

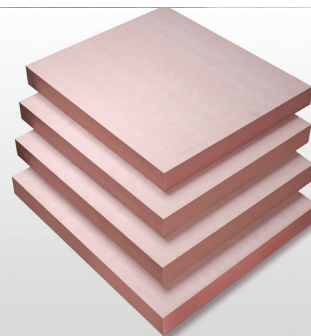
ENVIRONMENTAL PRODUCT DECLARATION

as per *ISO 14025* and *EN 15804+A1*

Owner of the Declaration	Kingspan Insulation B.V.
Programme holder	Institut Bauen und Umwelt e.V. (IBU)
Publisher	Institut Bauen und Umwelt e.V. (IBU)
Declaration number	EPD-KSI-20190072-IBC1-EN
Issue date	05/09/2019
Valid to	04/09/2024

Kooltherm K5 Kingspan Insulation B.V.

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1. General Information

Kingspan Insulation B.V.

Programme holder

IBU – Institut Bauen und Umwelt e.V.
Panoramastr. 1
10178 Berlin
Germany

Declaration number

EPD-KSI-20190072-IBC1-EN

This declaration is based on the product category rules:

Insulating materials made of foam plastics, 06.2017
(PCR checked and approved by the SVR)

Issue date

05/09/2019

Valid to

04/09/2024



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



Dr. Alexander Röder
(Managing Director Institut Bauen und Umwelt e.V.)

Kooltherm K5

Owner of the declaration

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

Declared product / declared unit

Kooltherm K5, External Wall Board
1m², 100mm thickness, R=5,0 m²-K/W

Scope:

The insulation material Kooltherm, is produced by Kingspan Insulation B.V. at the manufacturing facility in Tiel, the Netherlands. A glass tissue based facing is autohesively bonded to the insulation core during manufacture.

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+A1*. 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 14025:2010*

internally externally



Dipl. Natw. ETH Sascha Iqbal
(Independent verifier)

2. Product

2.1 Product description/Product definition

Kingspan Kooltherm ® K5 is a rigid thermoset cellular insulation material faced on both sides with a glass tissue based facing. The product is available in variable thicknesses from 20mm up to 200mm. This EPD covers one of the most commonly sold thickness of 100mm with an R-value of 5,0 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 13166:2012+A2:2016 - 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.

2.2 Application

Due to its high insulating value the Kooltherm K5 is suitable for use as external thermal insulation underneath applicable render systems.

2.3 Technical Data

Constructional data

Name	Value	Unit
Compressive strength acc. to /EN 13166/	≥ 100	kPa
Tensile strength perpendicular to faces acc. to /EN 13166/	≥ 80	kPa
Thermal conductivity λ _d acc. to /EN 13166/ for d = 20 – 44mm	0.021	W/(m·K)
Thermal conductivity λ _d acc. to /EN 13166/ for d = 45 – 120mm	0.020	W/(m·K)
Thermal conductivity λ _d acc. to /EN 13166/ for d = 120 - 159mm	0.021	W/(m·K)
Thermal conductivity λ _d acc. to /EN 13166/ for d = 160 - 200mm (2 layers)	0.021	W/(m·K)
Short term water absorption acc. to /EN 13166/	≤ 1.00 (WS2)	

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). The short term water absorption is tested to show the influence of water exposure during construction; the other water absorption/moisture characteristics are not applicable for the product application.

Performance data of the product in accordance with the declaration of performance with respect to its essential characteristics according to /EN 13166:2012+A2:2016/ - Thermal insulation products for buildings - Factory made phenolic foam (PF) products - Specification

2.4 Delivery status

The products are delivered in standard dimensions of 1200 x 400mm and in thicknesses varying from 20 to 200mm. Products are packed up to 27 boards per pack.

2.5 Base materials/Ancillary materials

The main materials are phenolic (PF) resin (between 70-80%) with added catalyst and additives (between 15-20%) which are encapsulated in the final foam. In the factory, the resin is foamed onto a facing material (between 5-10%) into a rigid foam using a propellant with no ozone depletion potential (5%). Due to the closed cell content (conform EN 13166), the blowing agent remains in the foam.

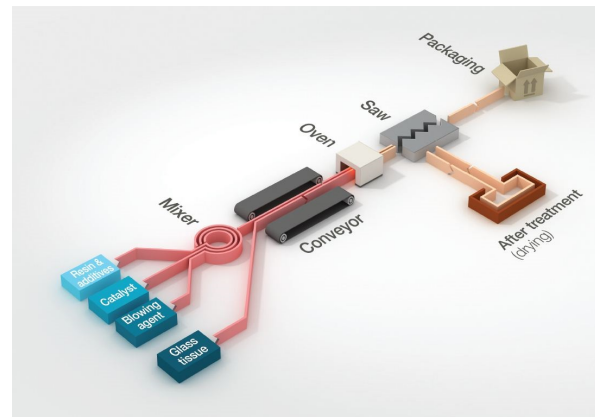
In the current /REACH/ regulations, phenolic foam insulation products are considered “articles” and are exempt from the requirements of Article 57 and 59(1) of REACH Regulation (EC) No 1907/2006. These products are not classified as “hazardous products” according to any current legislation, and can hence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

- This article contains substances listed in the candidate list (date: 24.06.2019) exceeding 0.1 percentage by mass: **no**.
- This article contains other 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) Ordinance on Biocide Products No. 528/2012): **no**.”

The chemical functional group of the additives used in both of the resins is that of non-ionic surfactants, while the one of the fire retardant used in the facing material is that of a N-P (Nitrogen-Phosphorous) based fire retardant.“

2.6 Manufacture

Phenolic foam is produced by the use of phenolic resin, a catalyst, additives and blowing agent. The cell structure is formed in the resin under the influence of heat released during the chemical reaction. Hereby, the blowing agent is incorporated into the material which forms a solid and very fine cell structure, which is nearly 100% closed. The foam is applied on the glass fiber facings. After this, the thickness and strength is determined by the conveyor belt where upper and lower rollers compress the material into the desired thickness. The board is sawed into the correct size and packed according to the product specification.



2.7 Environment and health during manufacturing

The production is carried out in accordance with all national guidelines and regulations.

2.8 Product processing/Installation

Boards are mechanically fixed to the exterior of masonry external walls. Cutting should be carried out either by using a fine toothed saw or a sharp knife. The product requires the installation of a further appropriate exterior render system.

Inhalation: Dust is non-hazardous.

As with all cutting procedures it is recommended that a disposable dust mask is worn. Where dust is generated through mechanical cutting in confined spaces, it is recommended that air extraction is used.

Hands: It is recommended that gloves are worn when handling the products.

Skin: Non-sensitising.

When facings containing glass fibres are handled, skin irritation may occur. Wash carefully using soap and water or an appropriate cleanser to remove.

2.9 Packaging

The product is packaged flat per 6 boards (100mm boards) and shipped in units of typically 12 packages. On average, the consumption of packaging is 25g per kg final product, composed of approx. 80% polyethylene film, 20% expanded polystyrene skids and thermoplastic adhesive. All of the packaging material, except the adhesive, can be recycled.

2.10 Condition of use

Under standard conditions of use, the construction material does not display any material change during the period of use.

2.11 Environment and health during use

The product will be left alone after installation, there are no known associated environmental impacts.

2.12 Reference service life

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

2.13 Extraordinary effects

Fire

The product Kooltherm K5 has been classified “As placed on the market” - according to /EN 13501-1/:

Name	Value
Building material class (product)	C
Smoke gas development (product)	s2
Burning droplets (product)	d0

Water

Due to the closed cell structure of the product it can resist moisture but is water vapor open.

Mechanical destruction

The material is considered chemically inert and is not expected to present a risk if mechanically destroyed.

2.14 Re-use phase

If the insulation boards are dismantled from the wall structure in entire pieces they could be directly re-used in the same application. Re-use however has not been considered in this study.

2.15 Disposal

The following points describe the product disposal:

- Waste insulation is non-hazardous.
- Product dust created in the installation process is regarded as nuisance dust only due to its inert nature.
- Observe usual safety precautions with polythene bags, wrapping and packaging.
- Waste product should be disposed of in accordance with local laws and regulations. Disposal key no. 17 06 04 "Insulation materials other than those mentioned in 17 06 01 and 17 06 03" in accordance with /EWG 2002/.
- The product is suitable for incineration with energy recovery.

2.16 Further information

For product data, including safety information, please refer to www.kingspan.com

3. LCA: Calculation rules

3.1 Declared Unit

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

Declared unit

Name	Value	Unit
Declared unit	1	m ²
Gross density	35	kg/m ³
Conversion factor to 1 kg	3.5	kg/m ²
Grammage	3.5	kg/m ²
Layer thickness	0.1	m

3.2 System boundary

Type of EPD: Cradle to gate with options, modules A1-A3, C3, D

The following processes are included in the A1-A3 production stage of Kooltherm: Manufacture of preliminary products (Resin, additives, blowing agent):

- Transportation of raw materials and preliminary products to the plant
- Manufacturing process in the plant including energy, water consumption, disposal of residual materials and consideration of any direct VOC emissions to air
- Manufacture and transport of packaging materials.

The following processes are included in the C3 and D stage of Kooltherm:

- End of life scenario (incineration in a waste incineration plant with energy recuperation)

3.3 Estimates and assumptions

For the end of life an incineration in a waste incineration plant with an R1-value assumed to be >0,6 is considered. Production of capital equipment, facilities and infrastructure required for manufacture are outside the scope of this assessment.

3.4 Cut-off criteria

No cut-off criteria are applied in this study. All reported data were incorporated and modelled using best available LCI data.

3.5 Background data

All background data used was taken from the /GaBi ts/ software data bases. The consistent data sets contained in the /GaBi ts/ data base are documented in the online /GaBi ts/ documentation. The last update of the database was in February 2018.

In order to guarantee comparability of the results, exclusively the consistent background data from the /GaBi ts/ data base was used in the LCA (e.g. data sets on energy, transport, auxiliaries and consumables).

3.6 Data quality

Primary data was collected by Kingspan insulation B.V. using a specifically prepared questionnaire. The foreground data collected by the manufacturer are based on yearly production amounts. The production data refer to an average of the year 2017.

Cross-checks concerning the plausibility of mass and energy flows were carried out on the data received. Similar checks were made on the software model developed during the study. Overall the data quality can be described as good. The primary data collection has been done thoroughly, all relevant flows are considered.

3.7 Period under review

The input data for raw material production and the consumption of process energy on the manufacturing facility was measure data during January 1st 2017 to December 31st 2017, i.e. collected over a 12 month period.

3.8 Allocation

The production process does not deliver any co-products. The applied software model does not contain any allocation.

Production waste is sent to a waste incineration plant. Resulting electrical and thermal energy is looped inside module A1-A3 as the quality of the recovered energy is assumed to be comparable to the input energy. Environmental burden of the incineration of packaging and the product in the end of life scenario are assigned to the system (A5 or C3); resulting

potential credits for thermal and electrical energy are declared in module D.

3.9 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 GaBi software-system version 8 /GaBi ts/ is used

4. LCA: Scenarios and additional 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.

Installation into the building (A5)

Within A1-A3 the following packaging of the final product is included:

Polyethylene cover and wrap: 0,09 kg/m²

Others (mainly Expanded Polystyrene skid): 0,025 kg/m²

The recycling of the packaging should be considered in the context of a building assessment in A5.

End of life (C3)

Name	Value	Unit
Collected as mixed construction waste	3.5	kg
Energy recovery	3.5	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.

5. LCA: Results

DESCRIPTION OF THE SYSTEM BOUNDARY (X = INCLUDED IN LCA; MND = MODULE 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	MND	MND	X	MND	X

RESULTS OF THE LCA - ENVIRONMENTAL IMPACT according to EN 15804+A1: 1 m², 100mm thickness

Parameter	Unit	A1-A3	C3	D
Global warming potential	[kg CO ₂ -Eq.]	7.71E+0	7.56E+0	-3.07E+0
Depletion potential of the stratospheric ozone layer	[kg CFC11-Eq.]	1.95E-8	1.24E-15	-4.24E-14
Acidification potential of land and water	[kg SO ₂ -Eq.]	1.44E-2	3.01E-3	-5.19E-3
Eutrophication potential	[kg (PO ₄) ³⁻ -Eq.]	1.74E-3	7.64E-4	-5.62E-4
Formation potential of tropospheric ozone photochemical oxidants	[kg ethene-Eq.]	4.57E-3	1.91E-4	-4.11E-4
Abiotic depletion potential for non-fossil resources	[kg Sb-Eq.]	1.01E-5	6.89E-8	-5.55E-7
Abiotic depletion potential for fossil resources	[MJ]	2.30E+2	1.85E+0	-4.34E+1

RESULTS OF THE LCA - INDICATORS TO DESCRIBE RESOURCE USE according to EN 15804+A1: 1 m², 100mm thickness

Parameter	Unit	A1-A3	C3	D
Renewable primary energy as energy carrier	[MJ]	6.51E+0	2.82E-1	-1.10E+1
Renewable primary energy resources as material utilization	[MJ]	0.00E+0	0.00E+0	0.00E+0
Total use of renewable primary energy resources	[MJ]	6.51E+0	2.82E-1	-1.10E+1
Non-renewable primary energy as energy carrier	[MJ]	1.43E+2	9.10E+1	-5.45E+1
Non-renewable primary energy as material utilization	[MJ]	8.89E+1	-8.89E+1	0.00E+0
Total use of non-renewable primary energy resources	[MJ]	2.32E+2	2.09E+0	-5.45E+1
Use of secondary material	[kg]	0.00	0.00	0.00
Use of renewable secondary fuels	[MJ]	0.00	0.00	0.00
Use of non-renewable secondary fuels	[MJ]	0.00	0.00	0.00
Use of net fresh water	[m ³]	3.30E-2	1.77E-2	-1.30E-2

RESULTS OF THE LCA – WASTE CATEGORIES AND OUTPUT FLOWS according to EN 15804+A1: 1 m², 100mm thickness

Parameter	Unit	A1-A3	C3	D
Hazardous waste disposed	[kg]	9.88E-5	2.07E-9	-2.24E-8
Non-hazardous waste disposed	[kg]	6.91E-1	8.23E-2	-2.35E-2
Radioactive waste disposed	[kg]	9.71E-4	9.44E-5	-4.40E-3
Components for re-use	[kg]	0.00	0.00	0.00
Materials for recycling	[kg]	0.00	0.00	0.00
Materials for energy recovery	[kg]	0.00	3.50	0.00
Exported electrical energy	[MJ]	0.00	13.10	0.00
Exported thermal energy	[MJ]	0.00	23.40	0.00

6. LCA: Interpretation

The EPD declares the production and end of life stage of the product.

All impact categories are mainly determined by the production stage (A1-A3) with the exception of global warming potential (GWP). For GWP also the incineration emissions at the end of life have a significant environmental impact.

Within the production stage the pre-chains of the resin production have the most important contribution in all impact categories except for formation potential of tropospheric ozone photochemical oxidants (POCP).

For POCP the blowing agents have the highest contribution.

Thermal energy consumption, packaging and the transport to production site have a minor influence on the overall impact within A1-A3. Negligible influence has the electricity consumption and other auxiliary raw materials.

Factors for different thicknesses

The LCA results for the insulation material declared in this EPD refer to a product with a thickness of 100mm. 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, C3 and D the LCA results in chapter 5 have to be multiplied with these factors.

K5	Module A1-A3			Module C			Module D		
	100mm	20mm	200mm	100mm	20mm	200mm	100mm	20mm	200mm
GWP	1	0,24	1,94	1	0,18	2,02	1	0,18	2,02
ODP	1	0,17	2,04	1	0,21	1,99	1	0,18	2,02
AP	1	0,35	1,81	1	0,18	2,03	1	0,18	2,02
EP	1	0,27	1,92	1	0,17	2,03	1	0,18	2,02
POCP	1	0,29	1,89	1	0,18	2,03	1	0,18	2,02
ADPE	1	0,31	1,86	1	0,28	1,90	1	0,18	2,02
ADPF	1	0,23	1,96	1	0,20	2,00	1	0,18	2,02

7. Requisite evidence

7.1 VOC Emissions

The product is not intended for indoor use and hence no specific VOC emission tests are performed.

The insulation boards are covered with external cladding and will not come in contact with water under normal circumstances and under correct installation, and no leaching tests are performed.

7.2 Leaching performance

8. References

/PCR Version 1.7, Part A/

Institut Bauen und Umwelt e.V., Berlin (pub.): Product Category Rules for Building-Related Products and services, Part A: Calculation Rules for the Life Cycle Assessment and Requirements on the Project Report, March 2018

/EN 12089/

EN 12089:2013: Thermal insulating products for building applications - Determination of bending behaviour

/PCR 2017, 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 2017

/EN 13166/

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

/EN 13823/

Reaction to fire tests for building products - Building products excluding floorings exposed to the thermal attack by a single burning item

/EN 826/

EN 826:2013: Thermal insulating products for building applications - Determination of compression behaviour

/EN 13501-1/

Fire classification of construction products and building elements - Part 1: Classification using data from reaction to fire tests

/EN 1607/

EN 1607:2013: Thermal insulating products for building applications - Determination of tensile strength perpendicular to faces

/EN 29052-1/

EN 29052-1: 1992: Acoustics - Determination of dynamic stiffness - Part 1: Materials used under floating floors in dwellings

/EN 1609/

EN 1609:2013: Thermal insulating products for building applications - Determination of short term water absorption by partial immersion

/EWC 2002/

EWC 2002: Commission Decision 2000/532/EC of 3 May 2000 replacing Decision 94/3/EC establishing a list of wastes pursuant to Article 1(a) of Council Directive 75/442/EEC on waste and Council Decision 94/904/EC establishing a list of hazardous waste pursuant to Article 1(4) of Council Directive 91/689/EEC on hazardous waste

/EN 12086/

EN 12086:2013: Thermal insulating products for building applications - Determination of water vapour transmission properties



/CPR/

REGULATION (EU) No. 305/2011 of the European Parliament and of the Council of 9 March 2011 laying down harmonised conditions 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

/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 24th of June 2019, 197 substances listed.

**Publisher**

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