

ENVIRONMENTAL PRODUCT DECLARATION

IN ACCORDANCE WITH EN 15804+A2 & ISO 14025

OPTIM-R® E Vacuum Insulated Panel
Kingspan Insulation Ltd



EPD HUB, HUB-7927
Published on 29.10.2026, last updated on 29.10.2026, valid until 28.10.2031

Life Cycle Assessment study has been performed in accordance with the requirements of EN 15804, EPD Hub PCR version 1.2 (24 Mar 2025) and JRC characterization factors EF 3.1.

Created with One Click LCA

GENERAL INFORMATION

MANUFACTURER

Manufacturer	Kingspan Insulation Limited
Address	Pembridge, Leominster, HR6 9LA, UK
Contact details	info@kingspaninsulation.co.uk
Website	www.kingspan.com/gb/en/products/insulation-boards

EPD STANDARDS, SCOPE AND VERIFICATION

Program operator	EPD Hub, hub@epdhub.com
Reference standard	EN 15804:2012+A2:2019 and ISO 14025
PCR	EPD Hub Core PCR Version 1.2, 24 Mar 2025 EN 16783 Thermal insulation products
Sector	Construction product
Category of EPD	Third party verified EPD
Parent EPD number	-
Scope of the EPD	Cradle to gate with modules A5, C1-C4, D
EPD author	Kingspan Insulation Ltd
EPD verification	Independent verification of this EPD and data, according to ISO 14025: ☐ Internal verification ☑ External verification
EPD verifier	Vera Durão, as an authorised verifier acting for EPD Hub Limited

The manufacturer has the sole ownership, liability, and responsibility for the EPD. EPDs within the same product category but from different programs may not be comparable. EPDs of construction products may not be comparable if they do not comply with EN 15804 and if they are not compared in a building context.

PRODUCT

Product name	OPTIM-R® E Vacuum Insulated Panel
Additional labels	-
Product reference	-
Place(s) of raw material origin	Europe, Asia
Place of production	Pembridge, UK
Place(s) of installation and use	UK, Europe, USA
Period for data	Calendar year 2023
Averaging in EPD	No averaging

ENVIRONMENTAL DATA SUMMARY

Declared unit	1 m^2 at 52 mm thickness (R-value = 5.778 m^2K/W for panel size 1200 x 300 mm & 6.500 m^2K/W for all other panel sizes)
Declared unit mass (kg)	9.34
Mass of packaging (kg)	2.47
GWP-fossil, A1-A3 ($kgCO_2e$)	5.12E+01
GWP-total, A1-A3 ($kgCO_2e$)	4.91E+01
Secondary material, inputs (%)	1.21
Total energy use, A1-A3 (kWh)	267
Net freshwater use, A1-A3 (m^3)	0.38

PRODUCT AND MANUFACTURER

ABOUT THE MANUFACTURER

Kingspan Insulation Ltd is a leading manufacturer of insulation products and insulated systems for building fabric and building services applications. Kingspan Insulation Ltd products are available for both new build and refurbishment projects, in a variety of applications in both domestic and non-domestic buildings.

PRODUCT DESCRIPTION

OPTIM-R® E is a vacuum insulation panel comprising a microporous core encased and sealed in a thin, gas-tight envelope with a protective coating. It is available in various thicknesses from 22–52 mm. The impact data shown in the main body of this EPD are based on a thickness of 52 mm, which has a corresponding R-value of 6.500 m²K/W for panel sizes 600 x 400 mm, 600 x 600 mm, 1200 x 400 mm and 1200 x 600 mm, and 5.778 m²K/W for the 1200 x 300 mm panel size. For impact data for different thicknesses please refer to the scaling mechanism detailed in the Supplementary Data Sheet to this EPD and/or the Results Summary given in Appendix 1 of this EPD.

OPTIM-R® E is a high-performance vacuum insulation panel designed for inverted roof applications. The product achieves a thermal conductivity of 0.008W/mK for panel sizes 600 x 400 mm, 600 x 600 mm, 1200 x 400 mm and 1200 x 600 mm, and 0.009 W/mK for the 1200 x 300 mm panel size. This variation is due to the proportionally greater edge effect of the encapsulating film on the narrower panel format.

PRODUCT RAW MATERIAL MAIN COMPOSITION

Raw material category	Amount, mass %	Material origin
Metals	2.3	Asia
Minerals	78.6	Europe, Asia
Fossil materials	19.1	Europe, Asia
Bio-based materials	0.0	-

BIOGENIC CARBON CONTENT

Product's biogenic carbon content at the factory gate

Biogenic carbon content in product (kg C)	0.000
Biogenic carbon content in packaging (kg C)	0.955

FUNCTIONAL UNIT AND SERVICE LIFE

Declared unit	1 m² at 52 mm thickness (R-value = 5.778 m²K/W for panel size 1200 x 300 mm & 6.500 m²K/W for all other panel sizes)
Mass per declared unit (kg)	9.34
Reference service life (years)	60 years (as per RICS v2)

The RSL has been defined as per RICS v2. Once installed the product does not require any maintenance, repair, replacement, refurbishment or use any utilities, and once it is removed from a building it will enter its end of life stage.

SUBSTANCES, REACH - VERY HIGH CONCERN

The product does not contain any REACH SVHC substances in amounts greater than 0.1% (1000ppm).

PRODUCT LIFE-CYCLE

SYSTEM BOUNDARY

This EPD covers the life-cycle modules listed in the following table.

Product stage			Assembly stage		Use stage							End of life stage				Beyond the system boundaries		
A1	A2	A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D		
X	X	X	ND	X	ND	ND	ND	ND	ND	ND	ND	X	X	X	X	X		
Raw materials	Transport	Manufacturing	Transport	Assembly	Use	Maintenance	Repair	Replacement	Refurbishment	Operational energy use	Operational water use	Deconstruction/ demolition	Transport	Waste processing	Disposal	Reuse	Recovery	Recycling

Modules not declared = ND

MANUFACTURING AND PACKAGING (A1-A3)

The environmental impacts considered for the product stage cover: the raw materials used in the product; packaging and other ancillary materials; fuel use in manufacturing; and waste from manufacturing. Ancillary manufacturing materials, such as lubricants and cleaners, are excluded as they account for less than 0.1% of product mass. The study also considers material losses during manufacturing and losses during electricity transmission. Distances for raw material transportation to the manufacturing facility are based on supplier locations and known supply routes. Waste figures included within this study have been sourced from Kingspan Insulation waste partners for 2022. The transportation of the waste to the waste management facility has been assumed to be 100 km. Energy sources have been profiled based on Kingspan Insulation Ltd.'s purchased energy volumes for 2023, using a market-based approach for electricity. Electricity is modelled on the renewable supply contract in place since 2024, which is more representative of current operations than the supply actually used in 2023 (residual grid mix). Where renewable energy is contractually supported but the specific mix is unknown, the average grid mix of renewable energy from Government reports is used as a conservative assumption.

OPTIM-R® E panels are rigid vacuum insulation panels comprised of a microporous core, covered with dust protective layer, encased and sealed in a thin, gas-tight foil envelope. To manufacture the product, a mixture of raw materials is poured into a mould and compressed. This raw material mixture creates the ridged insulation core. This core material is then fleece wrapped and passed through an oven to remove any residual moisture and is encased within a composite foil envelope. The insulation panels are evacuated and spray coated. Final product is fully covered with protective layer and packaged. The packaging materials included are cardboard, paper labels, wooden pallets and EPS strips.

TRANSPORT AND INSTALLATION (A4-A5)

This EPD does not cover A4 transport to the construction site.

This EPD does cover module A5 installation losses directly relating to the product itself. There is assumed to be no loss to OPTIM-R® E within the installation phase because if the product is punctured or cut it will immediately enter its end of life stage.

Within this study, the installation phase represents the end-of-life treatment of packaging materials. The packaging end-of-life scenarios modelled are based on UK-specific waste management data published by the UK Government in 2024. The following waste treatment distributions have been applied:

- **Wood packaging:** 42% recycled, 10% incinerated with energy recovery, 48% landfilled.
- **Plastic packaging**: 51% recycled, 10% incinerated with energy recovery, 39% landfilled.
- **Paper packaging**: 74% recycled, 10% incinerated, 16% landfilled.

These assumptions are considered representative of current UK packaging waste management practices at the time of publication. https://www.gov.uk/government/statistics/uk-waste-data/uk-statistics-on-waste#packaging-waste

PRODUCT USE AND MAINTENANCE (B1-B7)

This EPD does not cover the use phase. The reference service life has been defined as per RICS v2. Once installed the product does not require any maintenance, repair, replacement, refurbishment or use any utilities, and once it is removed from a building it will enter its end of life stage

PRODUCT END OF LIFE (C1-C4)

This EPD assesses the end of life impacts of the OPTIM-R® E product based on current market practices. All waste disposal routes within this EPD are relevant specifically to the UK and European markets.

For the end of life scenario the energy usage in C1 to remove the Panels from the building is assumed minimal, likely removed by hand and has therefore been excluded from the model. End-of-life waste transport (C2) has been conservatively modelled at 100 km. This distance is derived from the Qflow UK Construction Industry Waste Report 2023, which examined more than 90,000 Waste Transfer Notes and found disposal journeys to average 9.6 mi, with outliers reaching 290 mi. Choosing 100 km places the assumption above the mean yet comfortably within the documented range, providing a robust "mid-range worst-case" value that avoids understating potential impacts while staying faithful to the report's empirical data. https://www.qualisflow.com/uk-construction-waste-report-2023/

Data published in 2023 from the UK Government* shows that there is a 93 % demolition waste recovery rate for construction materials. However, vacuum insulation panels present specific end of life challenges; the multi-layer gas-tight envelope and microporous core cannot currently be separated and processed through mainstream recycling or energy recovery streams. Regardless of whether the product is recovered from the building or not, landfill represents the only currently available disposal route for VIP waste as of 2026. This EPD therefore models 100% of the end of life product mass going to landfill.

*www.gov.uk/government/statistics/uk-waste-data/uk-statistics-on-waste

BENEFITS AND LOADS BEYOND THE SYSTEM BOUNDARY (D)

Module D of this Environmental Product Declaration (EPD) represents the potential environmental benefits and burdens that occur outside the life cycle stages (Modules A-C) of the product covered by this EPD i.e. outside of the system boundary. Module D is purely hypothetical and has no relevance to the environmental impact of the product covered by this EPD. Module D data should never be added to data for Modules A-C and used for comparison purposes.

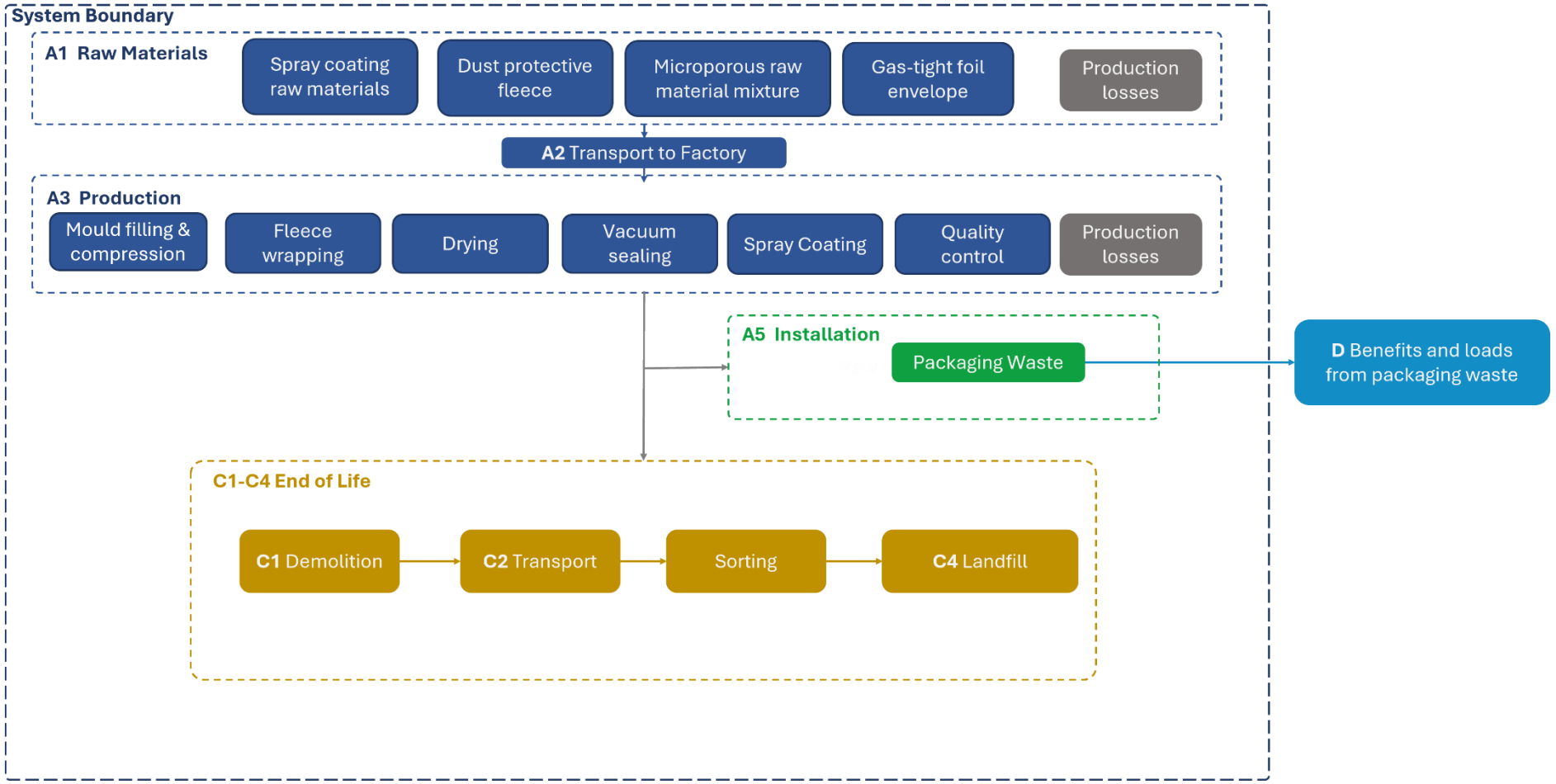
As no viable recovery, recycling or energy recovery pathway currently exists for OPTIM-R® E at end of life, no Module D benefit is claimed for the product. Module D within this EPD solely reflects the net benefits and loads associated with the end of life treatment of packaging materials.

Packaging that is recycled is credited against the primary material it replaces. Recycled cardboard substitutes corrugated board box production, recycled paper labels substitute kraft paper production, and recycled EPS strips substitute polystyrene foam slab production. The reprocessing burdens are included as loads: recycled paper production for cardboard and paper, and recycled polymer granulate production for the EPS. Timber from wooden pallets is assumed to be chipped and down-cycled for use as mulch,

substituting post-consumer wood chips, and the diesel used for grinding and loading is included as a load.

Energy exported from the incineration of packaging with energy recovery is credited as substituting UK medium-voltage grid electricity and UK district or industrial heat.

LIFE CYCLE PROCESS DIAGRAM



LIFE-CYCLE ASSESSMENT

CUT-OFF CRITERIA

The study does not exclude any modules or processes which are stated mandatory in the reference standard and the applied PCR. The study does not exclude any hazardous materials or substances. The study includes all major raw material and energy consumption. All inputs and outputs of the unit processes, for which data is available, are included in the calculation. There is no neglected unit process more than 1 % of total mass or energy flows. The module specific total neglected input and output flows also do not exceed 5% of energy usage or mass.

The production of capital equipment, construction activities, and infrastructure, maintenance and operation of capital equipment, personnel-related activities, energy and water use related to company management and sales activities are excluded.

This LCA study includes the provision of all materials, transportation, energy and emission flows, and end of life processing of the product. The use phase is not covered, assuming there are no use emissions or replacements. All industrial processes from raw material acquisition and pre-processing, production, and end-of-life management are included. For easier modelling and because of lack of accuracy in available modelling resources, some constituents under 0.1 % of product mass are excluded. These include some ancillary materials which are used in manufacturing only in very small amounts and have a negligible impact on the emissions of the product.

VALIDATION OF DATA

Data collection for production, transport, and packaging was conducted using time and site-specific information, as defined in the general information section on page 1 and 2. Upstream process calculations rely on generic data as defined in the Bibliography section. Manufacturer-provided specific and generic data were used for the product's manufacturing stage. The analysis was performed in One Click LCA EPD Generator, with the 'Cut-Off, EN 15804+A2' allocation method, and characterization factors according to EN 15804:2012+A2:2019/AC:2021 and JRC EF 3.1.

ALLOCATION, ESTIMATES AND ASSUMPTIONS

Allocation is required if some material, energy, and waste data cannot be measured separately for the product under investigation. All allocations are done as per the reference standards and the applied PCR.

In this study, allocation is based on manufacturing data for the calendar year 2023 for the Pembridge manufacturing facility. There are no co-products within the production process so no co-product allocation is required. Allocation has been done in the following ways.

Data type	Allocation
Raw materials	No allocation
Packaging material	No allocation
Ancillary materials	Not applicable
Manufacturing energy and waste	Allocated by mass or volume

All estimations and assumptions are given below:

- **Module A1:** Minor variability in facing material mass may occur between product thicknesses due to manufacturing tolerances. For the assessed thickness (52 mm), facing material inputs have been normalised on a mass-per-m² basis across total good production and treated as constant. Any residual variability is considered negligible for the purposes of the life cycle assessment.
- **Module A3:** Transportation of manufacturing waste to the waste processing facility has been assumed to be 100 km.
- **Module C1**: Consumed energy and other sources for demolition process of the product is negligible.
- **Module C2**: End-of-life waste transport has been conservatively modelled at 100 km per movement. This distance is derived from the

Qflow UK Construction Industry Waste Report 2023, which examined more than 90 000 Waste Transfer Notes and found disposal journeys to average 9.6 mi, with outliers reaching 290 mi. Choosing 100 km places our assumption above the mean yet comfortably within the documented range, providing a robust “mid-range worst-case value that avoids understating potential impacts while staying faithful to the report’s empirical data. https://www.qualisflow.com/uk-construction-waste-report-2023/

AVERAGES AND VARIABLITY

Type of average	No averaging
Averaging method	Not applicable
Variation in GWP-fossil for A1-A3	Not applicable

This EPD is product and factory specific and does not contain average calculations. The output of this study is fixed to the mass of 1 m^2 of the declared product.

LCA SOFTWARE AND BIBLIOGRAPHY

This EPD has been created using One Click LCA EPD Generator for EPD Hub V3 and EPD Process Certification v3.2.5. The LCA and EPD have been prepared according to the reference standards and ISO 14040/14044. The EPD Generator uses Ecoinvent v3.10.1/3.11/3.12 and One Click LCA databases as sources of environmental data. Allocation used in Ecoinvent 3.10.1/3.11/3.12 environmental data sources follow the methodology ‘allocation, Cut-off, EN 15804+A2‘.

https://www.rics.org/profession-standards/rics-standards-and-guidance/sector-standards/construction-standards/whole-life-carbon-assessment

https://www.gov.uk/government/statistics/uk-waste-data/uk-statistics-on-waste#packaging-waste

https://www.qualisflow.com/uk-construction-waste-report-2023/

www.gov.uk/government/statistics/uk-waste-data/uk-statistics-on-waste

https://publications.anl.gov/anlpubs/2021/10/171657.pdf

ENVIRONMENTAL IMPACT DATA

Product stage			Construction stage		Use stage							End of life stage				Beyond the system boundaries
A1	A2	A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
x	x	x	ND	x	ND	ND	ND	ND	ND	ND	ND	x	x	x	x	x

CORE ENVIRONMENTAL IMPACT INDICATORS – EN 15804+A2, EF 3.1

								END OF LIFE SCENARIO: 100% LANDFILL				
Impact category	**Unit**	**A1**	**A2**	**A3**	**A1-A3**		**A5**	**C1**	**C2**	**C3**	**C4**	**D**
GWP – total[1)]	kg CO_2e	3.35E+01	1.01E+00	1.47E+01	4.91E+01		3.67E+00	0.00E+00	1.81E-01	0.00E+00	1.55E-01	-2.04E+00
GWP – fossil	kg CO_2e	3.34E+01	1.00E+00	1.69E+01	5.12E+01		1.17E-01	0.00E+00	1.81E-01	0.00E+00	1.55E-01	-5.84E-03
GWP – biogenic	kg CO_2e	3.93E-02	1.78E-04	-2.25E+00	-2.21E+00		3.55E+00	0.00E+00	3.58E-05	0.00E+00	-8.65E-05	-2.02E+00
GWP – LULUC	kg CO_2e	4.53E-02	3.74E-04	4.65E-02	9.21E-02		1.20E-04	0.00E+00	6.38E-05	0.00E+00	3.79E-05	-1.71E-02
Ozone depletion pot.	kg $CFC\text{-}_{11}$e	1.48E-05	1.94E-08	4.43E-07	1.53E-05		1.74E-09	0.00E+00	3.59E-09	0.00E+00	1.81E-09	-3.29E-09
Acidification potential	mol H^+e	1.53E-01	5.75E-03	7.84E-02	2.37E-01		5.13E-04	0.00E+00	5.65E-04	0.00E+00	4.58E-04	4.90E-04
EP-freshwater[2)]	kg Pe	1.16E-02	6.32E-05	3.91E-03	1.56E-02		2.28E-05	0.00E+00	1.20E-05	0.00E+00	5.61E-06	-1.50E-04
EP-marine	kg Ne	2.83E-02	1.68E-03	1.29E-02	4.29E-02		6.64E-04	0.00E+00	1.90E-04	0.00E+00	2.47E-03	-1.06E-03
EP-terrestrial	mol Ne	2.83E-01	1.85E-02	1.56E-01	4.58E-01		1.83E-03	0.00E+00	2.07E-03	0.00E+00	1.89E-03	-6.01E-03
POCP ("smog")[3)]	kg NMVOCe	1.23E-01	6.63E-03	6.18E-02	1.92E-01		7.13E-04	0.00E+00	8.85E-04	0.00E+00	6.93E-04	-1.03E-03
ADP-minerals & metals[4)]	kg Sbe	2.45E-04	3.06E-06	8.82E-05	3.36E-04		4.59E-07	0.00E+00	5.91E-07	0.00E+00	1.10E-07	7.09E-07
ADP-fossil resources	MJ	6.14E+02	1.39E+01	2.15E+02	8.44E+02		1.46E+00	0.00E+00	2.54E+00	0.00E+00	1.54E+00	2.73E+00
Water use[5)]	m^3e depr.	1.07E+01	6.58E-02	3.32E+00	1.41E+01		2.23E-02	0.00E+00	1.25E-02	0.00E+00	5.06E-03	7.14E-01

1) GWP = Global Warming Potential; 2) EP = Eutrophication potential. Required characterisation method and data are in kg P-eq. Multiply by 3,07 to get PO4e; 3) POCP = Photochemical ozone formation; 4) ADP = Abiotic depletion potential; 5) EN 15804+A2 disclaimer for Abiotic depletion and Water use and optional indicators except Particulate matter and Ionizing radiation, human health. The results of these environmental impact indicators shall be used with care as the uncertainties on these results are high or as there is limited experience with the indicator.

ADDITIONAL (OPTIONAL) ENVIRONMENTAL IMPACT INDICATORS – EN 15804+A2, EF 3.1

								END OF LIFE SCENARIO: 100% LANDFILL				
Impact category	**Unit**	**A1**	**A2**	**A3**	**A1-A3**		**A5**	**C1**	**C2**	**C3**	**C4**	**D**
Particulate matter	Incidence	1.37E-06	7.41E-08	7.94E-07	2.24E-06		9.09E-09	0.00E+00	1.42E-08	0.00E+00	1.03E-08	-2.44E-09
Ionizing radiation[6)]	kBq U235e	4.70E+00	1.68E-02	4.93E-01	5.21E+00		4.83E-03	0.00E+00	3.23E-03	0.00E+00	1.09E-03	1.82E-01
Ecotoxicity (freshwater)	CTUe	3.74E+02	1.76E+00	4.58E+01	4.22E+02		6.60E+00	0.00E+00	3.33E-01	0.00E+00	3.95E+00	-3.13E+00
Human toxicity, cancer	CTUh	4.10E-08	1.75E-10	6.39E-09	4.75E-08		5.41E-11	0.00E+00	3.08E-11	0.00E+00	2.18E-11	1.69E-10
Human tox. non-cancer	CTUh	2.65E-07	8.28E-09	1.27E-07	4.00E-07		3.07E-09	0.00E+00	1.59E-09	0.00E+00	2.71E-09	4.49E-09
SQP[7)]	-	9.82E+01	7.66E+00	4.56E+02	5.62E+02		1.25E+00	0.00E+00	1.51E+00	0.00E+00	3.13E+00	-9.35E+00

6) EN 15804+A2 disclaimer for Ionizing radiation, human health. This impact category deals mainly with the eventual impact of low-dose ionizing radiation on human health of the nuclear fuel cycle. It does not consider effects due to possible nuclear accidents, occupational exposure nor due to radioactive waste disposal in underground facilities. Potential ionizing radiation from the soil, from radon and from some construction materials is also not measured by this indicator; 7) SQP = Land use related impacts/soil quality.

USE OF NATURAL RESOURCES

								END OF LIFE SCENARIO: 100% LANDFILL				
Impact category	**Unit**	**A1**	**A2**	**A3**	**A1-A3**		**A5**	**C1**	**C2**	**C3**	**C4**	**D**
Renew. PER as energy[8)]	MJ	5.21E+01	2.29E-01	1.28E+02	1.80E+02		-3.63E+01	0.00E+00	4.38E-02	0.00E+00	1.68E-02	4.55E+00
Renew. PER as material	MJ	0.00E+00	0.00E+00	3.12E+01	3.12E+01		-3.12E+01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.79E+01
Total use of renew. PER	MJ	5.21E+01	2.29E-01	1.59E+02	2.11E+02		-6.76E+01	0.00E+00	4.38E-02	0.00E+00	1.68E-02	2.25E+01
Non-re. PER as energy	MJ	5.52E+02	1.39E+01	2.14E+02	7.80E+02		1.24E+00	0.00E+00	2.54E+00	0.00E+00	-3.87E+01	2.30E+00
Non-re. PER as material	MJ	6.27E+01	0.00E+00	1.36E+00	6.41E+01		-1.36E+00	0.00E+00	0.00E+00	0.00E+00	-6.27E+01	6.20E-01
Total use of non-re. PER	MJ	6.14E+02	1.39E+01	2.16E+02	8.44E+02		-1.22E-01	0.00E+00	2.54E+00	0.00E+00	-1.01E+02	2.92E+00
Secondary materials	kg	1.13E-01	6.40E-03	1.03E+00	1.15E+00		1.15E-03	0.00E+00	1.16E-03	0.00E+00	4.17E-04	6.64E-03
Renew. secondary fuels	MJ	4.56E-03	7.48E-05	6.44E-01	6.49E-01		1.05E-05	0.00E+00	1.47E-05	0.00E+00	8.43E-06	-5.85E-02
Non-ren. secondary fuels	MJ	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
Use of net fresh water	m^3	2.98E-01	1.79E-03	8.16E-02	3.81E-01		-2.67E-03	0.00E+00	3.41E-04	0.00E+00	-2.79E-03	1.86E-02

8) PER = Primary energy resources

END OF LIFE – WASTE

								END OF LIFE SCENARIO: 100% LANDFILL				
Impact category	**Unit**	**A1**	**A2**	**A3**	**A1-A3**		**A5**	**C1**	**C2**	**C3**	**C4**	**D**
Hazardous waste	kg	2.58E+00	1.98E-02	9.72E-01	3.57E+00		1.02E-02	0.00E+00	3.64E-03	0.00E+00	1.89E-03	5.57E-02
Non-hazardous waste	kg	8.43E+01	4.07E-01	1.95E+01	1.04E+02		4.50E+00	0.00E+00	7.68E-02	0.00E+00	5.54E+00	7.07E-01
Radioactive waste	kg	1.20E-03	4.16E-06	1.23E-04	1.32E-03		1.21E-06	0.00E+00	8.04E-07	0.00E+00	2.66E-07	4.68E-05

END OF LIFE – OUTPUT FLOWS

								END OF LIFE SCENARIO: 100% LANDFILL				
Impact category	**Unit**	**A1**	**A2**	**A3**	**A1-A3**	**A5**	**C1**	**C2**	**C3**	**C4**	**D**
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
Materials for recycling	kg	0.00E+00	0.00E+00	9.90E-01	9.90E-01	1.40E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Materials for energy rec	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
Exported energy	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.34E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Exported energy – Electricity	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.59E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Exported energy – Heat	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00	7.53E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00

ENVIRONMENTAL IMPACTS – EN 15804+A1, CML

								END OF LIFE SCENARIO: 100% LANDFILL				
Impact category	**Unit**	**A1**	**A2**	**A3**	**A1-A3**	**A5**	**C1**	**C2**	**C3**	**C4**	**D**
Global Warming Pot.	kg CO_2e	3.32E+01	9.99E-01	1.84E+01	5.26E+01	3.82E-01	0.00E+00	1.79E-01	0.00E+00	1.50E-01	-3.43E-02
Ozone depletion Pot.	kg CFC_{-11}e	1.01E-05	1.55E-08	3.73E-07	1.05E-05	1.40E-09	0.00E+00	2.86E-09	0.00E+00	1.44E-09	-2.62E-09
Acidification	kg SO_2e	1.28E-01	4.49E-03	6.34E-02	1.95E-01	3.89E-04	0.00E+00	4.29E-04	0.00E+00	3.39E-04	8.74E-04
Eutrophication	kg PO_4^3e	5.66E-02	8.03E-04	2.45E-02	8.19E-02	3.40E-04	0.00E+00	1.09E-04	0.00E+00	2.03E-04	-2.29E-04
POCP (“smog”)	kg C_2H_4e	9.75E-03	3.21E-04	1.29E-02	2.30E-02	9.10E-05	0.00E+00	4.09E-05	0.00E+00	4.54E-05	-1.65E-05
ADP-elements	kg Sbe	8.89E-05	2.99E-06	8.66E-05	1.79E-04	4.48E-07	0.00E+00	5.77E-07	0.00E+00	1.08E-07	3.73E-07
ADP-fossil	MJ	2.48E+02	1.37E+01	2.07E+02	4.69E+02	1.38E+00	0.00E+00	2.48E+00	0.00E+00	1.52E+00	-4.31E-01

SCENARIO DOCUMENTATION

DATA SOURCES

Manufacturing energy scenario documentation

Scenario parameter	Value
Electricity data source and quality	Kingspan Insulation Limited Electricity Mix OPTIM-R® E 2023
Electricity (kg CO2e / kWh)	0.099
District heating data source and quality	Kingspan Insulation Limited Heating Mix OPTIM-R® E 2023
District heating (kg CO2e / kWh)	0.314

Installation scenario documentation - A5 (Installation waste)

Scenario parameter	Value
Cardboard waste to landfill (kg)	1.30E-01
Cardboard waste to recycling (kg)	6.30E-01
Cardboard waste to energy (kg)	8.20E-02
Paper waste to landfill (kg)	4.40E-02
Paper waste to recycling (kg)	2.10E-01
Paper waste to energy (kg)	2.70E-02
Plastic waste to landfill (kg)	2.10E-03
Plastic waste to recycling (kg)	2.80E-03
Plastic waste to energy (kg)	5.80E-04
Wood waste to landfill (kg)	6.40E-01
Wood waste to recycling (kg)	5.70E-01
Wood waste to energy (kg)	1.30E-01
Total packaging waste to landfill (kg)	8.16E-01
Total packaging waste to recycling (kg)	1.41E+00
Total packaging waste to energy (kg)	2.40E-01

End of life scenario documentation

Scenario parameter	Value
Insulation collected separately (kg)	0.00
Insulation collected with mixed waste (kg)	9.34
Insulation recovered for re-use (kg)	0.00
Insulation recovered for recycling (kg)	0.00
Insulation recovered for energy recovery (kg)	0.00
Insulation for landfilling (kg)	9.34
Insulation total disposal (kg)	9.34
Scenario assumptions e.g. transportation distance to waste management facility (km)	100

THIRD-PARTY VERIFICATION STATEMENT

EPD Hub declares that this EPD and supplementary data sheet are verified in accordance with ISO 14025 by an independent, third-party verifier. The project report on the Life Cycle Assessment and the report(s) on features of environmental relevance are filed at EPD Hub. EPD Hub PCR and ECO Platform verification checklist are used.

EPD Hub is not able to identify any unjustified deviations from the PCR and EN 15804+A2 in the Environmental Product Declaration and its project report. EPD Hub maintains its independence as a third-party body; it was not involved in the execution of the LCA or in the development of the declaration and has no conflicts of interest regarding this verification.

The company-specific data and upstream and downstream data have been examined as regards plausibility and consistency. The publisher is responsible for ensuring the factual integrity and legal compliance of this declaration.

The software used in creation of this LCA and EPD is verified by EPD Hub to conform to the procedural and methodological requirements outlined in ISO 14025:2010, ISO 14040/14044, EN 15804+A2, and EPD Hub Core Product Category Rules and General Program Instructions.

Verified tools

Tool verifier: Magaly Gonzalez Vazquez
Tool verification validity: 27 March 2025 - 26 March 2028

Vera Durão, as an authorised verifier acting for EPD Hub Limited
29.10.2026



APPENDIX 1 – RESULTS SUMMARY

The tables on the following pages give summary impact data for cradle-to-gate (A1-A3) and cradle-to-grave (A-C), for core indicators. Marketing law dictates that EPD data should be published for the whole life-cycle (A-C), unless it can be shown that the provision of data for fewer life cycle stages (e.g. A1-A3 only) would not be misleading, because it does not omit life cycle stages that account for significant impacts. To evaluate whether A1-A3 data would give a misleading picture, one requires A-C data, so, for simplicity, this EPD Results Summary provides both.

This study is based on a single thickness (52 mm) of the product, but it is available in a number of thicknesses.

In order to calculate the impact data for other thicknesses of the product, a scaling methodology is provided within the Supplementary Data Sheet to this EPD. Please contact Kingspan Insulation Ltd to request a copy.

The data shown in the tables on the following pages, for all thicknesses other than 52 mm, have been calculated according to the scaling methodology outlined within the Supplementary Data Sheet to this EPD.

The data for the 52 mm product have been calculated using the data in the impact data table on page 9 of this EPD.

In addition to data for manufactured thicknesses, the tables on the following pages also give data for the exact thicknesses required to meet R-values of 3 m^2K/W and 5 m^2K/W. For panel sizes other than 1200 x 300 mm, the required thicknesses are 24 mm (R=3 m^2K/W) and 40 mm (R=5 m^2K/W), neither of which are manufactured. For a panel size of 1200 x 300 mm, the required thicknesses are 27 mm (R=3 m^2K/W), a manufactured thickness, and 45 mm (R=5 m^2K/W), which is not a manufactured thickness.

Detailed results for the 52 mm product are given in pages 9-12 of this EPD. If results at the same level of detail are required for thicknesses other than 52 mm (e.g. for building LCA purposes), please refer to the scaling methodology outlined within the Supplementary Data Sheet to this EPD. Please contact Kingspan Insulation Ltd to request a copy.

Table 1: A1-A3 Core Indicators (EN 15804+A2, EF 3.1)

This table provides the **cradle-to-gate (A1-A3)** impacts for OPTIM-R® E Vacuum Insulation Panel.

Life cycle stage		A1-A3								
Product Thickness	**mm**	**22**	**24***	***27****	**32**	**40****	***42***	***45*****	**47**	**52**
GWP – total	kg CO_2e	2.24E+01	2.42E+01	2.69E+01	3.13E+01	3.84E+01	4.02E+01	4.29E+01	4.46E+01	4.91E+01
GWP – fossil	kg CO_2e	2.33E+01	2.51E+01	2.79E+01	3.26E+01	4.00E+01	4.19E+01	4.47E+01	4.65E+01	5.12E+01
GWP – biogenic	kg CO_2e	-8.75E-01	-9.65E-01	-1.10E+00	-1.33E+00	-1.69E+00	-1.78E+00	-1.91E+00	-2.00E+00	-2.21E+00
GWP – LULUC	kg CO_2e	4.06E-02	4.40E-02	4.92E-02	5.79E-02	7.17E-02	7.51E-02	8.03E-02	8.38E-02	9.21E-02
Ozone depletion pot.	kg CFC-$_{11}$e	7.07E-06	7.62E-06	8.44E-06	9.80E-06	1.20E-05	1.25E-05	1.34E-05	1.39E-05	1.53E-05
Acidification pot.	mol H^+_{eq}	1.06E-01	1.15E-01	1.28E-01	1.50E-01	1.85E-01	1.94E-01	2.07E-01	2.15E-01	2.37E-01
EP-freshwater	kg P_{eq}	7.27E-03	7.83E-03	8.66E-03	1.01E-02	1.23E-02	1.28E-02	1.37E-02	1.42E-02	1.56E-02
EP-marine	kg N_{eq}	1.96E-02	2.12E-02	2.35E-02	2.74E-02	3.36E-02	3.51E-02	3.75E-02	3.90E-02	4.29E-02
EP-terrestrial	mol N_{eq}	2.06E-01	2.23E-01	2.48E-01	2.90E-01	3.57E-01	3.73E-01	3.99E-01	4.15E-01	4.58E-01
POCP (“smog”)	kg $NMVOC_{eq}$	8.90E-02	9.59E-02	1.06E-01	1.23E-01	1.51E-01	1.57E-01	1.68E-01	1.75E-01	1.92E-01
ADP-min. & metals	kg Sb_{eq}	1.81E-04	1.91E-04	2.07E-04	2.33E-04	2.74E-04	2.84E-04	3.00E-04	3.10E-04	3.36E-04
ADP-fossil resources	MJ	3.98E+02	4.28E+02	4.73E+02	5.47E+02	6.65E+02	6.95E+02	7.39E+02	7.69E+02	8.44E+02
Water use	m^3 depr.	6.59E+00	7.08E+00	7.83E+00	9.07E+00	1.11E+01	1.16E+01	1.23E+01	1.28E+01	1.41E+01

**Non-manufactured thickness. Exact thickness that would be required to meet R-values of 3 m^2K/W (24 mm) and 5 m^2K/W (40 mm) for panel sizes other than 1200 x 300 mm*

*** Exact thicknesses that would be required to meet R-values of 3 m^2K/W (27 mm) for a panel size of 1200 x 300 mm*

**** Non-manufactured thickness. Exact thickness that would be required to meet an R-value of 5 m^2K/W (45 mm) for a panel size of 1200 x 300 mm*

Table 2: A-C Core Indicators (EN 15804+A2, EF 3.1)

This table provides the **cradle-to-grave (A-C)** impacts for OPTIM-R® E Vacuum Insulation Panel.

This scenario assumes that both the recovered and unrecovered waste will go to landfill, the current practiced method.

Life cycle stage		**A-C**								
Product Thickness	**mm**	**22**	**24***	***27****	**32**	**40****	***42***	***45*****	**47**	**52**
GWP – total	kg CO_2e	2.41E+01	2.61E+01	2.89E+01	3.38E+01	4.15E+01	4.34E+01	4.63E+01	4.83E+01	5.31E+01
GWP – fossil	kg CO_2e	2.35E+01	2.54E+01	2.82E+01	3.29E+01	4.04E+01	4.23E+01	4.51E+01	4.69E+01	5.17E+01
GWP – biogenic	kg CO_2e	5.53E-01	6.06E-01	6.85E-01	8.16E-01	1.03E+00	1.08E+00	1.16E+00	1.21E+00	1.34E+00
GWP – LULUC	kg CO_2e	4.07E-02	4.41E-02	4.93E-02	5.80E-02	7.18E-02	7.53E-02	8.05E-02	8.40E-02	9.23E-02
Ozone depletion pot.	kg CFC-$_{11}$e	7.07E-06	7.62E-06	8.44E-06	9.81E-06	1.20E-05	1.25E-05	1.34E-05	1.39E-05	1.53E-05
Acidification pot.	mol H^+_{eq}	1.07E-01	1.16E-01	1.29E-01	1.51E-01	1.86E-01	1.95E-01	2.08E-01	2.17E-01	2.39E-01
EP-freshwater	kg P_{eq}	7.29E-03	7.85E-03	8.68E-03	1.01E-02	1.23E-02	1.29E-02	1.37E-02	1.43E-02	1.56E-02
EP-marine	kg N_{eq}	2.24E-02	2.40E-02	2.64E-02	3.03E-02	3.67E-02	3.83E-02	4.07E-02	4.22E-02	4.62E-02
EP-terrestrial	mol N_{eq}	2.09E-01	2.26E-01	2.51E-01	2.93E-01	3.61E-01	3.78E-01	4.04E-01	4.21E-01	4.64E-01
POCP (“smog”)	kg $NMVOC_{eq}$	9.01E-02	9.70E-02	1.07E-01	1.25E-01	1.52E-01	1.59E-01	1.70E-01	1.77E-01	1.94E-01
ADP-min. & metals	kg Sb_{eq}	1.81E-04	1.92E-04	2.07E-04	2.33E-04	2.75E-04	2.85E-04	3.01E-04	3.11E-04	3.37E-04
ADP-fossil resources	MJ	4.01E+02	4.31E+02	4.76E+02	5.50E+02	6.70E+02	6.99E+02	7.44E+02	7.74E+02	8.50E+02
Water use	m^3 depr.	6.61E+00	7.10E+00	7.85E+00	9.10E+00	1.11E+01	1.16E+01	1.23E+01	1.28E+01	1.41E+01

**Non-manufactured thickness. Exact thickness that would be required to meet R-values of 3 m^2K/W (24 mm) and 5 m^2K/W (40 mm) for panel sizes other than 1200 x 300 mm*

*** Exact thicknesses that would be required to meet R-values of 3 m^2K/W (27 mm) for a panel size of 1200 x 300 mm*

**** Non-manufactured thickness. Exact thickness that would be required to meet an R-value of 5 m^2K/W (45 mm) for a panel size of 1200 x 300*