ENVIRONMENTAL PRODUCT DECLARATION

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

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-KIN-20230015-CBD1-EN
Issue date	07/02/2023
Valid to	06/02/2028

Therma™ TW50 / Therma™ TW50 EUR

Kingspan Insulation B.V.

Institut Bauen und Umwelt e.V.

ECO PLATFORM EPD VERIFIED

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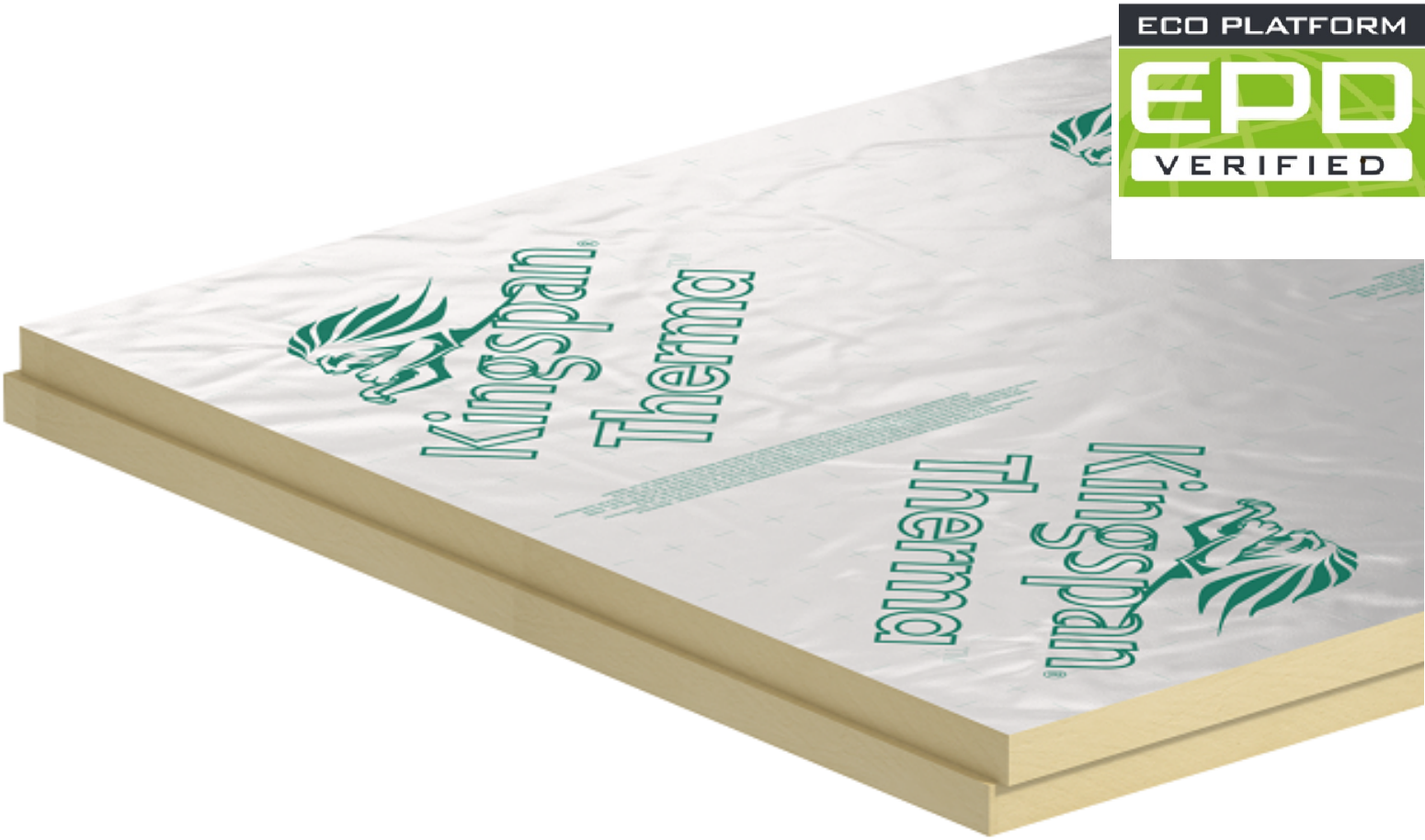

General Information

Kingspan Insulation B.V.

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

Declaration number
EPD-KIN-20230015-CBD1-EN

This declaration is based on the product category rules:
Insulating materials made of foam plastics, 01.2019
(PCR checked and approved by the SVR)

Issue date
07/02/2023

Valid to
06/02/2028

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

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

Therma™ TW50
Therma™ TW50 EUR

Owner of the declaration
Kingspan Insulation B.V.
Lorentzstraat 1
7102 JH Winterswijk
The Netherlands

Declared product / declared unit
Therma™ TW50 / Therma™ TW50 EUR
1m², 120mm thickness, R_D = 5,45 m².K/W

Scope:
The insulation materials Therma™ TW50 and Therma™ TW50 EUR are produced by Kingspan Insulation at the manufacturing facilities in Winterswijk (the Netherlands), Burkhardtsdorf (Germany) and Kankaanpää (Finland). 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.

Therma™ TW50 / Therma™ TW50 EUR Cavity Board is an insulation board with a rigid thermoset polyisocyanurate (PIR) fibre-free insulation core, faced on both sides with a low emissivity composite foil. Therma™ TW50 Cavity Board is used as thermal insulation for cavity walls.

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
Therma™ TW50 / Therma™ TW50 EUR Cavity Board is an insulation board with a rigid thermoset polyisocyanurate (PIR) fibre-free insulation core, faced on both sides with a low emissivity composite foil. The products are available in variable thicknesses from 20 mm up to 200 mm. This EPD is based on a thickness of 120 mm and R_D-value of 5,45 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 13165* - Thermal insulation products for buildings - Factory made polyurethane foam

(PU) products - Specification and the CE-marking. For the application and use the respective national provisions apply.

Application
Therma™ TW50 / Therma™ TW50 EUR Cavity Board is used as thermal insulation for cavity walls.

Technical Data

Constructional data

Name	Value	Unit
Thermal conductivity according to EN 13165	0.022	W/(m.K)
Reaction to fire according to EN 13165 for Therma™ TW50	F	
Reaction to fire according to EN 13165 for Therma™ TW50 EUR	E	
Compressive strength according to EN 13165	CS(10\Y) 100	
Thickness tolerance according to EN 13165	T2-T3	

Performance data of the product in accordance with the declaration of performance with respect to its essential characteristics according to *EN 13165* - Thermal insulation products for buildings - Factory made rigid polyurethane foam (PU) products - Specification

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

Base materials/Ancillary materials
The product contains approximately 3,3 kg/m^2 polyurethane rigid foam and 0,3 kg/m^2 multi-layer aluminium facings.

The main materials of the polyurethane foam are MDI (between 57-62 %), polyol (between 27-32 %) and a blowing agent (between 5-6 %). Due to the closed-cell structure (conform EN 13165), the blowing agent remains in the foam. Water, flame retardants and additives are added (between 4-8 %).

In the current *REACH* regulations, polyurethane foam insulation products are considered “articles” and are exempt from the requirements of Articles 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: 31.08.2022) 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.

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	30	kg/m^3
Grammage	3.6	kg/m^2
Layer thickness	0.12	m

This EPD is based on a weighted average of the annual production volume of three factories producing the products Therma™ TW50 and Therma™ TW50 EUR.

The scope of this EPD is the thermal insulation products Therma™ TW50 and Therma™ TW50 EUR as produced by Kingspan Insulation at the manufacturing facilities in Winterswijk (the Netherlands), Burkhardtsdorf (Germany) and Kankaanpää (Finland).

The environmental impacts have been calculated per plant over the calendar year 2021. Based on the one year production volume of Therma™ TW50 and Therma™ TW50 EUR per plant, the individual environmental impacts are weighted.

The EPD is studied for a common product thickness of 120 mm. Multiplication factors are included to calculate impacts for other product thicknesses within the range of 20 to 200 mm.

System boundary
The type of EPD according to *EN 15804* is: 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.

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

Factors for different thicknesses
The LCA results for the insulation material declared in this EPD refer to a product with a thickness of 120 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 multi-layer aluminium facings are for all product thicknesses equal and the foam inputs are scaling upwards and downwards with other product thicknesses.

TR26/TT46	Module A1 - A3					Modules A4/A5/C1/C2/C3					Module D				
	20mm	100mm	120mm	140mm	200mm	20mm	100mm	120mm	140mm	200mm	20mm	100mm	120mm	140mm	200mm
GWP - total	0.24	0.83	1.00	1.17	1.68	0.25	0.83	1.00	1.17	1.67	0.23	0.83	1.00	1.18	1.68
GWP - fossil	0.25	0.83	1.00	1.17	1.67	0.25	0.83	1.00	1.17	1.67	0.23	0.83	1.00	1.18	1.68
GWP - biogenic	0.82	0.96	1.00	1.04	1.16	0.25	0.83	1.00	1.17	1.67	0.21	0.82	1.00	1.18	1.70
GWP - luluc	0.24	0.83	1.00	1.17	1.68	0.25	0.83	1.00	1.17	1.67	0.26	0.84	1.00	1.17	1.66
ODP	0.30	0.86	1.00	1.15	1.58	0.25	0.83	1.00	1.17	1.67	0.19	0.82	1.00	1.19	1.72
AP	0.27	0.84	1.00	1.16	1.65	0.25	0.83	1.00	1.17	1.67	0.34	0.86	1.00	1.15	1.58
EP - freshwater	0.27	0.84	1.00	1.16	1.65	0.25	0.83	1.00	1.17	1.67	0.20	0.82	1.00	1.19	1.71
EP - marine	0.26	0.84	1.00	1.16	1.66	0.25	0.83	1.00	1.17	1.67	0.26	0.84	1.00	1.17	1.65
EP - terrestrial	0.26	0.84	1.00	1.16	1.66	0.25	0.83	1.00	1.17	1.67	0.26	0.84	1.00	1.17	1.65
POCP	0.24	0.83	1.00	1.17	1.66	0.25	0.83	1.00	1.17	1.67	0.27	0.84	1.00	1.17	1.65
ADPF	0.20	0.82	1.00	1.18	1.72	0.25	0.83	1.00	1.17	1.67	0.20	0.82	1.00	1.18	1.70
ADPE	0.23	0.83	1.00	1.17	1.68	0.25	0.83	1.00	1.17	1.67	0.22	0.83	1.00	1.18	1.69
WDP	0.23	0.83	1.00	1.17	1.69	0.25	0.83	1.00	1.17	1.67	0.25	0.83	1.00	1.17	1.66

LCA: Scenarios and additional technical information

Characteristic product properties
Information on 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)
A polyethylene packaging foil is used. The products are transported either on expanded polystyrene (EPS) skids or on wooden pallets.
Within Module A3 the following packaging of the final product is included:
- Polyethylene cover and wrap: 0,052 kg/m²
- Expanded Polystyrene skid: 0,02 kg/m²
- Wooden pallet: 0,0 kg/m²

Transport to the building site (A4)

Name	Value	Unit
Litres of fuel	0.0103	l/100km
Transport distance	100	km
Gross density of products transported	30	kg/m³

Installation into the building (A5)

Name	Value	Unit
Total output substances following waste treatment on-site packaging material	0.072	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	3.6	kg
Energy recovery	3.6	kg

Reuse, recovery and/or recycling potentials (D), relevant scenario information
Waste incineration with energy recuperation is assumed as an 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	ND	ND	MNR	MNR	MNR	ND	ND	X	X	X	X	X

RESULTS OF THE LCA - ENVIRONMENTAL IMPACT according to EN 15804+A2: 1m2 120mm Therma™ TW50 / Therma™ TW50 EUR

Core Indicator	Unit	A1-A3	A4	A5	C1	C2	C3	C4	D
GWP-total	[kg CO_2-Eq.]	9.85E+0	3.03E-2	1.80E-1	2.31E-3	1.51E-2	7.79E+0	0.00E+0	-3.20E+0
GWP-fossil	[kg CO_2-Eq.]	1.01E+1	3.02E-2	1.80E-1	2.31E-3	1.51E-2	7.63E+0	0.00E+0	-3.18E+0
GWP-biogenic	[kg CO_2-Eq.]	-2.37E-1	-4.17E-5	9.84E-6	3.09E-6	-2.08E-5	1.66E-1	0.00E+0	-1.58E-2
GWP-luluc	[kg CO_2-Eq.]	6.64E-3	1.68E-4	2.14E-6	2.85E-8	8.41E-5	1.43E-5	0.00E+0	-3.63E-4
ODP	[kg CFC11-Eq.]	2.89E-11	1.81E-15	3.21E-14	1.41E-16	9.04E-16	5.77E-13	0.00E+0	-2.04E-11
AP	[mol H^+-Eq.]	2.15E-2	3.11E-5	2.25E-5	1.07E-5	1.55E-5	4.55E-3	0.00E+0	-4.89E-3
EP-freshwater	[kg P-Eq.]	4.57E-5	9.01E-8	8.10E-9	4.65E-10	4.50E-8	1.56E-7	0.00E+0	-4.20E-6
EP-marine	[kg N-Eq.]	5.50E-3	1.02E-5	6.02E-6	5.10E-6	5.09E-6	2.20E-3	0.00E+0	-1.18E-3
EP-terrestrial	[mol N-Eq.]	5.67E-2	1.21E-4	1.02E-4	5.59E-5	6.06E-5	2.53E-2	0.00E+0	-1.27E-2
POCP	[kg NMVOC-Eq.]	2.72E-2	2.74E-5	1.74E-5	1.45E-5	1.37E-5	5.64E-3	0.00E+0	-3.34E-3
ADPE	[kg Sb-Eq.]	1.17E-5	2.52E-9	7.83E-10	9.44E-11	1.26E-9	1.58E-8	0.00E+0	-4.65E-7
ADPF	[MJ]	2.64E+2	4.03E-1	6.65E-2	3.12E-2	2.02E-1	2.02E+0	0.00E+0	-5.33E+1
WDP	[m^3 world-Eq deprived]	1.54E+0	2.71E-4	1.71E-2	4.29E-6	1.35E-4	7.72E-1	0.00E+0	-3.50E-1

Caption	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: 1m2 120mm Therma™ TW50 / Therma™ TW50 EUR

Indicator	Unit	A1-A3	A4	A5	C1	C2	C3	C4	D
PERE	[MJ]	2.97E+1	2.29E-2	1.71E-2	1.18E-4	1.15E-2	3.54E-1	0.00E+0	-1.52E+1
PERM	[MJ]	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0
PERT	[MJ]	2.97E+1	2.29E-2	1.71E-2	1.18E-4	1.15E-2	3.54E-1	0.00E+0	-1.52E+1
PENRE	[MJ]	1.50E+2	4.04E-1	3.11E+0	3.13E-2	2.02E-1	1.13E+2	0.00E+0	-5.33E+1
PENRM	[MJ]	1.14E+2	0.00E+0	-3.04E+0	0.00E+0	0.00E+0	-1.11E+2	0.00E+0	0.00E+0
PENRT	[MJ]	2.64E+2	4.04E-1	6.65E-2	3.13E-2	2.02E-1	2.02E+0	0.00E+0	-5.33E+1
SM	[kg]	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0
RSF	[MJ]	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0
NRSF	[MJ]	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0
FW	[m^3]	7.08E-2	2.59E-5	4.06E-4	1.78E-7	1.30E-5	1.82E-2	0.00E+0	-1.64E-2

Caption	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: 1m2 120mm Therma™ TW50 / Therma™ TW50 EUR

Indicator	Unit	A1-A3	A4	A5	C1	C2	C3	C4	D
HWD	[kg]	1.12E-7	1.94E-12	5.54E-12	1.03E-13	9.68E-13	2.76E-10	0.00E+0	-6.59E-9
NHWD	[kg]	2.85E-1	5.79E-5	1.62E-2	2.93E-6	2.90E-5	4.37E-2	0.00E+0	-8.03E-2
RWD	[kg]	2.75E-3	4.98E-7	2.77E-6	3.43E-8	2.49E-7	8.40E-5	0.00E+0	-4.17E-3
CRU	[kg]	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0
MFR	[kg]	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	2.54E-2	0.00E+0	0.00E+0
MER	[kg]	0.00E+0	0.00E+0	7.21E-2	0.00E+0	0.00E+0	3.46E+0	0.00E+0	0.00E+0
EEE	[MJ]	0.00E+0	0.00E+0	3.27E-1	0.00E+0	0.00E+0	1.32E+1	0.00E+0	0.00E+0
EET	[MJ]	0.00E+0	0.00E+0	5.85E-1	0.00E+0	0.00E+0	2.36E+1	0.00E+0	0.00E+0

Caption	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: 1m2 120mm Therma™ TW50 / Therma™ TW50 EUR

Indicator	Unit	A1-A3	A4	A5	C1	C2	C3	C4	D
PM	[Disease Incidence]	1.81E-7	1.80E-10	2.74E-10	1.21E-10	8.98E-11	1.27E-8	0.00E+0	-4.26E-8
IRP	[kBq U235-Eq.]	3.34E-1	7.30E-5	3.80E-4	4.99E-6	3.65E-5	1.35E-2	0.00E+0	-7.12E-1
ETP-fw	[CTUe]	1.08E+2	2.80E-1	4.76E-2	2.17E-2	1.40E-1	6.96E-1	0.00E+0	-1.21E+1
HTP-c	[CTUh]	7.30E-9	5.64E-12	2.67E-12	4.02E-13	2.82E-12	5.21E-11	0.00E+0	-6.27E-10
HTP-nc	[CTUh]	6.22E-7	2.93E-10	2.70E-10	2.03E-11	1.46E-10	1.90E-9	0.00E+0	-2.21E-8
SQP	[-]	6.35E+1	1.39E-1	1.70E-2	8.61E-5	6.94E-2	4.26E-1	0.00E+0	-9.18E+0

Caption	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 "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 to 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.

References

Biocidal Products Regulation No. 528/2012 (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

ISO 14025
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EN 13165
EN 13165:2012+A2:2016: Thermal insulation products for buildings. Factory made polyurethane foam (PU) products. Specification

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

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 Umwelt e.V., Version 2.0, Berlin: Institut Bauen und Umwelt e.V., 2021.
www.ibu-epd.com

LCA-tool
Kingspan LCA tool, version 1.1. IBU-KSI-202001-LT1-EN.
Developed by Sphera Solutions GmbH (formely Thinkstep GmbH)

PCR Version 1.7, Part A
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November 2021

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. January 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)
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Candidate list
https://echa.europa.eu/candidate-list-table; accessed 31.08.2022, 233 substances listed.

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