ENVIRONMENTAL PRODUCT DECLARATION

as per *ISO 14025* and *EN 15804+A2*

Owner of the Declaration	Kingspan Insulation B.V.
Publisher	Institut Bauen und Umwelt e.V. (IBU)
Programme holder	Institut Bauen und Umwelt e.V. (IBU)
Declaration number	EPD-KSI-20250273-CBA1-EN
Issue date	15.05.2025
Valid to	14.05.2030

Kooltherm® K21 N

Kingspan Insulation B.V.

Institut Bauen und Umwelt e.V.

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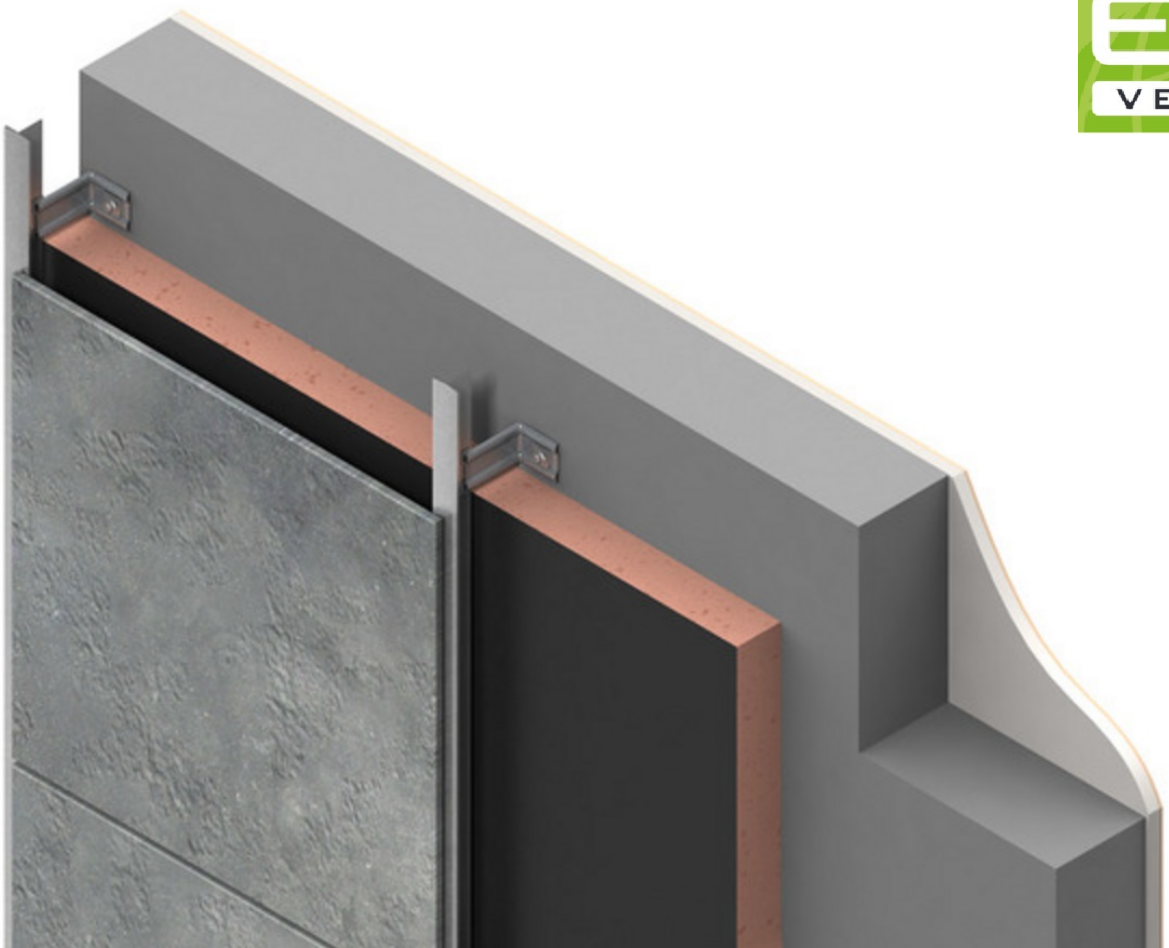
ECO PLATFORM EPD VERIFIED



General Information

Kingspan Insulation B.V.

Programme holder

IBU – Institut Bauen und Umwelt e.V.
Hegelplatz 1
10117 Berlin
Germany

Declaration number

EPD-KSI-20250273-CBA1-EN

This declaration is based on the product category rules:

Insulating materials made of foam plastics, 01.08.2021
(PCR checked and approved by the SVR)

Issue date

15.05.2025

Valid to

14.05.2030

Dipl.-Ing. Hans Peters
(Chairman of Institut Bauen und Umwelt e.V.)

Florian Pronold
(Managing Director Institut Bauen und Umwelt e.V.)

Kooltherm® K21 N

Owner of the declaration

Kingspan Insulation B.V.
Lingewei 8
4004LL Tiel
Netherlands

Declared product / declared unit

Kooltherm® K21 N, Rainscreen Board
1m², 100 mm thickness, R_D = 4,75 m²·K/W

Scope:

The thermal insulation material Kooltherm® K21 N is produced by Kingspan Insulation B.V. at the manufacturing facility in Tiel, the Netherlands.

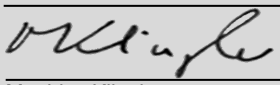
Kooltherm® K21 N is a rigid thermoset cellular insulation material faced on one side with a black coated glass tissue based facing and on the other side with a mineral coated glass tissue based facing.

In order to enable the user of the EPD to calculate the LCA results for different thicknesses, the EPD contains the respective calculation rules. The owner of the declaration shall be liable for the underlying information and evidence; the IBU shall not be liable with respect to manufacturer information, life cycle assessment data and evidences.

The EPD was created according to the specifications of EN 15804+A2. In the following, the standard will be simplified as *EN 15804*.

Verification

The standard EN 15804 serves as the core PCR
Independent verification of the declaration and data according to ISO 14025:2011
☐ internally ☒ externally



Matthias Klingler,
(Independent verifier)

Product

Product description/Product definition

Koolthern® K21 N is a rigid thermoset cellular insulation material faced on one side with a black coated glass tissue based facing and on the other side with a mineral coated glass tissue based facing. The product is available in variable thicknesses from 80 mm up to 159 mm. This EPD covers one of the most commonly sold thicknesses: 100 mm with an R_D-value of 4,75 m²·K/W.

For the placing on the market of the product in the European Union/European Free Trade Association (EU/EFTA) (with the exception of Switzerland) Regulation (EU) No. *305/2011 (CPR)* applies. The product needs a declaration of performance taking into consideration *EN 13166* - Thermal insulation products for buildings - Factory made phenolic foam (PF) products - Specification and the CE-marking. For the application and use the respective national provisions apply.

Application

Koolthern® K21 N is suitable for use as insulation in curtain walls.

Technical Data

Constructional data

Name	Value	Unit
Compressive strength acc. to EN 13166	CS(Y)100	
Thermal conductivity λd acc. to EN 13166 for dN ≥ 40mm	0.021	W/(mK)
Thermal conductivity λd acc. to EN 13166 for dN < 40mm	0.022	

Performance data of the product in accordance with the declaration of performance with respect to its essential characteristics according to *EN 13166* - Thermal insulation products for buildings - Factory made phenolic foam (PF) products - Specification. The declaration of performance of the product can be found at dop.kingspan.com.

Base materials/Ancillary materials

The main materials of the product are phenolic (PF) resin (between 60-70%), a catalyst and additives (between 15-20%), a blowing agent (between 5-7%) and the facings (depending on the product thickness between 8-15%). Due to the closed cell structure (conform EN 13166), the blowing agent is permanent.

In the current *REACH* regulations, phenolic foam insulation products are considered 'articles' and are exempt from the requirements of Article 57 and 59(1) of *REACH* Regulation (EC) No 1907/2006. These products are not classified as 'hazardous products' according to any current legislation, and can hence be declared as follows:

- This article contains substances listed in the *candidate list* (date: 20.01.2025) exceeding 0.1 percentage by mass: no

- This article contains other carcinogenic, mutagenic, reprotoxic (CMR) substances in categories 1A or 1B which are not on the candidate list, exceeding 0.1 percentage by mass: no

- Biocide products were added to this construction product or it has been treated with biocide products (this then concerns a treated product as defined by the (EU) Biocidal Products Regulation No. *528/2012 (BPR)*: no

The chemical functional group of the additives used in the resin is that of non-ionic surfactants.

Reference service life

The reference service life is not to be declared in this EPD as it does not cover the use stage.

LCA: Calculation rules

Declared Unit

The declared unit (1 m²) and conversion factors are listed in the table below.

Declared unit

Name	Value	Unit
Declared unit	1	m^2
Gross density (foam)	>35	kg/m^3
Grammage	4.71	kg/m^2
Layer thickness	0.1	m
Conversion factor to 1kg	0.21	

System boundary

Type of EPD: according to *EN 15804*: cradle to gate with modules C1–C4 and module D (A1–A3, C, D).

The product stage is a mandatory information module and it covers:
· A1, raw material extraction and processing, processing of secondary material input (e.g. recycling processes),
· A2, transport to the manufacturer,
· A3, manufacturing, including provision of all materials, products and energy, packaging processing and its transport, as well as waste processing up to the end-of-waste state or disposal of final residues during the product stage.

The end-of-life stage is a mandatory information module and it covers:
· C1 de-construction, demolition;
· C2 transport to waste processing;
· C3 waste processing for reuse, recovery and/or recycling;
· C4 disposal including provision and all transport, provision of all materials, products and related energy and water use.

Environmental burden of the incineration (R1 > 60 %) of the product at the end-of-life stage are assigned to the product system (C3); resulting potential credits for thermal and electrical energy from energy substitution are declared in module D.

Renewable electricity sources for manufacturing

All electricity used during production comes from renewable sources: by generating energy on-site with solar panels and with procured energy from fully certified renewable sources (following the global Net Zero Energy strategy from Kingspan Group plc.)

Period under review

The input data for raw material production and the consumption of process energy on the manufacturing facility was measured data during January 1st 2024 to December 31st 2024, i.e. collected over a 12 month period.

Geographic Representativeness
Land or region, in which the declared product system is manufactured, used or handled at the end of the product´s lifespan: Europe

Comparability
Basically, a comparison or an evaluation of EPD data is only possible if all the data sets to be compared were created according to *EN 15804* and the building context, respectively the product-specific characteristics of performance, are taken into account.
Background data from Sphera LCA FE (GaBi) with Sphera data sets CUP 2024.1 is used.

LCA: Scenarios and additional technical information

Characteristic product properties of biogenic carbon

Information on describing the biogenic Carbon Content at factury gate
The total mass of biogenic carbon containing materials is less than 5 %. Neither the product nor the packaging does contain biogenic carbon.

Name	Value	Unit
Biogenic carbon content in product	-	kg C
Biogenic carbon content in accompanying packaging	-	kg C

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

Technical information
The following technical information is a basis for the declared modules or can be used for developing specific scenarios in the context of a building assessment.

Manufacturing (A3)
A polyethylene packaging foil is used. The products are transported on expanded polystyrene (EPS) skids. Within Module A3 the following packaging of the final product is included:
Polyethylene cover and wrap: 0,066 kg/m²
Expanded Polystyrene skid: 0,011 kg/m²

End of life (C1-C4)
After the use stage, the entire product is sent for incineration with energy recovery.

The assumptions for C1 are for both scenarios: diesel driven excavator (100 kW; 0.2 litre fuel per ton excavated material).

The assumptions for C2 are for both scenarios: Truck Euro 6, diesel driven, 26-28 t gross weight, assumed distance 50 km

Name	Value	Unit
Collected as mixed construction waste	4.71	kg
Energy recovery	4.71	kg

Reuse, recovery and/or recycling potentials (D), relevant scenario information
Waste incineration with energy recuperation is assumed as end-of-life scenario

LCA: Results

DESCRIPTION OF THE SYSTEM BOUNDARY (X = INCLUDED IN LCA; MND = MODULE OR INDICATOR NOT DECLARED; MNR = MODULE NOT RELEVANT)

Product stage			Construction process stage		Use stage							End of life stage				Benefits and loads beyond the system boundaries
Raw material supply	Transport	Manufacturing	Transport from the gate to the site	Assembly	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	MND	MND	MND	MND	MNR	MNR	MNR	MND	MND	X	X	X	X	X

RESULTS OF THE LCA - ENVIRONMENTAL IMPACT according to EN 15804+A2: 1 m2 100 mm thickness

Parameter	Unit	A1-A3	C1	C2	C3	C4	D
Global Warming Potential total (GWP-total)	kg CO_2 eq	1.17E+01	3E-03	2.4E-02	9.56E+00	0	-3.52E+00
Global Warming Potential fossil fuels (GWP-fossil)	kg CO_2 eq	1.16E+01	3E-03	2.4E-02	9.56E+00	0	-3.5E+00
Global Warming Potential biogenic (GWP-biogenic)	kg CO_2 eq	2.62E-03	1.13E-05	5.76E-05	4.97E-04	0	-1.5E-02
Global Warming Potential luluc (GWP-luluc)	kg CO_2 eq	1.12E-01	4.94E-05	4.05E-04	1.37E-04	0	-3.2E-04
Depletion potential of the stratospheric ozone layer (ODP)	kg CFC11 eq	1.01E-10	4.33E-16	3.55E-15	9.74E-13	0	-3.17E-11
Acidification potential of land and water (AP)	mol H^+ eq	2.47E-02	1.49E-05	3.89E-05	5E-03	0	-4E-03
Eutrophication potential aquatic freshwater (EP-freshwater)	kg P eq	4.01E-05	1.26E-08	1.03E-07	3.52E-07	0	-5.91E-06
Eutrophication potential aquatic marine (EP-marine)	kg N eq	7.89E-03	7.16E-06	1.51E-05	3E-03	0	-1E-03
Eutrophication potential terrestrial (EP-terrestrial)	mol N eq	7.7E-02	7.93E-05	1.77E-04	3E-02	0	-1.2E-02
Formation potential of tropospheric ozone photochemical oxidants (POCP)	kg NMVOC eq	3.3E-02	2.02E-05	3.86E-05	7E-03	0	-3E-03
Abiotic depletion potential for non fossil resources (ADPE)	kg Sb eq	6.76E-05	2.56E-10	2.1E-09	1.15E-08	0	-3.08E-07
Abiotic depletion potential for fossil resources (ADPF)	MJ	3.04E+02	3.9E-02	3.18E-01	2.71E+00	0	-6.26E+01
Water use (WDP)	m^3 world eq deprived	1.92E+00	4.55E-05	3.74E-04	9.88E-01	0	-3.88E-01

RESULTS OF THE LCA - INDICATORS TO DESCRIBE RESOURCE USE according to EN 15804+A2: 1 m2 100 mm thickness

Parameter	Unit	A1-A3	C1	C2	C3	C4	D
Renewable primary energy as energy carrier (PERE)	MJ	5.33E+01	3E-03	2.7E-02	5.96E-01	0	-2.12E+01
Renewable primary energy resources as material utilization (PERM)	MJ	0	0	0	0	0	0
Total use of renewable primary energy resources (PERT)	MJ	5.33E+01	3E-03	2.7E-02	5.96E-01	0	-2.12E+01
Non renewable primary energy as energy carrier (PENRE)	MJ	1.72E+02	3.9E-02	3.18E-01	1.31E+02	0	-6.26E+01
Non renewable primary energy as material utilization (PENRM)	MJ	1.32E+02	0	0	-1.29E+02	0	0
Total use of non renewable primary energy resources (PENRT)	MJ	3.04E+02	3.9E-02	3.18E-01	2.71E+00	0	-6.26E+01
Use of secondary material (SM)	kg	0	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
Use of net fresh water (FW)	m^3	7.14E-02	3.72E-06	3.05E-05	2.3E-02	0	-1.6E-02

RESULTS OF THE LCA – WASTE CATEGORIES AND OUTPUT FLOWS according to EN 15804+A2: 1 m2 100 mm thickness

Parameter	Unit	A1-A3	C1	C2	C3	C4	D
Hazardous waste disposed (HWD)	kg	1.28E-04	1.48E-12	1.22E-11	1.25E-09	0	-4.29E-08
Non hazardous waste disposed (NHWD)	kg	2.75E+00	6.32E-06	5.19E-05	2.73E-01	0	-3.3E-02
Radioactive waste disposed (RWD)	kg	6.16E-03	7.05E-08	5.79E-07	1.06E-04	0	-5E-03
Components for re-use (CRU)	kg	0	0	0	0	0	0
Materials for recycling (MFR)	kg	2.8E-01	0	0	0	0	0
Materials for energy recovery (MER)	kg	0	0	0	0	0	0
Exported electrical energy (EEE)	MJ	0	0	0	1.65E+01	0	0
Exported thermal energy (EET)	MJ	0	0	0	2.95E+01	0	0

RESULTS OF THE LCA – additional impact categories according to EN 15804+A2-optional: 1 m2 100 mm thickness

Parameter	Unit	A1-A3	C1	C2	C3	C4	D
Incidence of disease due to PM emissions (PM)	Disease incidence	3.15E-07	1.79E-10	4.27E-10	1.82E-08	0	-3.04E-08
Human exposure efficiency relative to U235 (IR)	kBq U235 eq	8.69E-01	1.02E-05	8.39E-05	1.7E-02	0	-7.72E-01
Comparative toxic unit for ecosystems (ETP-fw)	CTUe	1.11E+02	2.9E-02	2.36E-01	9.66E-01	0	-8.96E+00
Comparative toxic unit for humans (carcinogenic) (HTP-c)	CTUh	4.09E-09	5.8E-13	4.76E-12	7.05E-11	0	-7.21E-10
Comparative toxic unit for humans (noncarcinogenic) (HTP-nc)	CTUh	1.24E-07	2.61E-11	2.14E-10	1.14E-09	0	-1.68E-08

Soil quality index (SQP)	SQP	2.78E+01	1.9E-02	1.56E-01	6.61E-01	0	-1.24E+01

Disclaimer 1 – for the indicator 'Potential Human exposure efficiency relative to U235'. 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 or radioactive waste disposal in underground facilities. Potential ionizing radiation from the soil, radon and from some construction materials is also not measured by this indicator.

Disclaimer 2 – for the indicators 'abiotic depletion potential for non-fossil resources', 'abiotic depletion potential for fossil resources', 'water (user) deprivation potential, deprivation-weighted water consumption', 'potential comparative toxic unit for ecosystems', 'potential comparative toxic unit for humans – cancerogenic', 'Potential comparative toxic unit for humans - not cancerogenic', 'potential soil quality index'. The results of this environmental impact indicator shall be used with care as the uncertainties on these results are high as there is limited experience with the indicator.

Factors for different thicknesses

The LCA results for the insulation material declared in this EPD refer to a product with a thickness of 100 mm. To enable the user of the EPD to calculate the results for different thicknesses the factors in the following table can be used for the calculation. For modules A1-A3, C1-C4 and D the LCA results above have to be multiplied with these factors.

Module A1-A3	80 mm	100 mm	120 mm	140 mm	150mm	159 mm
GWP - total	0.83	1.00	1.17	1.34	1.43	1.51
GWP - fossil	0.83	1.00	1.17	1.34	1.43	1.51
GWP - biogenic	0.97	1.00	1.03	1.45	1.46	1.48
GWP - luluc	0.80	1.00	1.19	1.39	1.49	1.57
ODP	0.82	1.00	1.18	1.36	1.45	1.54
AP	0.83	1.00	1.13	1.29	1.38	1.46
EP - freshwater	0.84	1.00	1.16	1.32	1.40	1.47
EP - marine	0.85	1.00	1.15	1.30	1.31	1.44
EP - terrestrial	0.84	1.00	1.18	1.32	1.43	1.49
POCP	0.79	1.00	1.15	1.33	1.45	1.52
ADPE	0.97	1.00	1.03	1.06	1.07	1.08
ADPF	0.82	1.00	1.18	1.37	1.46	1.55
WDP	0.83	1.00	1.16	1.33	1.41	1.49

Module C1-C4	80 mm	100 mm	120 mm	140 mm	150mm	159 mm
GWP - total	0.81	1.00	1.19	1.37	1.47	1.55
GWP - fossil	0.81	1.00	1.19	1.37	1.47	1.55
GWP - biogenic	0.80	1.00	1.20	1.40	1.50	1.59
GWP - luluc	0.86	1.00	1.14	1.28	1.35	1.42
ODP	0.84	1.00	1.16	1.33	1.41	1.48
AP	0.80	1.00	1.20	1.60	1.60	1.80
EP - freshwater	0.87	1.00	1.13	1.25	1.32	1.37
EP - marine	0.67	1.00	1.00	1.33	1.33	1.33
EP - terrestrial	0.80	1.00	1.20	1.40	1.50	1.60
POCP	0.72	1.00	1.14	1.29	1.43	1.57
ADPE	0.84	1.00	1.16	1.32	1.40	1.47
ADPF	0.83	1.00	1.17	1.34	1.43	1.51
WDP	0.82	1.00	1.18	1.36	1.45	1.53

Module D	80 mm	100 mm	120 mm	140 mm	150mm	159 mm
GWP - total	0.81	1.00	1.19	1.38	1.47	1.55
GWP - fossil	0.81	1.00	1.19	1.38	1.47	1.55
GWP - biogenic	0.80	1.00	1.20	1.40	1.53	1.60
GWP - luluc	0.81	1.00	1.19	1.38	1.47	1.55
ODP	0.81	1.00	1.19	1.38	1.47	1.55
AP	0.75	1.00	1.00	1.25	1.25	1.50
EP - freshwater	0.81	1.00	1.19	1.38	1.47	1.55
EP - marine	0.92	1.00	1.00	2.00	2.00	2.00
EP - terrestrial	0.83	1.00	1.17	1.42	1.50	1.58
POCP	1.00	1.00	1.33	1.33	1.67	1.67
ADPE	0.81	1.00	1.19	1.38	1.47	1.55
ADPF	0.81	1.00	1.19	1.38	1.47	1.55
WDP	0.81	1.00	1.19	1.38	1.47	1.55

This EPD was created using a software tool.

References

BPR
Regulation (EU) No 528/2012 of the European Parliament and of the Council of 22 May 2012 concerning the making available on the market and use of biocidal products

CPR
Regulation (EU) No. 305/2011 of the European Parliament and of the Council of 9 March 2011 laying down harmonised condition for the marketing of construction products and repealing Council Directive 89/106/EC

EN 13166
EN 13166:2012+A2:2016: Thermal insulation products for buildings. Factory made phenolic foam (PF) products - Specification

EN 15804+A2
EN15804/A2: Sustainability of construction works - Environmental product declarations - Core rules for the product category of construction products, 2019

GaBi ts
thinkstep AG: Leinfelden-Echterdingen GaBi Software- System and Database for Life Cycle Engineering 1992-2019

IBU 2021
EPD programme of Institut Bauen und Umwelte.V., Version 2.1, Berlin: Institut Bauen und Umwelte.V., 2022. www.ibu-epd.com

ISO 14025
EN ISO 14025:2011-10 - Environmental labels and declarations — Type III environmental declarations — Principles and procedures

LCA-tool
Kingspan Insulation LCA tool, version 2.0 CUP 2024.1. Developed by Sphera Solutions GmbH (formely Thinkstep GmbH)

PCR, Part A
Calculation Rules for the Life Cycle Assessment and Requirements on the Project Report acccording to EN 15804+A2:2019, v1.4. Institut Bauen und Umwelt e.V., 2024.

PCR, Part B
Requirements on the EPD for Insulating materials made of foam plastics, v10. Institut Bauen und Umwelt e.V., August 2021

REACH
Regulation (EC) No 1907/2006 of the European Parliament and of the Council on the Registration, Evaluation, Authorisation and Restriction of Chemicals (REACH) https://echa.europa.eu/candidate-list-table; accessed 20th of January 2025, 242 substances listed.

Publisher

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