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-20230320-CBA1-EN
Issue date	22.09.2023
Valid to	21.09.2028

Kooltherm® K12 D

Kingspan Insulation B.V.

Institut Bauen und Umwelt e.V.

ECO PLATFORM EPD VERIFIED

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General Information

Kingspan Insulation B.V.

Programme holder

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

Declaration number

EPD-KSI-20230320-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

22.09.2023

Valid to

21.09.2028

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

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

Kooltherm® K12 D

Owner of the declaration

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

Declared product / declared unit

Kooltherm® K12 D Framing Board
1 m², 100 mm thickness, R_D = 4,75 m²·K/W

Scope:

The insulation material Kooltherm® K12 D, is produced by Kingspan Insulation B.V. at the manufacturing facilities in Tiel, the Netherlands and Jönköping, Sweden. This EPD is based on weighted averages which have been determined on the basis of the single values originating from the different Kingspan Insulation factories.

Kooltherm® K12 D is a rigid thermoset cellular insulation material faced on both sides with a micro-perforated aluminum foil.

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

Vito D'Incognito,
(Independent verifier)

Product

Product description/Product definition

Kooltherm® K12 D is a rigid thermoset cellular insulation material faced on both sides with a composite foil based facing. The product is available in variable thicknesses from 40 mm up to 120 mm. This EPD is based on a thickness of 100 mm and 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

Kooltherm® K12 D is suitable for use as insulation for framing systems.

Technical Data

The declaration of performance of the product can be found at www.kingspan.com.

Constructional data

Name	Value	Unit
Compressive strength acc. to EN 13166	≥ 100	kPa
Thermal conductivity λd acc. to EN 13166	0.021	W/(mK)

Technical parameters not included are modulus of elasticity as well as sound absorption (not relevant for this application) and creep (not placed under permanent load).

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

Base materials/Ancillary materials

The main materials are phenolic (PF) resin (between 70-80%) with added catalyst and additives (between 15-20%). Phenolic rigid foam onto a facing material (between 5-10%) is formed by the chemical reaction of these materials and adding a blowing agent with no ozone depletion potential (ca. 5%). Due to the closed-cell structure (conform *EN 13166*), the blowing agent remains in the foam.

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: 17.01.2023) 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	3.735	kg/m^2
Layer thickness	0.1	m

This EPD is based on a weighted average of the annual production volume of two factories producing the products Kooltherm® K12 D. The scope of this EPD is the thermal insulation product Kooltherm® K12 D as produced by Kingspan Insulation at the manufacturing facilities in Tiel (the Netherlands), and Jönköping (Sweden). The environmental impacts have been calculated per plant over the calendar year 2022. Based on the one-year production volume of Kooltherm® K12 D per plant, the individual environmental impacts are weighted.

The EPD is studied for a common product thickness of 100mm. Multiplication factors are included to calculate impacts for other product thicknesses within the range of 20 to 120 mm.

System boundary

Type of EPD: according to *EN 15804*: cradle to gate with options, modules C1–C4, and module D (A1–A3, C, D and additional modules: A4,A5).

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 construction process stage includes:
· A4 transport to the building site;
· A5 installation in the building including provision of all materials, products and energy, as well as waste processing up to the end-of-waste state or disposal of final residues during the construction process 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 (not applicable for this EPD) 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.

	Module A1 - A3				Modules A4/A5/C1/C2/C3/C4				Module D			
	100mm	20mm	70mm	120mm	100mm	20mm	70mm	120mm	100mm	20mm	70mm	120mm
GWP - total	1.00	0.29	0.71	1.18	1.00	0.25	0.72	1.19	1.00	0.37	0.76	1.16
GWP - fossil	1.00	0.31	0.71	1.18	1.00	0.25	0.72	1.19	1.00	0.37	0.76	1.16
GWP - biogenic	1.00	0.84	0.94	1.04	1.00	0.25	0.72	1.19	1.00	0.31	0.74	1.17
GWP - luluc	1.00	0.21	0.70	1.20	1.00	0.25	0.72	1.19	1.00	0.44	0.79	1.14
ODP	1.00	0.20	0.70	1.20	1.00	0.25	0.72	1.19	1.00	0.25	0.72	1.19
AP	1.00	0.44	0.78	1.14	1.00	0.25	0.72	1.19	1.00	0.59	0.85	1.10
EP - freshwater	1.00	0.29	0.73	1.18	1.00	0.25	0.72	1.19	1.00	0.27	0.73	1.18
EP - marine	1.00	0.34	0.74	1.17	1.00	0.25	0.72	1.19	1.00	0.44	0.79	1.14
EP - terrestrial	1.00	0.35	0.75	1.16	1.00	0.25	0.72	1.19	1.00	0.44	0.79	1.14
POCP	1.00	0.30	0.73	1.23	1.00	0.25	0.72	1.19	1.00	0.46	0.80	1.14
ADPF	1.00	0.21	0.70	1.20	1.00	0.25	0.72	1.19	1.00	0.30	0.74	1.17
ADPE	1.00	0.25	0.70	1.19	1.00	0.25	0.72	1.19	1.00	0.34	0.75	1.17
WDP	1.00	0.30	0.74	1.18	1.00	0.25	0.72	1.19	1.00	0.42	0.78	1.14

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. The LCA results in chapter 5 have to be multiplied by these factors. The scaling factors are applicable for the complete product, where the facings are for all product thicknesses equal, and the foam inputs are scaling upwards and downwards with other product thicknesses.

Background data from GaBi ts Version 10 is used with GaBi data sets CUP2022.1

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.

LCA: Scenarios and additional technical information

Characteristic product properties of biogenic carbon
The total mass of biogenic carbon containing materials is less than 5 % of the total mass of the product and accompanying packaging.

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)
Within A1-A3 the following packaging of the final product is included:
Polyethylene cover and wrap: 0,05 kg/m²
Others (mainly Expanded Polystyrene skid): 0,01 kg/m²

Transport to the building site (A4)

Name	Value	Unit
Litres of fuel	0.0103	l/100km
Transport distance	100	km
Grammage of products transproted	3.735	kg/m²

Installation into the building (A5)

Name	Value	Unit
Output substances following waste treatment on site packaging material	0.06	kg

The recycling of the packaging is considered in A5.

End of life (C1-C4)
The assumptions for C1 are: diesel driven excavator (100 kW; 0.2 litre fuel per ton excavated material).
The assumptions for C2 are: Truck Euro 6, diesel driven, 26-28 t gross weight, assumed distance 50 km

Name	Value	Unit
Collected as mixed construction waste	3.735	kg
Energy recovery	3.735	kg
R1-value of waste incineration plant	>60	%

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; ND = 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	X	X	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	A4	A5	C1	C2	C3	C4	D
GWP-total	kg CO_2 eq	7.46E+00	3.14E-02	1.88E-01	2.4E-03	1.57E-02	8.03E+00	0	-3.88E+00
GWP-fossil	kg CO_2 eq	7.63E+00	3.13E-02	1.88E-01	2.39E-03	1.57E-02	8.03E+00	0	-3.86E+00
GWP-biogenic	kg CO_2 eq	-2.44E-01	-4.32E-05	1.03E-05	3.2E-06	-2.16E-05	5.46E-04	0	-1.79E-02
GWP-luluc	kg CO_2 eq	8.02E-02	1.75E-04	2.23E-06	2.95E-08	8.73E-05	1.43E-05	0	-4.75E-04
ODP	kg CFC11 eq	1.42E-08	1.88E-15	3.35E-14	1.47E-16	9.38E-16	5.88E-13	0	-2.18E-11
AP	mol H^+ eq	1.65E-02	3.23E-05	2.34E-05	1.11E-05	1.61E-05	4.74E-03	0	-7.78E-03
EP-freshwater	kg P eq	2.57E-05	9.35E-08	8.46E-09	4.83E-10	4.67E-08	1.58E-07	0	-4.62E-06
EP-marine	kg N eq	4.43E-03	1.06E-05	6.29E-06	5.29E-06	5.28E-06	2.29E-03	0	-1.55E-03
EP-terrestrial	mol N eq	4.4E-02	1.26E-04	1.07E-04	5.8E-05	6.28E-05	2.64E-02	0	-1.67E-02
POCP	kg NMVOC eq	2.25E-02	2.84E-05	1.81E-05	1.5E-05	1.42E-05	5.89E-03	0	-4.48E-03
ADPE	kg Sb eq	7.22E-06	2.62E-09	8.18E-10	9.79E-11	1.31E-09	1.62E-08	0	-5.25E-07
ADPF	MJ	2.1E+02	4.18E-01	6.94E-02	3.24E-02	2.09E-01	2.07E+00	0	-6.25E+01
WDP	m^3 world eq deprived	1.2E+00	2.81E-04	1.78E-02	4.45E-06	1.4E-04	7.91E-01	0	-4.5E-01

GWP = Global warming potential; ODP = Depletion potential of the stratospheric ozone layer; AP = Acidification potential of land and water; EP = Eutrophication potential; POCP = Formation potential of tropospheric ozone photochemical oxidants; ADPE = Abiotic depletion potential for non-fossil resources; ADPF = Abiotic depletion potential for fossil resources; WDP = Water (user) deprivation potential)

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

Parameter	Unit	A1-A3	A4	A5	C1	C2	C3	C4	D
PERE	MJ	3.4E+01	2.38E-02	1.78E-02	1.22E-04	1.19E-02	3.61E-01	0	-1.91E+01
PERM	MJ	0	0	0	0	0	0	0	0
PERT	MJ	3.4E+01	2.38E-02	1.78E-02	1.22E-04	1.19E-02	3.61E-01	0	-1.91E+01
PENRE	MJ	1.05E+02	4.19E-01	3.27E+00	3.24E-02	2.1E-01	1.04E+02	0	-6.25E+01
PENRM	MJ	1.05E+02	0	-3.21E+00	0	0	-1.02E+02	0	0
PENRT	MJ	2.1E+02	4.19E-01	6.95E-02	3.24E-02	2.1E-01	2.07E+00	0	-6.25E+01
SM	kg	0	0	0	0	0	0	0	0
RSF	MJ	0	0	0	0	0	0	0	0
NRSF	MJ	0	0	0	0	0	0	0	0
FW	m^3	5.56E-02	2.69E-05	4.24E-04	1.84E-07	1.35E-05	1.86E-02	0	-2.53E-02

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 resources; SM = Use of secondary material; RSF = Use of renewable secondary fuels; NRSF = Use of non-renewable secondary fuels; FW = Use of net fresh water

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

Parameter	Unit	A1-A3	A4	A5	C1	C2	C3	C4	D
HWD	kg	9.57E-05	2.01E-12	5.79E-12	1.07E-13	1E-12	2.85E-10	0	-6.09E-09
NHWD	kg	3.3E-01	6.01E-05	1.69E-02	3.04E-06	3.01E-05	4.04E-02	0	-2.36E-01
RWD	kg	2.81E-03	5.17E-07	2.89E-06	3.56E-08	2.58E-07	8.55E-05	0	-4.78E-03
CRU	kg	0	0	0	0	0	0	0	0
MFR	kg	0	0	0	0	0	9.72E-02	0	0
MER	kg	0	0	7.53E-02	0	0	3.64E+00	0	0
EEE	MJ	0	0	3.42E-01	0	0	1.39E+01	0	0
EET	MJ	0	0	6.11E-01	0	0	2.48E+01	0	0

HWD = Hazardous waste disposed; NHWD = Non-hazardous waste disposed; RWD = Radioactive waste disposed; CRU = Components for re-use; MFR = Materials for recycling; MER = Materials for energy recovery; EEE = Exported electrical energy; EET = Exported thermal energy

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

Parameter	Unit	A1-A3	A4	A5	C1	C2	C3	C4	D
PM	Disease incidence	1.79E-07	1.86E-10	2.86E-10	1.26E-10	9.31E-11	1.31E-08	0	-7.23E-08
IR	kBq U235 eq	4.66E-01	7.57E-05	3.97E-04	5.18E-06	3.79E-05	1.37E-02	0	-8.33E-01
ETP-fw	CTUe	7.86E+01	2.91E-01	4.97E-02	2.25E-02	1.45E-01	7.07E-01	0	-1.5E+01
HTP-c	CTUh	3.19E-09	5.86E-12	2.79E-12	4.17E-13	2.93E-12	5.34E-11	0	-9.74E-10
HTP-nc	CTUh	1.16E-07	3.04E-10	2.82E-10	2.11E-11	1.52E-10	1.94E-09	0	-2.96E-08
SQP	SQP	3.93E+01	1.44E-01	1.77E-02	8.93E-05	7.2E-02	4.34E-01	0	-9.86E+00

PM = Potential incidence of disease due to PM emissions; IR = Potential Human exposure efficiency relative to U235; ETP-fw = Potential comparative Toxic Unit for ecosystems; HTP-c = Potential comparative Toxic Unit for humans (cancerogenic); HTP-nc = Potential comparative Toxic Unit for humans (not cancerogenic); SQP = Potential soil quality index

Disclaimer 1 – for the indicator IR
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.
Disclaimer 2 – for the indicators ADPE, ADPF, WDP, ETP-fw, HTP-c, HTP-nc, SQP
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. This EPD was created using a software tool.

References

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

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

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

IBU 2021
Institut Bauen und Umwelt e.V.: General Instructions for the EPD programme of Institut Bauen und Umwelte.V., Version 2.0, Berlin: Institut Bauen und Umwelte.V., 2021. 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 LCA tool, version 1.2. IBU-KSI-202001-LT1-EN. Developed by Sphera Solutions GmbH (formely Thinkstep GmbH)

PCR Version 1.7, Part A
Institut Bauen und Umwelt e.V., Berlin (pub.): Product Category Rules for Building-Related Products andservices, Part A: Calculation Rules for the Life Cycle Assessment and Requirements on the Project Report according to EN 15804+A2:2019 November 2021

PCR, Part B
Institut Bauen und Umwelt e.V., Berlin (pub.): Product Category Rules for Construction Products from the range of Environmental Product Declarations of Institut Bauen und Umwelt (IBU), Part B: Requirements on the EPD for insulating materials made of foam plastics. June 2023

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 17th of January 2023, 233 substances listed.

Publisher

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

+49 (0)30 3087748- 0
info@ibu-epd.com
www.ibu-epd.com

Programme holder

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

+49 (0)30 3087748- 0
info@ibu-epd.com
www.ibu-epd.com

Author of the Life Cycle Assessment

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

+31 (0) 543 543 210
info@kingspaninsulation.nl
www.kingspan.com

Owner of the Declaration

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

+31 (0) 543 543 210
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