ENVIRONMENTAL PRODUCT DECLARATION (EPD) ACCORDING TO STANDARD SN EN 15804+A2:2019

swissporLAMBDA REC 100%, insulation products made from recycled expanded polystyrene with graphite (incl. swissporLAMBDA Vento REC 100% and swissporLAMBDA Roof REC 100%)

The SN EN 15804+A2 [1] standard serves as PCR[a)]
Independent verification of the declaration and data according to EN ISO 14025:2010 [2]
☐ internal ☒ external
Verification by an independent third party: Martina Alig Intep Integrale Planung GmbH Pfingstweidstrasse 16 CH – 8005 Zürich
[a)] *Product category rules*

Owner and publisher of the Environmental Product Declaration	swisspor Management AG CH-6312 Steinhausen www.swisspor.ch
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The French version of this Environmental Product Declaration is authoritative. No responsibility is taken for the correctness of the translations.

DECLARATION OF GENERAL INFORMATION

Name and address of the manufacturer

swisspor Romandie SA / swisspor Management AG

Chemin des Rochettes 100
CH-1618 Châtel-Saint-Denis

For any information regarding the information contained in this Environmental Product Declaration (EPD), please contact swisspor Management AG (info@swisspor.com).

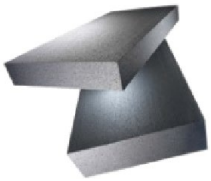
Application of the product

The function of the products swissporLAMBDA REC 100% from recycled expanded polystyrene (EPS) is the thermal insulation of new or renovated buildings and thus the reduction of heating energy consumption. The thickness of the insulation boards to be installed depends on the thermal conductivity of the building materials and the desired thermal performance of the building.

Product identification

The swissporLAMBDA REC 100% thermal insulation products are rigid panels that are applied to the facade (swissporLAMBDA Vento REC 100%), roof, floor (under screed) or ceiling (swissporLAMBDA Roof REC 100%). Their dimensions are variable, as is their color shade.
The product studied, swissporLAMBDA REC 100%, is a set of commercial references for panels with thermal conductivity between 0.029 W/(m.K) and 0.031 W/(m.K), depending on the density of the foam. It was created from the totality of the following commercial references:

swissporLAMBDA
swissporLAMBDA Vento REC 100% swissporLAMBDA Roof REC 100%



Declared unit

The declared unit is 1 kg of insulation board. The boards have an average density of 15 to 23.5 kg/m^3. The average density was calculated according to the produced quantities of the individual commercialized products on which the average product is based. The packaging material was taken into account in the LCA.

Description of the main components

The swissporLAMBDA REC 100% boards examined consist entirely of recycled graphitized polystyrene from the swisspor ALPOR process.
The recycled polystyrene is supplied in the form of loose, non-adherent beads. They contain pentane, a solvent commonly used in organic chemistry. Polystyrene is said to "expand" when the pentane-laden beads have been exposed to water vapor: They increase in volume and clump together, taking on the shape of the formwork in which they are placed.

Program holder

The program holder of the EPD is the company swisspor Management AG.

Considered phases

The following life cycle phases were considered:

- the manufacturing phase up to the factory gate (phases A1 to A3);
- the transport and waste treatment phase at the end of the life cycle (phases C1 to C4);
- the benefits and impacts across system boundaries (Module D).

EPDs of construction products are not comparable if they do not comply with the SN EN 15804+A2:2019 standard [1].

Variability of results (average product)

There is no variability in the results, neither between the two trade references that make up the product grouping swissporLAMBDA REC 100%, nor by product thickness.

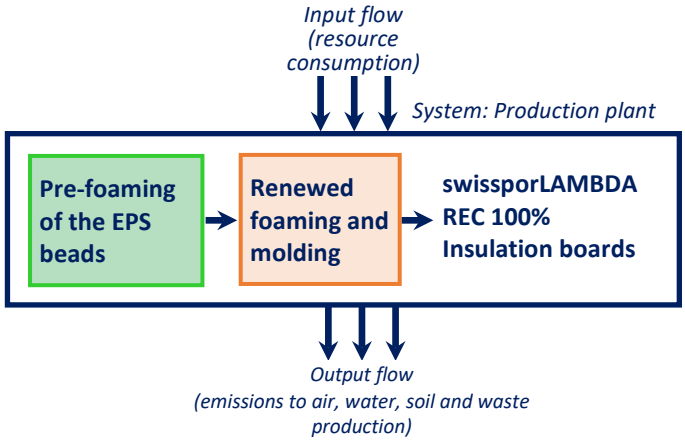
Declaration of the material product content according to the candidate list for an authorization by the European Chemicals Agency (REACH Regulation)

The company confirms that its EPS products do not contain any substances included in the candidate list for authorization of substances of very high concern by the European Chemicals Agency.

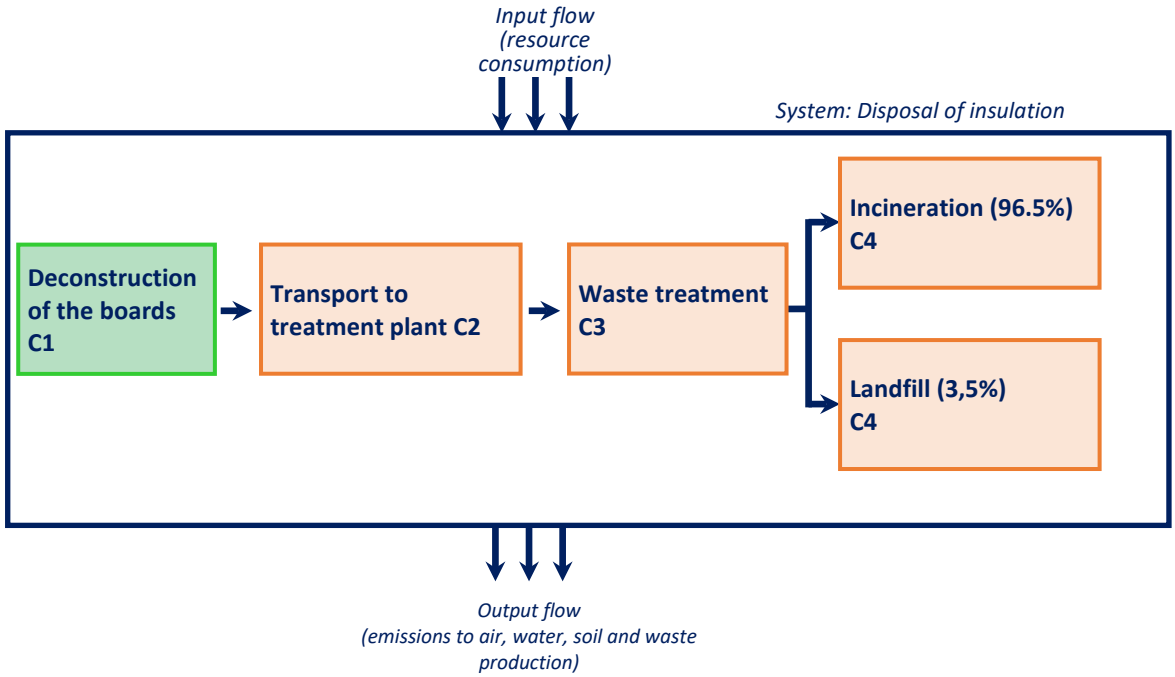
DECLARATION OF ENVIRONMENTAL PARAMETERS FROM THE LIFE CYCLE ASSESSMENT

General information

The following figures show the flowcharts of the processes covered in the LCA for each of the life cycle phases considered.



Simplified representation of the processes in the manufacturing phase (phases A1 -> A3)



Simplified scheme of the disposal processes (phases C1 -> C4)

Rules for the declaration of information from the LCA by module

This is an EPD of the "cradle to gate" type with modules C1-C4 and module D, issued by the company swisspor Management AG.

Information on the system boundaries
(X = included in the LCA; NDM = non-declared module)

Product stage			Construction process stage		Use stage							End of life stage				Benefits and loads beyond the system boundary
Raw material supply	Transport	Manufacturing	Transport	Construction/installation process	Use	Maintenance	Repair	Replacement	Refurbishment	Operational energy use	Operational water use	De-construction/ 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
X	X	X	NDM	NDM	NDM	NDM	NDM	NDM	NDM	NDM	NDM	X	X	X	X	X

Parameters for the description of environmental impacts

1. environmental impact indicators

Indicator	unit	Product stage A1–A3	End of life stage C1 (Demolition)	End of life stage C2 (Transport)	End of life stage C3 (Waste processing)	End of life stage C4 (Disposal)	Module D
Global Warming Potential – total (GWP-total)	kg CO2 eq.	0,46	6,83E-3	1,7E-3	2,34E-3	3,09	3,47
Global Warming Potential – fossil fuels (GWP-fossil)	kg CO2 eq.	0,47	6,82E-3	1,69E-3	2,26E-3	3,09	3,38
Global Warming Potential – biogenic (GWP-biogenic)	kg CO2 eq.	-1,12E-2	9,48E-6	5,58E-6	7,83E-5	2,79E-4	9,01E-2
Global Warming Potential – luluc (GWP-luluc)	kg CO2 eq.	9,76E-4	1,13E-6	6,91E-6	4,15E-6	3,64E-5	-7,68E-4
Depletion potential of the stratospheric ozone layer (ODP)	kg CFC-11 eq.	4,37E-8	1,03E-10	5,3E-11	2,49E-10	3,26E-9	-1,59E-8
Acidification potential, Accumulated Exceedance (AP)	mol H+ eq.	1,28E-3	3,25E-5	6,3E-6	6,75E-6	3,99E-4	1,17E-2
Eutrophication potential - freshwater (EP-freshwater)	kg P eq.	1,07E-4	3,03E-7	1,39E-7	1,4E-6	3,87E-6	-9,06E-5
Eutrophication potential - marine (EP-marine)	kg N eq.	2,8E-4	1,24E-5	2,06E-6	2,24E-6	2,25E-4	1,56E-3
Eutrophication potential - terrestrial (EP-terrestrial)	mol N eq.	3,15E-3	1,34E-4	2,07E-5	2,13E-5	1,99E-3	1,72E-2
Photochemical Ozone Creation Potential (POCP)	kg NMVOC eq.	9,54E-3	4,25E-5	7,71E-6	6,66E-6	5,03E-4	9,99E-3
Abiotic depletion potential - non-fossil resources (ADPE)[1]	kg Sb eq.	7,56E-7	3,09E-9	4,15E-9	3,41E-9	4,99E-8	-4,07E-7
Abiotic depletion potential - non-fossil resources (ADPF)[1]	MJ	15,82	8,53E-2	2,34E-2	0,10	0,47	64,19
Water (user) deprivation potential (WDP)[1]	m^3 world eq. deprived	750,29	0,18	9,47E-2	4,87	2,18	-7,7E+2
Potential incidence of disease due to PM emissions (PM)	Disease incidence	1,58E-8	1,53E-10	1,4E-10	5,69E-11	2,15E-9	7,56E-8
Potential Human exposure efficiency relative to U235 (IRP)[2]	kBq U235-eq.	0,69	2,16E-4	1,47E-4	8,73E-3	2,66E-3	-1,35
Potential Comparative Toxic Unit for ecosystems (ETP-fw)[1]	CTUe	3,73	7,59E-2	2,58E-2	3,27E-2	15,82	-2,84
Potential Comparative Toxic Unit for humans - cancer effects (HTP-c)[1]	CTUh	1,41E-10	4,05E-12	5,28E-13	1,16E-12	1,93E-10	3,8E-10
Potential Comparative Toxic Unit for humans - non-cancer effects (HTP-nc)[1]	CTUh	3,28E-9	5,98E-11	2,91E-11	1,71E-11	7,91E-9	4,61E-9
Potential Soil quality index (SQP)[1]	dimensionless	3,23	4,39E-3	-3,66E-3	1,82E-2	4,4E-2	-14,7

[1] Disclaimer 1: Results for these environmental impact categories should be used with caution due to high uncertainties in these results or limited experience with this indicator.
[2] Disclaimer 2: This impact category mainly concerns the possible effects on human health of low-dose ionizing radiation from the nuclear fuel cycle. It does not consider the consequences of possible nuclear accidents, occupational exposure, or disposal of radioactive waste in underground facilities. This indicator also does not measure potential ionizing radiation from soil, radon, and certain building materials.

2. indicators to describe the use of resources

Indicator	unit	Product stage A1–A3	End of life stage C1 (Demolition)	End of life stage C2 (Transport)	End of life stage C3 (Waste processing)	End of life stage C4 (Disposal)	Module D
Use of renewable primary energy as energy carrier (PERE)	MJ	4,45	8,24E-4	1,2E-3	2,59E-2	1,36E-2	-7,66
Use of renewable primary energy resources used as raw materials (PERM)	MJ	0	0	0	0	0	0
Total use of renewable primary energy (PERT)	MJ	4,45	8,24E-4	1,2E-3	2,59E-2	1,36E-2	-7,66
Use of non renewable primary energy as energy carrier (PENRE)	MJ	-16,4	8,53E-2	2,35E-2	0,10	0,47	64,19
Use of non renewable primary energy resources used as raw materials (PENRM)	MJ	32,20	0	0	0	0	0
Total use of non-renewable primary energy resource (PENRT)	MJ	15,82	8,53E-2	2,35E-2	0,10	0,47	64,19
Use of secondary material (SM)	kg	1,00	0	0	0	0	0
Use of renewable secondary fuels (RSF)	MJ	0	0	0	0	0	0
Use of non-renewable secondary fuels (NRSF)	MJ	0	0	0	0	0	0
Net use of fresh water (FW)	m^3	17,47	4,15E-3	2,22E-3	0,11	5,09E-2	-17,9

3. environmental information describing categories of waste

Indicator	unit	Product stage A1–A3	End of life stage C1 (Demolition)	End of life stage C2 (Transport)	End of life stage C3 (Waste processing)	End of life stage C4 (Disposal)	Module D
Hazardous waste disposed (HWD)	kg	7,03E-3	9,5E-5	3,63E-5	2,75E-5	4,71E-2	3,75E-2
Non harzardous waste disposed (NHWD)	kg	0,11	1,79E-4	1,97E-4	5,29E-4	4,25E-2	-9,37E-2
Radioactive waste disposed (RWD)	kg	8,0E-5	3,05E-8	1,93E-8	1,06E-6	3,58E-7	-1,61E-4

4. environmental information to describe output flows

Indicator	unit	Product stage A1–A3	End of life stage C1 (Demolition)	End of life stage C2 (Transport)	End of life stage C3 (Waste processing)	End of life stage C4 (Disposal)	Module D
Components for re-use (CRU)	kg	0	0	0	0	0	0
Materials for recycling (MFR)	kg	3,18E-2	0	0	0	0	2,62E-2
Materials for energy recovery (MER)	kg	2,54E-3	0	0	0	0	0
Exported electrical energy (EEE)	MJ	2,39E-2	0	0	0	3,93	0
Exported thermal energy (EET)	MJ	4,67E-2	0	0	0	7,60	0

The results of the environmental impact indicators in Figure 1 were calculated using the characterization factors of the environmental impact assessment methods included in the EN 15804+A2 standard and implemented in the Simapro version 9.1 software (see the accompanying report to this EPD)[3].
For certain indicators, most of the environmental impacts come from the product disposal step (C4), which includes a share of the incineration of Styrofoam products. This applies, for example, to the indicators global and fossil warming potential, water withdrawal potential, and human toxicity. For the other indicators, the production stage (A1-A3) contributes most to the impacts. The deconstruction (C1), transport to disposal (C2) and waste treatment prior to disposal (C3) stages have only minor impacts in comparison (see Figure 1).

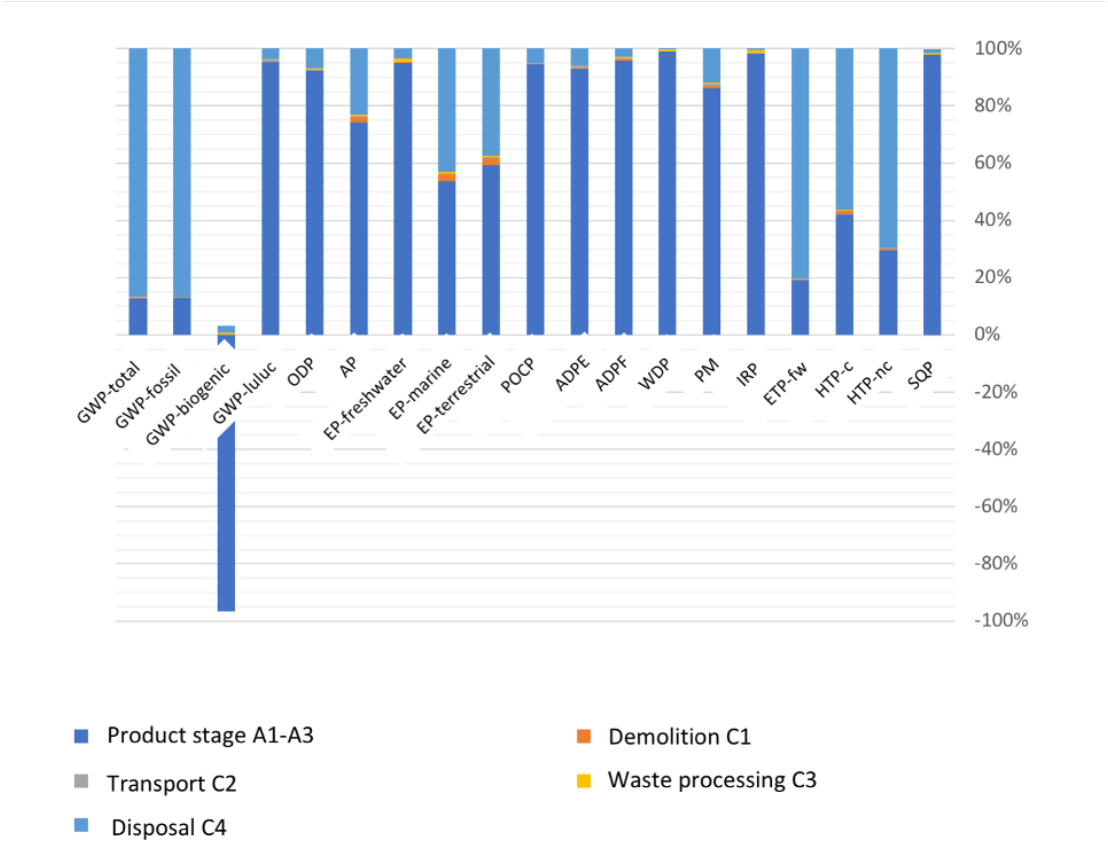


Figure 1: Contributions of life cycle phases to impacts by category.

SCENARIOS AND ADDITIONAL TECHNICAL INFORMATION

Disposal

The disposal scenario at the end of the service life of swissporLAMBDA REC 100% insulation materials corresponds to the average disposal processes identified in Switzerland in the KBOB database. This average scenario includes 96.5 % waste incineration with energy recovery and 3.5 % landfilling. The energy recovery efficiency reported in the KBOB database is 28.51% for heat and 15.84% for electricity. According to the SN EN 15804+A2:2019 standard, the overall efficiency is less than 60%, so it cannot be assumed that the material is intended for energy recovery. However, the energy recovered during combustion is still counted in the calculation of module D.

Process	Unit (per declared unit)	End of life stage C1–C4
Collection method specified by type	kg collected separately	0,00
	kg collected as mixed construction waste	1,00
Retrieval method specified by type	kg for reuse	0,00
	kg for recycling	0,00
	kg for energy recovery	0,00
Disposal, specified by type	kg Product or material for final disposal, incineration	0,965
	kg Product or material for final disposal, landfill	0,035
Efficiency of energy recovery during combustion, specified by type	% Heat	28,51%
	% Electricity	15,84%

Other impact indicators

The method report [3] served as the methodological basis for calculating the environmental impact indicators required by the SN EN 15804+A2:2019 standard as well as the indicators commonly used in Switzerland for construction products. These additional indicators correspond to the KBOB list 2009/1:2022:

- Environmental impact points (UBP) according to the ecological scarcity method 2021;
- Global warming potential;
- non-renewable primary energy
- renewable primary energy

The table below contains the impact data verified by Martina Alig according to KBOB recommendation 2009/1:2022:

Indicator	unit	Product stage A1–A3	End of life stage C1–C4
Environmental impact points (ecological scarcity method 2021)	UBP	1154,51	3267,72
Greenhouse gas emissions	kg CO2 eq.	0,46	3,09
Primary energy, non-renewable	kWh	4,61	0,18
Energetically recovered (production)	kWh	4,61	
Recycled as material (production)	kWh	0	
Primary energy, renewable	kWh	1,24	0,013
Energetically recovered (production)	kWh	1,24	
Recycled as material (production)	kWh	0	
Biogenic carbon content	kg C	0	

LITERATURE

[1] SN EN 15804+A2:2019, "Sustainability of construction works - Environmental product declarations - Basic rules for the product category construction products" 2019.
[2] SN EN ISO 14025:2010-8, "Environmental labels and declarations - Type III Environmental declarations - Principles and procedures" 2010.
[3] M. Frossard, G. Talandier, und S. Lasvaux, „Rapport méthodologique d'écobilan de produits swisspor en lés d'étanchéité bitumineux selon les règles de la plate-forme d'écobilan KBOB 2009/1:2022 et de la norme SN EN 15804+A2:2019," Yverdon-les-Bains, Switzerland, 2022.