Environmental Product Declaration

In accordance with ISO 14025 and EN 15804:2012+A2:2019 for:

PLASTOPOR EPS 100-035, EPS 100-037 and EPS 150

from

Plastform d.o.o.

Programme:	The International EPD® System, www.environdec.com
Programme operator:	EPD International AB
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An EPD should provide current information and may be updated if conditions change. The stated validity is therefore subject to the continued registration and publication at www.environdec.com

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General information

Programme information

Programme:	The International EPD® System
Address:	EPD International AB Box 210 60 SE-100 31 Stockholm Sweden
Website:	www.environdec.com
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CEN standard EN 15804 serves as the Core Product Category Rules (PCR)
Product category rules (PCR): PCR 2019:14 CONSTRUCTION PRODUCTS*, version 1.2.5, CPC 369, 314*
PCR review was conducted by: The Technical Committee of the International EPD® System. Chair: Claudia Peña. Contact via info@environdec.com
Independent third-party verification of the declaration and data, according to ISO 14025:2006: ☐ EPD process certification ☒ EPD verification
Third party verifier: - *Odyssefs Papagiannidis, Bureau Veritas HSE Denmark on behalf of Bureau Veritas Certification Denmark, EPD Lead verifier* - *Jaka Jelenc, on behalf of Bureau Veritas Slovenija, EPD Lead verifier under training on behalf of Bureau Veritas Certification Sverige AB accredited by SWEDAC with accreditation number 1236* *In case of accredited certification bodies:* Accredited by: *Bureau Veritas Certification Sverige AB accredited by SWEDAC with accreditation number 1236.* *In case of recognised individual verifiers:* Approved by: The International EPD® System
Procedure for follow-up of data during EPD validity involves third party verifier: ☐ Yes ☒ No

The EPD owner has the sole ownership, liability, and responsibility for the EPD.

EPDs within the same product category but from different programmes may not be comparable. EPDs 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.

Company information

Owner of the EPD: Plastform d.o.o., Šašinovec, Ivana Granđe 25, Sesvete, Croatia
Contact: Ivica Konječić, director
Description of the organisation: The main subject of business of the company Plastform d.o.o. is the production of plastic products. Plastform d.o.o. is the leading manufacturer of expanded polystyrene (EPS) for thermal insulation elements and packaging in the Republic of Croatia.

The main activity of the company is the production of thermal insulation panels and expanded polystyrene (EPS), the production of Styrofoam® for thermal insulation in construction, and the production of Styrofoam® packaging for the use in industry and agriculture. In addition to the mentioned products, various decorative elements are made according to customer wishes, as well as granules, coarsely and finely ground Styropor® for the production of thermal plasters and lightweight concrete.

Product-related or management system-related certifications: ISO 9001, ISO 14001, ISO 14021 "self-declared of recycled content product"
Name and location of production site(s): Šašinovec, Ivana Granđe 25, Sesvete, Croatia

Product information

Product name: PLASTOPOR EPS 100-035, -037 and EPS 150
Product identification: HRN EN 13163
Product description: EPS is a solution for thermal isolation in construction in form of boards/panels. EPS is not toxic because it doesn't contain hydrocarbons substituted by halogen elements (such as fluorine and chlorine). Its use saves several times more energy than is required for its production. Plastopor styrofoam is produced using state of the art vacuum technology and so completely complies with the requirements of the Croatian (HRN EN 13163) and European standards (EN13163). The possibility of making a fold of 50 – 300 mm
UN CPC code: *369, 314*
Recycled part of the product (pre-consumer scrap + post-consumer scrap) is 15% by mass (see Table 1).
Products are produced in one site: Šašinovec, Ivana Granđe 25, Sesvete, Croatia.

Conversion factors to EPS products

For the Group A of products and further calculations following parameters were used:
1 m² of insulation material (EPS) with an average RSI = 1 $m^2 K W^{-1}$

The conversion factors for all the products PLASTOPOR EPS 100-035, -037 and EPS 150 are determined and they all are within the interval ± 10% of the declared unit and will not be calculated separately.

LCA information

Declared unit: 1 m^2 of insulation material (EPS) with a thickness of 35.7 mm that gives an average thermal resistance RSI = 1 $m^2 K W^{-1}$
Reference service life: min. 60 years
Time representativeness: reference year 2022

Database(s) and LCA software used: ***SimaPro*** version 7.3 & Ecoinvent 2.2 software using the EN 15804 + A2 Method V1.02 / EF 3.0 normalization and weighting set methodology

Transport of raw materials for production purposes (expandable PS and other auxiliary materials) is mostly brought by road vehicles (trucks). The average transport distances for raw materials supplies is 920 km for Group C. The average transport distance for collection of postconsumer EPS scrap was estimated to be 50 km.
The following steps are not included in the study:

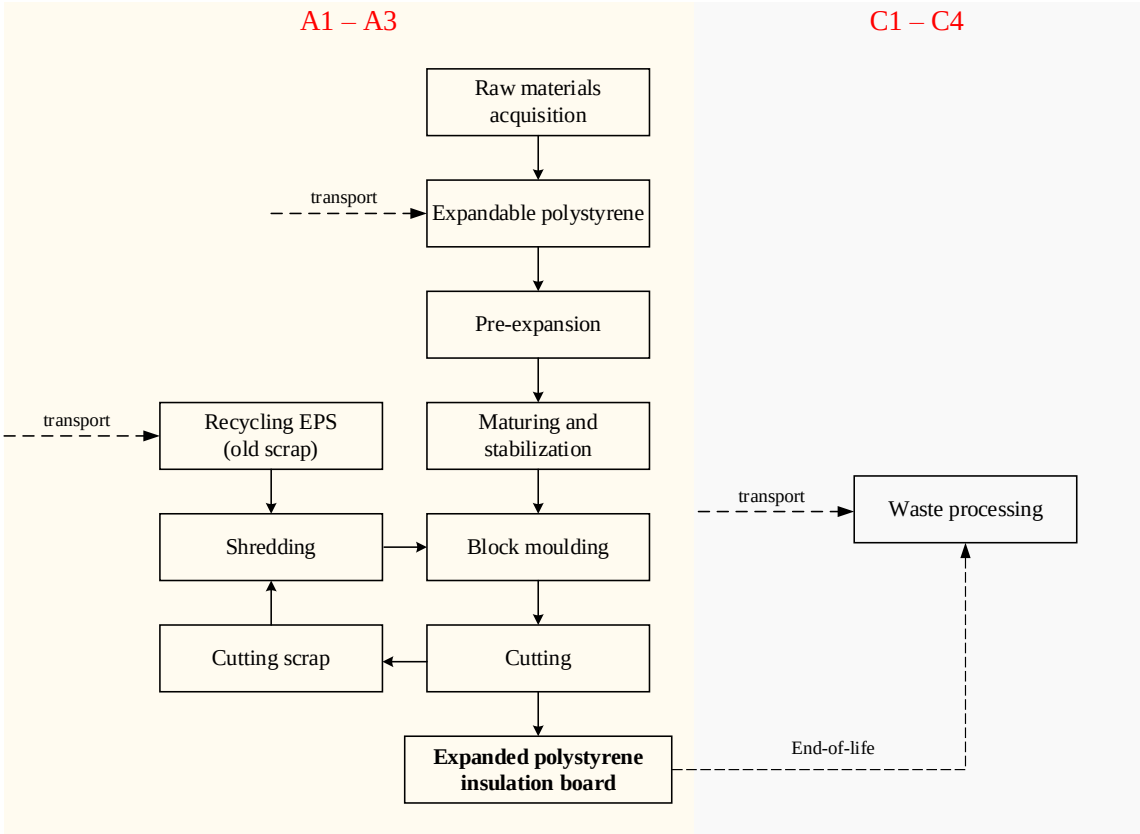
- maintenance and operation of support equipment;
- transport to warehouse and to final customer;
- product use.

For group C of products: pre-consumer scrap – 11.48 % by mass, post-consumer scrap 3.52 % by mass (total of recycled material – 15%).

It is assumed that by end-of-life stage (C1-C4) 100% of EPS will be incinerated. In C1 stage manual disassembly without operations relevant to LCA is assumed. Transport distance to the incineration plant was assumed to be 100 km. For C3 stage it is assumed 100% of incineration of the EPS material. In C4 stage there are no other requirements due to landfilling/disposal.
Module D comprises energetic recovery potentials resulting from end-of-life cycle thermal recycling. It is assumed that only incineration of the EPS is included, without energetic recovery.

Description of system boundaries: Cradle to gate (A1–A3); End of life (C1-C4); D

System diagram:



Modules declared, geographical scope, share of specific data (in GWP-GHG indicator) and data variation: (***X*** – included, ***ND*** – Not declared)

	Product stage			Construction process stage		Use stage							End of life stage				Resource recovery stage
	Raw material supply	Transport	Manufacturing	Transport	Construction installation	Use	Maintenance	Repair	Replacement	Refurbishment	Operational energy use	Operational water use	De-construction demolition	Transport	Waste processing	Disposal	Reuse-Recovery-Recycling-potential
Module	**A1**	**A2**	**A3**	**A4**	**A5**	**B1**	**B2**	**B3**	**B4**	**B5**	**B6**	**B7**	**C1**	**C2**	**C3**	**C4**	**D**
Modules declared	***X***	***X***	***X***	***ND***	***ND***	***ND***	***ND***	***ND***	***ND***	***ND***	***ND***	***ND***	***X***	***X***	***X***	***X***	***X***
Geography	Global	EU	HR														
Specific data used	>90%					-	-	-	-	-	-	-	-	-	-	-	-
Variation – products	<10%					-	-	-	-	-	-	-	-	-	-	-	-
Variation – sites	Not relevant					-	-	-	-	-	-	-	-	-	-	-	-

More information: About products - https://www.plastform.hr/en/

LCA practitioner: Davor Ljubas Ph.D. and Goran Smoljanić, M.Sc.,

Contact information of the organisation carrying out the underlying LCA study: CTT - Center of Technology Transfer llc, Ivana Lučića 5, 10000 Zagreb, CROATIA

Additional information: Acknowledging the growing body of evidence of environmental pollution and the major impact on Earth's climate change, Plastform has begun the process of establishing its environmental impacts related to the production of expanded polystyrene and its further products. As a suitable first step in determining the impact on the environment, the creation of a Life Cycle Assessment (LCA) Study was initiated in 2022.

LCA is a standardized methodology for assessing the potential environmental impacts of products, services and organizations using a life cycle perspective. This LCA study was conducted in accordance with the following standards and guidelines [1-4]:

The EPD framework includes a 3-step allocation procedure, but system expansion according to the ISO14044 is not allowed in the EPD due to the nature of the framework being strictly attributional, not consequential.

The 3-step allocation procedure:

- When possible, allocation shall be avoided through sub-dividing the processes, so that the input and output data related to the sub-processes can be obtained.
- When allocation cannot be avoided, a partitioning of input and output to different products or services shall be done based on their underlying physical relationship.

- If allocation based on a physical relationship cannot be applied, partitioning based on another relationship is also possible. A sensitivity analysis needs to be performed when economic value is used as a basis for allocation.

By-products of waste treatment processes are cut-off, as are all by-products classified as recyclable. Markets in this model include all activities in proportion to their current production volume.
The general rules for cut-off of inputs and outputs follow the requirements in EN 15804, 6.3.5, where the total of neglected input flows per module shall be a maximum of 5 % of energy usage and mass and 1 % of energy usage and mass for unit processes. Recycling processes and benefits for recycled plastic packaging is regarded as below cut-off criterion of 1%.

Content information

Table 1. Basic information about product components and packaging materials

Product components	Weight, kg	Post-consumer material, weight-%	Biogenic material, weight-%
Expandable polystyrene (PS) - raw material	0.58265	0%	0
Expanded polystyrene (EPS) scrap - post-consumer	0.02411	100%	0
Expanded polystyrene (EPS) scrap - pre-consumer	0.07871	100%	0
TOTAL	**0.68547**	**85%**	0
Packaging materials	**Weight, kg**	**Weight-% (versus the product)**	
Packaging film LDPE	0.009051	1.32	
Packaging film LDPE, stretch film	0.002053	0.30	
TOTAL	0.011104	1.62	

Environmental Information

Potential environmental impact – mandatory indicators according to EN 15804

Table 2. Potential environmental impact aggregated for A1-A3, C1-C4 and D modules per declared unit

Indicator	Unit	Total A1-A3	C1	C2	C3	C4	D
GWP-fossil	kg CO_2 eq.	2.06E+00	0.00E+00	1.17E-02	2.17E+00	0.00E+00	0.00E+00
GWP-biogenic	kg CO_2 eq.	4.13E-03	0.00E+00	6.67E-02	3.08E-05	0.00E+00	0.00E+00
GWP-luluc	kg CO_2 eq.	7.39E-02	0.00E+00	6.67E-05	1.74E-04	0.00E+00	0.00E+00
GWP-total	kg CO_2 eq.	2.07E+00	0.00E+00	1.17E-02	2.17E+00	0.00E+00	0.00E+00
ODP	kg CFC 11 eq.	1.11E-07	0.00E+00	2.28E-09	1.27E-09	0.00E+00	0.00E+00
AP	mol H^+ eq.	6.66E-03	0.00E+00	4.55E-05	2.45E-04	0.00E+00	0.00E+00
EP-freshwater	kg P eq	4.78E-05	0.00E+00	1.02E-06	2.45E-06	0.00E+00	0.00E+00
EP-marine	kg N eq.	1.28E-03	0.00E+00	1.56E-05	1.24E-04	0.00E+00	0.00E+00
EP-terrestrial	mol N eq.	1.35E-02	0.00E+00	1.71E-04	1.28E-03	0.00E+00	0.00E+00
POCP	kg NMVOC eq.	9.48E-03	0.00E+00	4.20E-05	2.90E-04	0.00E+00	0.00E+00
ADP-minerals&metals*	kg Sb eq.	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
ADP-fossil*	MJ	1.79E+00	0.00E+00	1.40E-04	3.48E-04	0.00E+00	0.00E+00
WDP	m^3	1.26E+01	0.00E+00	6.02E-01	9.05E-01	0.00E+00	0.00E+00
Acronyms	GWP-fossil = Global Warming Potential fossil fuels; GWP-biogenic = Global Warming Potential biogenic; GWP-luluc = Global Warming Potential land use and land use change; ODP = Depletion potential of the stratospheric ozone layer; AP = Acidification potential, Accumulated Exceedance; EP-freshwater = Eutrophication potential, fraction of nutrients reaching freshwater end compartment; EP-marine = Eutrophication potential, fraction of nutrients reaching marine end compartment; EP-terrestrial = Eutrophication potential, Accumulated Exceedance; POCP = Formation potential of tropospheric ozone; ADP-minerals&metals = Abiotic depletion potential for non-fossil resources; ADP-fossil = Abiotic depletion for fossil resources potential; WDP = Water (user) deprivation potential, deprivation-weighted water consumption						

** Disclaimer: The results of this environmental impact indicator shall be used with care as the uncertainties of these results are high or as there is limited experience with the indicator.*

Potential environmental impact – additional mandatory and voluntary indicators

Table 3. Additional mandatory and voluntary indicators

Indicator	Unit	Tot. A1-A3	C1	C2	C3	C4	D
GWP-GHG[1]	kg CO_2 eq.	2.07E+00	0.00E+00	1.17E-02	2.17E+00	0.00E+00	0.00E+00
Additional voluntary indicators e.g. the voluntary indicators from EN 15804 or the global indicators according to ISO 21930:2017 - N.D.							

Use of resources

Table 4. Energy indicators

Indicator	Unit	Tot. A1-A3	C1	C2	C3	C4	D
PERE	MJ	7.42E-02	0.00E+00	3.52E-04	6.91E-04	0.00E+00	0.00E+00
PERM	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
PERT	MJ	7.42E-02	0.00E+00	3.52E-04	6.91E-04	0.00E+00	0.00E+00
PENRE	MJ	6.19E+02	0.00E+00	1.89E-01	2.81E+01	0.00E+00	0.00E+00
PENRM	MJ.	2.79E+01	0.00E+00	0.00E+00	-2.79E+01	0.00E+00	0.00E+00
PENRT	MJ	6.47E+02	0.00E+00	1.89E-01	1.47E-01	0.00E+00	0.00E+00
SM	kg	5.55E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
RSF	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
NRSF	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
FW	m^3	1.09E+00	0.00E+00	1.40E-02	2.11E-02	0.00E+00	0.00E+00
Acronyms	PERE = Use of renewable primary energy excluding renewable primary energy resources used as raw materials; PERM = Use of renewable primary energy resources used as raw materials; PERT = Total use of renewable primary energy resources; PENRE = Use of non-renewable primary energy excluding non-renewable primary energy resources used as raw materials; PENRM = Use of non-renewable primary energy resources used as raw materials; PENRT = Total use of non-renewable primary energy re-sources; SM = Use of secondary material; RSF = Use of renewable secondary fuels; NRSF = Use of non-renewable secondary fuels; FW = Use of net fresh water						

[1] The indicator includes all greenhouse gases included in GWP-total but excludes biogenic carbon dioxide uptake and emissions and biogenic carbon stored in the product. This indicator is thus equal to the GWP indicator originally defined in EN 15804:2012+A1:2013.

Waste production and output flows

Waste production

Table 5. Waste production per declared unit

Results per declared unit							
Indicator	**Unit**	**Tot. A1-A3**	**C1**	**C2**	**C3**	**C4**	**D**
Hazardous waste disposed	kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Non-hazardous waste disposed	kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Radioactive waste disposed	kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00

Output flows

Table 6. Output flows per declared unit

Results per declared unit							
Indicator	**Unit**	**Tot. A1-A3**	**C1**	**C2**	**C3**	**C4**	**D**
Components for re-use	kg	0.011104	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Material for recycling	kg	0.10282	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Materials for energy recovery	kg	0.68547	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Exported energy, electricity	MJ	ND	ND	ND	ND	ND	ND
Exported energy, thermal	MJ	ND	ND	ND	ND	ND	ND

Information on biogenic carbon content

Table 7. Biogenic carbon content in product and in packaging per declared unit

Results per functional or declared unit		
BIOGENIC CARBON CONTENT	**Unit**	**QUANTITY**
Biogenic carbon content in product	kg C	0.0
Biogenic carbon content in packaging	kg C	0.0

Note: 1 kg biogenic carbon is equivalent to 44/12 kg CO_2.

Additional information

The simplest way to reduce CO_2 emissions in construction sector is to reduce the amount of energy needed for heating and cooling in buildings. This can be achieved with PLASTOPOR EPS thermal insulation of residential, business and public buildings, with this we not only reduced the amount of CO_2 released into the atmosphere, but also saved on a smaller amount of energy consumed.

Information related to Sector EPD

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Differences versus previous versions

This version v.1.3 is the first version of EPD calculation for the products of the Group C for Plastform d.o.o. company.

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References

General Programme Instructions of the International EPD® System. Version 3.01. Product Category

[1] HRN EN ISO 14040:2008 - *Upravljanje okolišem – Procjena životnog ciklusa (LCA) – Načela i okvir rada* (ISO 14040:2006; EN ISO 14040:2006), Hrvatski zavod za norme, Zagreb, 2018.

[2] HRN EN ISO 14044:2008 - *Upravljanje okolišem – Procjena životnog ciklusa (LCA) – Zahtjevi i smjernice* (ISO 14044:2006; EN ISO 14044:2006), Hrvatski zavod za norme, Zagreb, 2020.

[3] HRN EN 15804:2019 - *Održivost građevina – Izjava zaštite okoliša – Osnovna pravila za kategorizaciju građevnih proizvoda* (EN 15804:2012+A2:2019 + EN 15804:2012 + A2:2019/AC:2021), Hrvatski zavod za norme, Zagreb, 2021.

[4] Product Category Rules (PCR) – CONSTRUCTION PRODUCTS, PCR 2019:14, v.1.2.5, EPD International AB, 2022.

[5] Ljubas, D., Smoljanić, G. *LCA (Life Cycle Assessment) study for PLASTOPOR EPS product groups of the company Plastform d.o.o. in accordance with ISO 14040 and ISO 14044 standards*, CTT-Center of Technology Transfer, Zagreb, V1.3, July 2023.

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