** System boundaries for environmental characteristic for EPS produced by Termo Organika.

Environmental assessment information (MNA – Module not assessed, MD – Module 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	Returbishment	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	MNA	MNA	MNA	MNA	MNA	MNA	MNA	MNA	MNA	MNA	MNA	MNA	MNA	MNA



## Expanded polystyrene boards (EPS) produced by TERMO ORGANIKA

Environmental impacts: (DU – 1 m <sup>3</sup> )					
Indicator	Unit	A1	A2	A3	A1-A3
Global warming potential	[kg CO <sub>2</sub> eq.] (100 years)	4.42E+01	9.15E-01	4.09E+00	4.92E+01
Depletion potential of the stratospheric ozone layer	[kg CFC 11 eq.]	5.15E-07	0.00E+00	1.26E-09	5.16E-07
Acidification potential of soil and water	[kg SO <sub>2</sub> eq.]	1.97E-01	6.69E-03	2.19E-03	2.06E-01
Formation potential of tropospheric ozone	[kg Ethene eq.]	3.58E-03	4.87E-04	3.20E-03	7,27E-03
Eutrophication potential	[kg (PO <sub>4</sub> ) <sup>3-</sup> eq.]	5.85E-02	1.18E-03	3.86E-04	6.01E-02
Abiotic depletion potential (ADP-elements) for non-fossil resources	[kg Sb eq.]	6.73E-01	0.00E+00	4.10E-06	6.73E-01
Abiotic depletion potential (ADP-fossil fuels) for fossil resources	[MJ]	1.30E+03	8.45E+00	7.53E+01	1.38E+03
Environmental aspects on resource use: (DU – 1 m <sup>3</sup> )					
Indicator	Unit				
Use of renewable primary energy excluding renewable primary energy resources used as raw materials	[MJ]	INA	INA	INA	INA
Use of renewable primary energy resources used as raw materials	[MJ]	INA	INA	INA	INA
Total use of renewable primary energy resources (primary energy and primary energy resources used as raw materials)	[MJ]	2.49E+01	7.43E-01	2.75E+00	2.84E+01
Use of non-renewable primary energy excluding non-renewable primary energy resources used as raw materials	[MJ]	INA	INA	INA	INA
Use of non-renewable primary energy resources used as raw materials	[MJ]	INA	INA	INA	INA
Total use of non-renewable primary energy resources (primary energy and primary energy resources used as raw materials)	[MJ]	1.39E+03	9.29E+00	8.29E+01	1.48E+03
Use of secondary material	[kg]	3.71E-05	0.00E+00	2.16E+00	2.16E+00
Use of renewable secondary fuels	[MJ]	4.38E-04	4.65E-01	0.00E+00	4.65E-01
Use of non-renewable secondary fuels	[MJ]	6.34E-05	0.00E+00	0.00E+00	6.34E-05
Net use of fresh water	[m <sup>3</sup> ]	6.82E-02	8.02E-04	3.04E-02	9.94E-02
Other environmental information describing waste categories: (DU – 1 m <sup>3</sup> )					
Indicator	Unit	A1	A2	A3	A1-A3
Hazardous waste disposed	[kg]	4.02E-03	5.86E-06	2.57E-04	4.28E-03
Non-hazardous waste disposed	[kg]	2.12E+00	5.00E-03	7.32E-02	2.20E+00
Radioactive waste disposed	[kg]	5.87E-04	0.00E+00	0.00E+00	5.87E-04
Components for re-use	[kg]	3.71E-05	0.00E+00	3.38E-01	3.39E-01
Materials for recycling	[kg]	0.00E+00	0.00E+00	2.57E-04	2.57E-04
Energy recovery	[kg]	0.00E+00	0.00E+00	2.20E-02	2.20E-02
Exported energy	[MJ]	0.00E+00	0.00E+00	0.00E+00	0.00E+00

## 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 and EN 16783
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
LCA, LCI audit and input data verification: M.Sc. Eng. Dominik Bekierski, <a href="mailto:d.bekierski@itb.pl">d.bekierski@itb.pl</a>
Verification of LCA: Ph.D.Eng. Justyna Tomaszewska, <a href="mailto:j.tomaszewska@itb.pl">j.tomaszewska@itb.pl</a>

## Normative references

- ITB PCR A- General Product Category Rules for Construction Products
- EN 16783:2017 Thermal insulation products - Product category rules (PCR) for factory made and in-situ formed products for preparing environmental product declarations
- 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+A1:2013 Sustainability of construction works - Environmental product declarations - Core rules for the product category of construction products
- EN 15942:2011 Sustainability of construction works - Environmental product declarations - Communication format business-to-business
- Wartości opałowe (WO) i wskaźniki emisji CO<sub>2</sub> (WE) w roku 2016 do raportowania w ramach Systemu Handlu Uprawnieniami do Emisji za rok 2019, KOBiZE 2018.

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# CERTIFICATE No 233/2021 of TYPE III ENVIRONMENTAL DECLARATION

Products:

Expanded polystyrene boards (EPS) produced by TERMO ORGANIKA

Manufacturer:

**Termo Organika Sp. z o.o.**

ul. Bolesława Prusa 33, 30-117 Kraków, Poland

confirms the correctness of the data included in the development of  
Type III Environmental Declaration and accordance with the requirements of the standard

**PN-EN 15804+A1**

Sustainability of construction works.

Environmental product declarations.

Core rules for the product category of construction products.

This certificate, issued for the first time on 7<sup>th</sup> July 2021 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, July 2021