S and B EPS Limited

Manufacturers of expanded polystyrene

Environmental Product Declaration

In accordance with ISO14025 and EN15804+A2:2019/AC:2021 for

Lambdatherm® / 70

Manufactured by S AND B EPS LIMITED

Programme: The International EPD® System, www.environdec.com
Programme Operator: EPD International AB
S-P Code: S-P-13703
Date of Publication: 2024-06-04
Date of Validity: 2029-06-03

EPD® THE INTERNATIONAL EPD® SYSTEM

ECO PLATFORM EPD VERIFIED

PROGRAMME INFORMATION

The International EPD® System: EPD International AB Box 210 60 SE-100 31 Stockholm, Sweden, info@environdec.com

ISO standard ISO 21930 and CEN standard EN 15804 serves as the core Product Category Rules (PCR): 2019:14 Version 1.3.3, Construction Products and, EN 15804:2012 + A2:2019/AC:2021 Sustainability of Construction Works.

PCR review was conducted by: The Technical Committee of the International EPD® System. The review panel may be contacted via the Secretariat www.environdec.com/contact.

Independent third-party verification of the declaration and data, according to ISO 14025:2006, via:

EPD verification by individual verifier

Third party verifier: Stephen Forson

Approved by: The International EPD® System

Procedure for follow-up of data during EPD validity involves third party verifier:

Yes No X

Life Cycle Assessment (LCA)

LCA accountability: Metsims Sustainability Consulting

The EPD owner has the sole ownership, liability, and responsibility for the EPD. EPDs within the same product category but registered in different EPD programmes may not be comparable. For two EPDs to be comparable, they must be based on the same PCR (including the same version number) or be based on fully-aligned PCRs or versions of PCRs; cover products with identical functions, technical performances and use (e.g. identical declared/functional units); have equivalent system boundaries and descriptions of data; apply equivalent data quality requirements, methods of data collection, and allocation methods; apply identical cut-off rules and impact assessment methods (including the same version of characterisation factors); have equivalent content declarations; and be valid at the time of comparison.

ABOUT S and B EPS

Established in 1978, S and B EPS is one of the UK's largest producers of expanded polystyrene (EPS) insulation products.

Based on a 10-acre site in the north east of England, it is our policy to continuously strive for the highest standards in product quality and customer service and to deliver insulation that exceeds expectation. Accredited with standards to ISO 9001 along with ISO14001 and other British standard certification as per our website

A continuation of re-investment into the business throughout the years has ensured that we are a highly efficient plant with the latest technology.

ABOUT THE PRODUCT

Expanded polystyrene (EPS) is manufactured from expandable polystyrene beads. These beads are produced by polymerising Styrene Monomer and adding pentane as an expansion agent along with a flame-retardant additive to produce a flame-retardant grade where required.

The EPS Beads raw materials are delivered to our site in cardboard Octabins. Beads are then transferred to an expander where they are heated by steam, expanding up to forty times their original size. The expanded beads are then stored in large silos for a period before being moulded into block form. These blocks can then be cut into the required products and packed for dispatch.

The main manufacturing stages are:

Raw material pre-expansion -> Expanded bead conditioning -> Block moulding -> Block conditioning -> Conversion to finished product.

EPS is fully recyclable, and no waste is created in its manufacture. EPS is an excellent example of the efficient use of a natural resource since the transformation process uses very little energy. The use of EPS for thermal insulation in the construction industry leads to significant energy savings on both heating and cooling of buildings.

The product UN CPC code is 54650 according to Central Product Classification (CPC) Version 2.1.

Feature	Lambdatherm® / 70
Thermal Conductivity W/mk	0.031
Compress Strength kPa Min	70
Density Kg/m3	15
Cross Breaking Strength kPa Min	115
Safe Working Load kPa at 1% nominal compression	21
Vapour Diffusion Resistance factor μ1	20-40
Fire Class	Euroclass E

SYSTEM BOUNDARIES & DESCRIPTION

S and B EPS Limited

A1 - RAW MATERIAL SUPPLY

This stage includes raw material/s extraction and pre-treatments before its use in manufacturing. The production of the energy necessary for the manufacturing of raw material process is taken into account.

A2 - TRANSPORT

Transport information of the raw materials is provided by the manufacturer. The distances and routes are calculated accordingly. The raw materials are locally supplied transported via trucks and the waste is sourced within the production province..

Transport Mode	Type
Road	Vehicle: Lorry Size Class: >32 metric ton Emission Standard: EURO6 Fuel Type: Diesel
Sea	Vehicle: Container Ship DWT (Load Capacity): 43000 tonnes Fuel Type: Heavy Fuel Oil

A3 - MANUFACTURING

The manufacturing stage encompasses all the emissions that are risen during the manufacture of each product. After raw material has been prepared and conditioned, beads are block molded and conditioned to form the final product. During the manufacturing stage per functional unit 0.047 m3 natural gas is consumed as well as the 0.008 kwh electricity from the United Kingdom Grid. The electricity emission factor was obtained from Ecoinvent 3.9. The electricity mix for the UK grid is composed of 16% nuclear, 39% natural gas, 3% coal, 40% renewables, and 2% from other sources.

Grid	Electricity Mix
UK Grid Mix, Medium Voltage	0.584 kg CO_2 eq./kWh

C1 - DECONSTRUCTION / DEMOLITION

For Lambdatherm® products, there are no impacts associated with deconstruction or demolition. This is because these products do not require specific energy or material use for deconstruction; they are typically removed as part of the overall building demolition process, rather than being deconstructed separately. As such, no specific impacts are attributed to this stage in the life cycle assessment.

C2 - WASTE TRANSPORT

This step includes the transport to the recycling plant after they reach their end-of-life. The average distance was assumed 200 km by truck from demolition site to the closest recycling area.

Transport Mode	Type
Vehicle Type	Vehicle: Lorry Size Class: 16-32 metric ton Emission Standard: EURO6 Fuel Type: Diesel
Distance	200 km (assumption)

SYSTEM BOUNDARIES & DESCRIPTION

C3 – WASTE PROCESS

Lambdatherm® that has dismantled, does not require any waste processing before its landfilled. However, Lambdatherm® will require compaction and shredding before its recyled. Lambdatherm® 70 would require 0.170 kWh electtricity for functional unit.

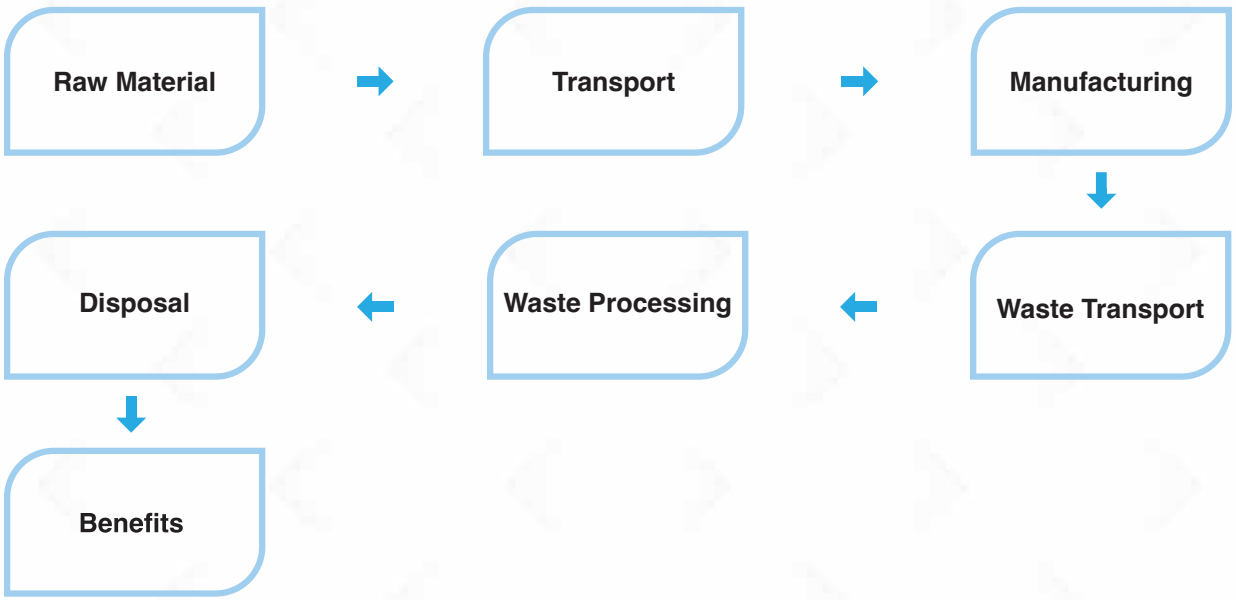
Grid	Electricity Mix
UK Grid Mix, Medium Voltage	0.584 kg CO_2 eq./kWh

C4 – DISPOSAL

The waste disposal phase accounts for the emissions that are resulting due to disposal of the waste. The Lambdatherm® at the end of its life will be subject to geographical sector practices. It is assumed that 61% of Lambdatherm® are landfilled at the end-of-life stage and 31% of Lambdatherm® are recyled after processed accordingly.

D - BENEFITS

This module assesses the advantages and environmental impacts associated with the recovery, reusing, or recycling processes of waste generated by the product at the end of its life cycle. These processes could potentially contribute to the life cycle of a new product. There are benefits considered from recycled material as the non-recycled portion of the product is assumed to be landfilled in its end of life as the worst-case scenario. As only 39% of the EPS boards is recycled only benefits arisen from recycled part is considered. After the necessary waste treatment processes the EPS boards are recycled to the polystyrene beads. It's important to note that when calculating the benefits of recycling these materials, only the post-consumer composition of the materials has been considered, and not the composition of the materials after they've been recycled.



LCA INFORMATION

Functional Unit/ Declared Unit: The declared unit are 1 m^2 Lambdatherm® 70 with thermal resistance of 1W/mK.

Reference Service Life: Is not relevant for the Lambdatherm® LCA.

Time Representativeness: 2023

Database(s) and LCA Software: EN 15804 + A2, Ecoinvent 3.9.1 and SimaPro 9.5

System Boundaries: Cradle to gate with options as PCR 2019:14 V1.3.3. (A1-A3 + C + D)

	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	Deconstruction / 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	GLO	GLO	UK	-	-	-	-	-	-	-	-	-	GLO	GLO	GLO	GLO	GLO
Specific Data Used	>90%			-	-	-	-	-	-	-	-	-	-	-	-	-	-
Variation - Products	0			-	-	-	-	-	-	-	-	-	-	-	-	-	-
Variation - Sites	0			-	-	-	-	-	-	-	-	-	-	-	-	-	-

Allocations

Water consumption, energy consumption and raw material transportation were weighted according to 2023 production figures. In addition, hazardous and non-hazardous waste amounts were also allocated from the 2023 total waste generation. There is no co-product allocation.

Cut-Off Criteria

1% cut-off is applied. Data for elementary flows to and from the product system contributing to a minimum of 99% of the declared environmental impacts have been included.

REACH Regulation

No substances included in the Candidate List of Substances of Very High Concern for authorization under the REACH regulations are present in this product either above the threshold for registration with the European Chemicals Agency or above 0.1% (wt/wt).

LCA Modelling, Calculation and Data Quality

The results of the LCA with the indicators as per EPD requirement are given in the LCA result tables. EN15804 method is followed. All energy calculations were obtained using Cumulative Energy Demand, Low Heating Values (LHV) methodology, while freshwater use is calculated within selected inventory flows in SimaPro according to the PCR. Corresponding regional energy datasets were used for all energy related activities. Data quality assessment scheme is given in the table below.

LCA Stages	Data Type
Raw Material Supply	Generic database, plant specific data
Raw Material Transport	Generic database, plant specific data
Manufacturing	Generic database, plant specific data
Deconstruction	Scenario
Waste Transport	Generic database, scenario, and generic data
Waste Processing	Generic database, scenario, and generic data
Disposal	Generic database, scenario, and generic data
Benefits and Loads	Generic database, scenario, and generic data

Content Declarations

Product Composition

Product composition of the Lambdatherm® 70 is shown in the table below.

Product components	Weight Percentage, %	Post-consumer recycled material, weight-%	Biogenic material, weight-% and kg C/kg
EPS Starter (87% Polystyrene, 5.5% Pentane, 6% Graphite, 1.5% Fire Retardant)	100	0%	0%, 0
Sum	100	0%	0%, 0

Packaging

The Lambdatherm® is packaged using polyethylene packaging.

Product components	Weight Percentage, %	Post-consumer recycled material, weight-%	Biogenic material, weight-% and kg C/kg
PE Film	0.005	1%	0%
Sum	0.005	1%	0%

LCA RESULTS

S and B EPS Limited

The LCA results per functional unit of the investigated product based on EF 3.1 LCIA method. For all LCA modelling and calculation, Ecoinvent database (v3.9.1) and SimaPro (v9.5) LCA software were used. Characterization factors of EN 15804 reference package based on EF 3.1 are utilized. Impact of infrastructure and capital goods are excluded from the analysis.

Environmental Indicators per functional unit Lambdatherm® 70							
Core environmental impact indicators	**Unit**	**Total A1-A3**	**C1**	**C2**	**C3**	**C4**	**D**
Global warming potential - fossil fuels (GWP-fossil)	kg CO2 eq.	1.74E+00	0.00E+00	9.69E-03	1.94E-02	1.60E-02	-5.31E-01
Global warming potential - biogenic (GWP-biogenic)	kg CO2 eq.	1.20E-02	0.00E+00	7.73E-06	3.58E-05	2.23E-01	-4.45E-03
Global warming potential - land use and land use change (GWP-luluc)	kg CO2 eq.	4.89E-05	0.00E+00	4.73E-06	2.30E-05	6.45E-06	-1.25E-06
Global warming potential - total (GWP-total)	kg CO2 eq.	1.75E+00	0.00E+00	9.71E-03	1.95E-02	2.39E-01	-5.36E-01
Depletion potential of the stratospheric ozone layer (ODP)	kg CFC-11 eq	8.20E-09	0.00E+00	2.20E-10	9.93E-10	1.05E-10	-6.08E-09
Acidification potential. accumulated exceedance (AP)	mol H+ eq.	6.26E-03	0.00E+00	2.40E-05	4.95E-05	5.07E-05	-1.93E-03
Eutrophication potential - freshwater (EP-freshwater)	kg P eq.	2.99E-05	0.00E+00	7.15E-07	1.92E-06	4.70E-06	-1.67E-05
Eutrophication potential - marine (EP-marine)	kg N eq.	1.02E-03	0.00E+00	6.54E-06	1.37E-05	5.28E-04	-2.94E-04
Eutrophication potential - terrestrial (EP-terrestrial)	mol N eq.	1.09E-02	0.00E+00	6.71E-05	1.56E-04	1.44E-04	-3.14E-03
Photochemical ozone creation potential (POCP)	kg NMVOC eq.	4.72E-03	0.00E+00	3.92E-05	4.55E-05	1.09E-04	-1.69E-03
Abiotic depletion potential - non-fossil resources (ADPE)	kg Sb eq.	4.05E-07	0.00E+00	2.71E-08	4.65E-08	1.85E-08	-5.46E-08
Abiotic depletion potential - fossil resources (ADPF)	MJ. net cal	3.93E+01	0.00E+00	1.47E-01	5.05E-01	1.01E-01	-1.25E+01
Water (user) deprivation potential (WDP)	m3 world eq.	9.93E-01	0.00E+00	7.03E-04	8.17E-04	3.54E-03	-4.20E-01
Additional mandatory environmental impact indicators							
Global warming potential (GWP-GHG)	kg CO2 eq.	1.76E+00	0.00E+00	9.72E-03	1.95E-02	1.85E-01	-5.36E-01
Additional mandatory environmental impact indicators							
Particulate matter emissions (PM)	Disease incidence	6.68E-08	0.00E+00	9.60E-10	3.14E-10	6.61E-10	-2.09E-08
Ionizing radiation. human health (IRP)	kBq U235 eq.	6.10E-03	0.00E+00	1.86E-04	1.74E-02	3.74E-04	-1.11E-04
Eco-toxicity - freshwater (ETP-fw)	CTUe	7.40E-01	0.00E+00	7.08E-02	3.25E-02	7.56E-01	-1.87E-01
Human toxicity. cancer effect (HTP-c)	CTUh	2.07E-10	0.00E+00	4.31E-12	5.17E-12	9.49E-12	-6.25E-11
Human toxicity. non-cancer effects (HTP-nc)	CTUh	2.33E-09	0.00E+00	1.05E-10	1.17E-10	4.33E-10	-6.58E-10
Land use related impacts/Soil quality (SQP)	dimensionless	5.36E-01	0.00E+00	1.49E-01	2.18E-01	1.76E-01	-1.09E-02
Indicators describing resource use							
Use of renewable primary energy as energy carrier (PERE)	MJ. net calorific value	2.00E-01	0.00E+00	2.16E-03	1.13E-01	4.78E-03	-6.48E-02
Use of renewable primary energy resources used as raw materials (PERM)	MJ. net calorific value	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Total use of renewable primary energy (PERT)	MJ. net calorific value	2.00E-01	0.00E+00	2.16E-03	1.13E-01	4.78E-03	-6.48E-02
Use of non renewable primary energy as energy carrier (PENRE)	MJ. net calorific value	3.91E+01	0.00E+00	1.47E-01	5.05E-01	1.01E-01	-1.25E+01
Use of non renewable primary energy resources used as raw materials (PENRM)	MJ. net calorific value	2.15E-01	0.00E+00	0.00E +00	0.00E+00	0.00E+00	0.00E+00
Total use of non renewable primary energy resource (PENRT)	MJ. net calorific value	3.93E+01	0.00E+00	1.47E-01	5.05E-01	1.01E-01	-1.25E+01

Core environmental impact indicators	Unit	Total A1-A3	C1	C2	C3	C4	D
Use of secondary material (SM)	kg	0.00E+00	0.00E+00	0.00E +00	0.00E+00	0.00E+00	0.00E+00
Use of renewable secondary fuels (RSF)	MJ, net calorific value	0.00E+00	0.00E+00	0.00E +00	0.00E+00	0.00E+00	0.00E+00
Use of non-renewable secondary fuels (NRSF)	MJ, net calorific value	0.00E+00	0.00E+00	0.00E +00	0.00E+00	0.00E+00	0.00E+00
Net use of fresh water (FW)	m3	4.70E-03	0.00E+00	2.93E-05	1.26E-04	9.18E-05	-8.37E-04
Environmental information describing waste categories							
Hazardous waste disposed (HWD)	kg	2.07E-03	0.00E+00	6.01E-06	2.06E-05	2.25E-04	-6.92E-04
Non-harzardous waste disposed (NHWD)	kg	7.73E-02	0.00E+00	1.89E-02	1.39E-03	2.96E-01	-1.03E-02
Radioactive waste disposed (RWD)	kg	1.73E-06	0.00E+00	6.58E-08	5.56E-06	9.12E-08	-4.09E-08
Environmental information describing output flows							
Components for re-use (CRU)	kg	0.00E+00	0.00E+00	0.00E +00	0.00E+00	0.00E+00	0.00E+00
Materials for recycling (MFR)	kg	0.00E+00	0.00E+00	0.00E +00	1.89E-01	0.00E+00	0.00E+00
Materials for energy recovery (MER)	kg	0.00E+00	0.00E+00	0.00E +00	0.00E+00	0.00E+00	0.00E+00
Exported electrical energy (EEE)	MJ, net calorific value	0.00E+00	0.00E+00	0.00E +00	0.00E+00	0.00E+00	0.00E+00
Exported thermal energy (EET)	MJ, net calorific value	0.00E+00	0.00E+00	0.00E +00	0.00E+00	0.00E+00	0.00E+00

- Disclaimer 1: The results of this environmental impact indicator shall be used with care as the uncertainties on these results are high or as there is limited experienced with the indicator.
- Disclaimer 2: GWP-GHG = Global Warming Potential total excl. biogenic carbon following IPCC AR5 methodology. The indicator includes all greenhouse gases included in the GWP-total but excludes biogenic carbon dioxide uptake and emissions and biogenic carbon stored in the product. The GWP-GHG indicator is identical to GWP-total except that the characterisation factor (CF) for biogenic CO_2 is set to zero.
- Disclaimer 3: This impact category deals mainly with the eventual impact of low dose ionising radiation on human health of the nuclear fuel cycle. It does not consider effects due to possible nuclear accidents, occupational exposure, or due to radioactive waste disposal in underground facilities. This indicator also does not measure potential ionising radiation from the soil, from radon and from some construction materials is also not measured by this indicator.
- Disclaimer 4: Discouraging the use of the results of modules A1-A3 (A1-A5 for services) without considering the results of module C.

REFERENCES

GPI/ General Programme Instructions of the International EPD® System. Version 4.0. EN ISO 9001/ Quality Management Systems - Requirements EN ISO 14001/ Environmental Management Systems - Requirements

EN ISO 50001/ Energy Management Systems - Requirements ISO 14020:2000/ Environmental Labels and Declarations - General principles

EN 15804:2012+A2:2019/AC: 2021 Sustainability of construction works - Environmental Product Declarations - Core rules for the product category of construction products

ISO 14025/ DIN EN ISO 14025:2009-11: Environmental labels and declarations - Type III environmental declarations - Principles and procedures

ISO 14040/44/ DIN EN ISO 14040: 2006-10, Environmental management - Life cycle assessment - Principles and framework (ISO14040:2006) and Requirements and guidelines (ISO 14044:2006) PCR 2019:14 Construction products (EN 15804:A2) (1.3.3) prepared by IVL Swedish Environmental Research Institute, EPD International Secretariat, date 2023-12-08.

The International EPD® System/ The International EPD® System is a programme for type III environmental declarations, maintaining a system to verify and register EPD®s as well as keeping a library of EPD®s and PCRs in accordance with ISO 14025. www.environdec.com

Ecoinvent / Ecoinvent Centre, www.ecoinvent.org

SimaPro/ SimaPro LCA Software, Pré Consultants, the Netherlands, www.pre-sustainability.com

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