ENVIRONMENTAL PRODUCT DECLARATION

as per ISO 14025 and EN 15804

Owner of the Declaration	**Knauf Insulation**
Programme holder	Institut Bauen und Umwelt e.V. (IBU)
Publisher	Institut Bauen und Umwelt e.V. (IBU)
Declaration number	EPD-KNI-20170028-CBB1-EN
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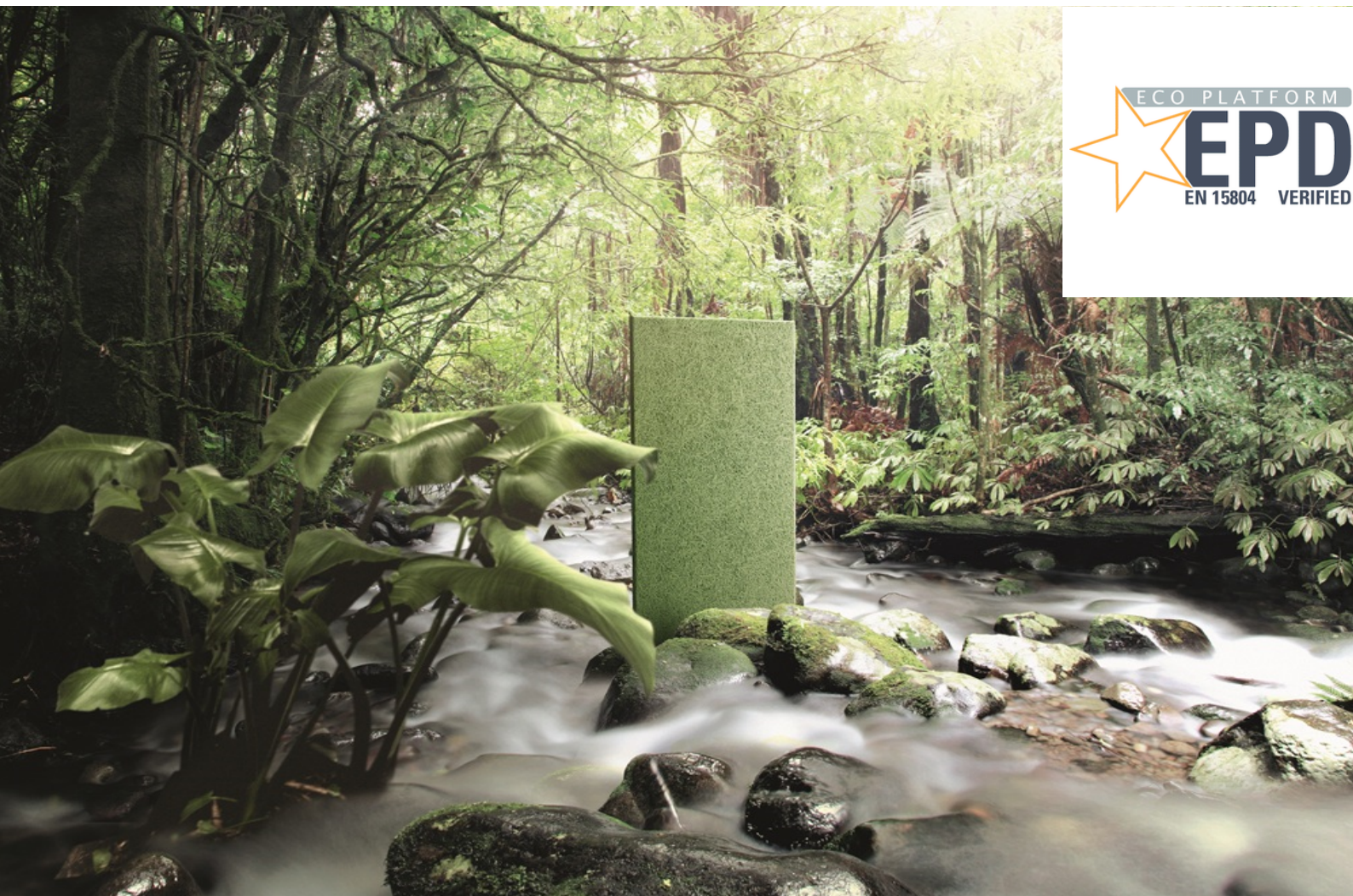
Issue date	28.03.2017
Valid to	27.03.2022

Heraklith homogeneous board

Knauf Insulation

Institut Bauen und Umwelt e.V.

www.ibu-epd.com / https://epd-online.com



ECO PLATFORM EPD EN 15804 VERIFIED

General Information

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Programme holder
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Declaration number
EPD-KNI-20170028-CBB1-EN

This Declaration is based on the Product Category Rules:
Wood based panels, 07.2014
(PCR tested and approved by the SVR)

Issue date
28.03.2017

Valid to
27.03.2022

Prof. Dr.-Ing. Horst J. Bossenmayer
(President of Institut Bauen und Umwelt e.V.)

Dr. Burkhart Lehmann
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Heraklith Homogeneous Board

Owner of the Declaration
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Declared product / Declared unit
1 m² of Heraklith Homogeneous Board

Scope:
Heraklith Homogeneous Boards are wood wool lightweight building boards from Knauf Insulation which consist of wood, water and the mineral binding agents (cement or Heraklith binder). The Knauf Insulation manufacturing plants are plants of Simbach (Germany), Oosterhout (Netherlands) and Zalaegerszeg (Hungary). The results are based on average of the 3 plants. The weighting is relative to the annual quantity produced by each plant.

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.

Verification

The CEN Norm /EN 15804/ serves as the core PCR
Independent verification of the declaration according to /ISO 14025/
☐ internally ☒ externally

Matthias Schulz
(Independent verifier appointed by SVR)

Product

Product description / Product definition

This document refers to the homogeneous Wood Wool boards made by the company Knauf Insulation. The dimensions are usually of widths 500 or 600 mm; lengths of 600 to 2400 mm and thicknesses from 8 to 100 mm.

Heraklith boards are Wood Wool boards produced from wool of sustainable wood and mineral binding agents.

For the placing on the market of construction products in the European Union and EFTA with the exception of Switzerland /Regulation (EU) No. 305/2011/ applies (CPR). The products need a Declaration of performance (DoP) taking into consideration the harmonized product standard /EN 13168/ and the CPR Regulation.

Application
The products are basically used for thermal insulation, fire protection and acoustical insulation, for example in the following typical applications: parking decks, basement ceilings, loft conversions, sound insulation walls and timber frame constructions.
Wood Wool boards increase the duration of fire resistance of building components and therefore make a considerable contribution to construction fire protection.

Technical Data
Heraklith homogeneous board and their technical characteristics meet a number of technical requirements. The most important ones are summarized in the table here below, which also includes references to testing methods.

Technical characteristics

Name	Value	Unit
Thermal conductivity /EN 13168/	0.08	W/(mK)
Grammage	11.5 - 12.5	kg/m²
Bending strength (longitudinal)	not tested	N/mm²
Bending strength (transverse)	not tested	N/mm²
Water vapour diffusion resistance factor /EN 4108-4	2 - 5	-
E-module (longitudinal)	not tested	N/mm²

E-module (transverse)	not tested	N/mm²
Material dampness at delivery	up to 22	%
Gross density /EN 1602/	500	kg/m³
Dimension change on plate level	not tested	mm
Tensile strength rectangular	not tested	N/mm²
Impact resistance classification	not tested	-
Joint opening	not tested	mm
Height difference between elements	not tested	mm
Reaction to fire /EN 13501-1/	Euroclass B s1 d0 / A2 s1 d0	-
Sound absorption coefficient	30 - 35	%
Specific heat capacity Test	2.1	kJ/kgK
Room sound improvement	not tested	Sone
Acoustic absorption /EN 11654/	D	
Compression strength/resistance /EN 13168/	>= 200	kPa
Bending strength /EN 12089/	>= 1000	kPa

Base materials / Ancillary materials
The composition of Wood Wool is in average composition: wood 40 % and binder 60%. There are three types of binders: white cement, grey cement and Heraklith binder (the last one including recycled gypsum).
The wood is spruce wood and is originating from regional sustainable forests, certified PEFC (Programme for the Endorsement of Forest Certification Schemes) or FSC (Forest Stewardship Council).
No substances of the "Candidate List of Substances of Very High Concern for Authorisation"/REACH/ are present in the concerned product.

Reference service life
The RSL or durability of the Wood Wool product is at least 50 years and as long as the lifetime of the building in which it is used.

LCA: Calculation rules

Declared Unit
The declared unit is 1 m² of wood wool board of 25 mm thickness. The density used for the calculation of the LCA is 500 kg/m³.

Declared unit

Name	Value	Unit
Declared unit	1	m²
Gross density	500	kg/m³
Conversion factor to 1 kg	0.08	-
Mass reference	12.5	kg/m²

System boundary
The system boundary of the EPD follows the modular approach defined by /EN 15804/.
The type of EPD is cradle to gate - with options.

List and explanation of the modules declared in the EPD.

The product stage (A1-A3) includes:
- A1 - raw material extraction and processing
- A2 - transport to the manufacturer and
- A3 - manufacturing.

This includes provision of all materials, products and energy, packaging processing and their transport, as well as waste processing up to the end-of waste state or disposal of final residues during the product stage. The LCA results are given in an aggregated form for the product stage, meaning that the modules A1, A2 and A3 are considered as **a unique module A1-A3**.

The construction process stage includes:
- A4 - transport to the construction site and
- A5 - installation into the building.

The transport to the building site (A4) is included in the LCA calculation. For wood wool board, the average transport distance is assumed to be 450 km with a truck capacity utilization of 92%.
Module A5 has been included in this EPD, with impact from packaging materials treatment and a loss of 2% of products . Therefore, the treatment of waste after the installation of the product has been considered.

The use stage.
Because they are specific for the building, its use and location, none of the modules related to the building fabric (B1-B5) nor the operation of the building (B6 and B7) have been taken into account in this EPD. Besides it is assumed that no maintenance activities or replacement should occur during the products life.

The end-of-life stage includes:
- C1 - de-construction, demolition,
- C2 - transport to waste processing,
- C3 - waste processing for reuse, recovery and/or recycling and
- C4 - disposal.

This includes provision of all transports, materials, products and related energy and water use, but only modules C2 and C4 are reported, as they are considered the most relevant scenarios for Wood Wool products.
One of Heraklith products caracteritics is a very low reaction to fire as they have a very low calorific value (for most of the products below 3 MJ/Kg). The products can be utilized as a kind fire barrier. Consequently, incineration is not the preferable route for the end of life. Besides wood wool products from Knauf Insulation could be partly recycled at end-of-life, but there is not yet an established collection system in place and as such the assumption chosen in this study, 100% landfill after the use phase, is the most conservative approach.

Module D includes re-use, recovery and/or recycling potentials.
According to /EN 15804/, any declared benefits and loads from net flows leaving the product system not allocated as co-products and having passed the end-of waste state shall be included in module D.
Benefits and loads from incineration of packaging in A5 are considered, so module D is included in the background model.

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.
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LCA: Scenarios and additional technical information

For the making of this EPD, GaBi software has been utilized with /Ecoinvent version3/ datasets.

The following technical information can be used for the development of specific scenarios in the context of a building assessment.

Transport to the building site (A4)

Name	Value	Unit
Litres of fuel	30	l/100km
Transport distance	450	km
Capacity utilisation (including empty runs)	92	%
Gross density of products transported	500	kg/m^3
Capacity utilisation volume factor	1	-

Installation into the building (A5)

Name	Value	Unit
Material loss	0.25	kg
Output substances following waste treatment on site (packagings)	0.076	kg

Reference service life

Name	Value	Unit
Reference service life	50	a

End-of-life (C1 - C4)

Name	Value	Unit
Landfilling	12.5	kg
Transport distance	50	km
Capacity utilization	50	%

LCA: Results

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

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	MND	MND	MND	MND	MND	MND	X	MND	X	X

RESULTS OF THE LCA - ENVIRONMENTAL IMPACT: 1 m² Heraklith Homogeneous Board

Parameter	Unit	A1-A3	A4	A5	C2	C4	D
Global warming potential	[kg CO_2-Eq.]	3.10E+0	9.59E-1	7.04E-1	1.04E-1	2.52E-1	-2.66E-1
Depletion potential of the stratospheric ozone layer	[kg CFC11-Eq.]	4.99E-7	1.74E-7	1.68E-9	1.89E-8	2.20E-8	-2.56E-8
Acidification potential of land and water	[kg SO_2-Eq.]	1.63E-2	3.34E-3	6.33E-4	3.63E-4	5.10E-4	-3.96E-4
Eutrophication potential	[kg $(PO_4)^{3-}$-Eq.]	1.05E-2	9.21E-4	4.55E-4	1.00E-4	1.34E-4	-5.08E-4
Formation potential of tropospheric ozone photochemical oxidants	[kg ethene-Eq.]	2.25E-3	5.12E-4	1.34E-4	5.57E-5	7.81E-5	-4.46E-5
Abiotic depletion potential for non-fossil resources	[kg Sb-Eq.]	1.48E-5	3.13E-6	3.46E-7	3.41E-7	8.84E-8	-7.66E-8
Abiotic depletion potential for fossil resources	[MJ]	5.26E+1	1.43E+1	2.87E+0	1.56E+0	1.86E+0	-3.40E+0

RESULTS OF THE LCA - RESOURCE USE: 1 m² Heraklith Homogeneous Board

Parameter	Unit	A1-A3	A4	A5	C2	C4	D
Renewable primary energy as energy carrier	[MJ]	6.50E+1	1.78E+2	1.74E+2	1.94E+2	4.43E+2	-2.03E-1
Renewable primary energy resources as material utilization	[MJ]	4.51E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0
Total use of renewable primary energy resources	[MJ]	6.95E+1	1.78E-1	1.74E+0	1.94E-2	4.43E-2	-2.03E-1
Non-renewable primary energy as energy carrier	[MJ]	5.93E+1	1.45E+1	3.02E+0	1.58E+0	1.89E+0	-4.24E+0
Non-renewable primary energy as material utilization	[MJ]	2.18E-1	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0
Total use of non-renewable primary energy resources	[MJ]	5.95E+1	1.45E+1	3.02E+0	1.58E+0	1.89E+0	-4.24E+0
Use of secondary material	[kg]	0.49	0.00	0.00	0.00	0.00	0.00
Use of renewable secondary fuels	[MJ]	0.00	0.00	0.00	0.00	0.00	0.00
Use of non-renewable secondary fuels	[MJ]	0.00	0.00	0.00	0.00	0.00	0.00
Use of net fresh water	[m³]	2.79E-2	2.78E-3	1.44E-3	3.03E-4	2.09E-3	-7.95E-4

RESULTS OF THE LCA – OUTPUT FLOWS AND WASTE CATEGORIES: 1 m² Heraklith Homogeneous Board

Parameter	Unit	A1-A3	A4	A5	C2	C4	D
Hazardous waste disposed	[kg]	IND	IND	IND	IND	IND	IND
Non-hazardous waste disposed	[kg]	IND	IND	IND	IND	IND	IND
Radioactive waste disposed	[kg]	IND	IND	IND	IND	IND	IND
Components for re-use	[kg]	0.00	0.00	0.00	0.00	0.00	0.00
Materials for recycling	[kg]	0.00	0.00	0.00	0.00	0.00	0.00
Materials for energy recovery	[kg]	0.00	0.00	0.00	0.00	0.00	0.00
Exported electrical energy	[MJ]	0.00E+0	0.00E+0	1.46E+0	0.00E+0	0.00E+0	0.00E+0
Exported thermal energy	[MJ]	0.00E+0	0.00E+0	1.12E+0	0.00E+0	0.00E+0	0.00E+0

INTERPRETATION

The waste related indicators are not declared (IND) because Ecoinvent background data does not support reporting on waste indicators (http://www.ecoinvent.org/database/system-models-in-ecoinvent-3/cut-off-system-model/allocation-cut-off-by-classification.html).

USE OF RESOURCES

The primary energy demand from non-renewable resources is dominated by the production of wood wool products (especially due to the energy consumption) and the packaging.
The renewable energy demand is dominated by the wooden sources (product and pallet) and production (electricity mix).

ENVIRONMENTAL IMPACT

Every impacts category is dominated by the production at a level of more than 70%. This is due to the consumption of energy (electricity and thermal energy) and the production of the binder materials.

The **Abiotic Depletion elements** (**ADPe)** is dominated by the binder because of the huge impact of cement fabrication. In comparison, the alternative Heraklith binder has fewer impacts.

In the production, the **Global Warming Potential (GWP)** is dominated mainly by the cement contributor. Due to the CO_2 uptake of the wood, the spruce used in the production of the wool of wood, has a positive impact on the environment by this CO2 sequestration. As the wood fibers are encapsulated by the inert binder, it is assumed as a scenario that the CO_2 is sequestrated for at least 100 years in the landfill. 1% of biogenic CO_2 emission is however taken as a conservative approach.
The **Ozone Layer Depletion Potential (ODP)** is influenced by the use and production of electricity and thermal energy.
The **Acidification Potential (AP)** is also dominated by the production and the important role of cement during its production.
The **Eutrophication Potential (EP)** is significantly influenced by the production of electricity and cement.
The **Photochemical Ozone Creation Potential (POCP)** is particularly dominated by the production and the transport.

References

Institut Bauen und Umwelt
Institut Bauen und Umwelt e.V., Berlin(pub.): Generation of Environmental Product Declarations (EPDs);
www.ibu-epd.de

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

EN 15804
EN 15804:2012-04+A1 2013: Sustainability of construction works — Environmental Product Declarations — Core rules for the product category of construction products

IBU 2016 PCR Part A
Product Category Rules for Construction Products from the range of Environmental Product Declarations of Institut Bauen une Umwelt (IBU), Part A: Calculation Rules for the Life Cycle Assessment and Requirements on teh Background Report. 04/2013, www.bau-umwelt.com

IBU 2013 PCR Part B
PCR PartB: Requirements on the EPD for Wood Based Panels, Version 1.3 Insitut Bauen und Umwelt e.v., www.bau-umwelt.com, 07/2014.

GaBi 7.3 2016
GaBi 7: Software and database for life cycle engineering. LBP, University of Stuttgart and PE INTERNATIONAL AG, Leinfelden-Echterdingen, 2016.

EN 13168
EN 13168:2009 Thermal insulation products for buildings - Plant-made products manufactured from wood wool (WW) products - Specification

EN 1602
EN 1602: 2013 Thermal insulating products for building applications - Determination of the apparent density

EN 11654
EN 11654: 1997 Acoustics -- Sound absorbers for use in buildings -- Rating of sound absorption

EN 13501-1
EN 13501-1: 2009 Fire classification of construction products and building elements - Part 1: Classification using test data from reaction to fire tests

DIN 4108-00
DIN 4108-4 : 2004 Thermal insulation and energy economy in buildings - Part 4: Hygrothermal design value

EN 12089
EN 12089 : 2013 Thermal insulating products for building applications - Determination of Bending behavior.

Regulation (EU) No 305/2011/
Regulation (EU) No 305/2011/ laying down harmonised conditions for the marketing of construction products and repealing Council Directive 89/106/EEC .

Ecoinvent version 3.2.
Ecoinvent version 3.2., 2015, Ecoinvent Technoparkstrasse 1, 8005 Zurich, Switzerland.

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