

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)
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DP7 - DP8



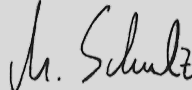
Multipurpose Rock Mineral Wool insulation

Knauf Insulation

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



General Information

<p>Knauf Insulation</p> <hr/> <p>Programme holder IBU - Institut Bauen und Umwelt e.V. Panoramastr. 1 10178 Berlin Germany</p> <hr/> <p>Declaration number EPD-KNI-20170218-CBD1-EN</p> <hr/> <p>This Declaration is based on the Product Category Rules: Mineral insulating materials, 07.2014 (PCR tested and approved by the SVR)</p> <hr/> <p>Issue date 31.01.2018</p> <hr/> <p>Valid to 30.01.2023</p> <hr/> <p style="text-align: center;"></p> <hr/> <p>Prof. Dr.-Ing. Horst J. Bossenmayer (President of Institut Bauen und Umwelt e.V.)</p> <hr/> <p style="text-align: center;"></p> <hr/> <p>Dr. Burkhardt Lehmann (Managing Director IBU)</p>	<p>DP7 - DP8</p> <hr/> <p>Owner of the Declaration Knauf Insulation rue de Maestricht, 95 4600 Visé Belgium</p> <hr/> <p>Declared product / Declared unit 1 m³ of product DP7 - DP8</p> <hr/> <p>Scope: The declared unit is 1 m³ of DP7 - DP8 rock mineral wool insulation product. It is manufactured in the form of slabs and complies with the requirements of the /EN 13162/. The thickness is ranging from from 20 mm to 210 mm. The manufacturing company is Knauf Insulation with production in plants of Skofja Loka (Slovenia), Novi Marov (Croatia) and Nova Bana (Slovakia) - equivalent production share.</p> <p>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.</p> <hr/> <p>Verification</p> <p>The CEN Norm /EN 15804/ serves as the core PCR</p> <p>Independent verification of the declaration according to /ISO 14025/</p> <p><input type="checkbox"/> internally <input checked="" type="checkbox"/> externally</p> <hr/> <p style="text-align: center;"></p> <hr/> <p>Matthias Schulz (Independent verifier appointed by SVR)</p>
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Product

Product description / Product definition

Knauf Insulation manufactures rock mineral wool (RMW) insulation products. They are available in the form of lamellas, slabs or boards, and also possibly rolls. The density range for rock mineral wool goes from 25 to 200 kg/m³. In terms of composition, inorganic rocks are the main components (typically 97%) of stone wool, with the remaining fraction of organic content which is generally a thermosetting resin binder. The binder content is typically less than 4%. The inorganic part is made of volcanic rocks, typically basalt, also dolomite and with an increasing proportion of recycled material as slags or in the form of briquettes, a mix of stone wool scrap and cement. DP7 and DP8 are multipurpose boards which are used as thermal, acoustical and fire insulation products. This EPD has been developed for unfaced products. For the placing on the market of construction products in the European Union/EFTA (with exception of Switzerland), the Regulation (EU) No 305/2011 applies. The products need a Declaration of performance R4305MPCPR, R4308LPCPR, R4309MPCPR taking into consideration the harmonized product standard /EN 13162/ and the CE-mark.

Application

DP7 and DP8 are multipurpose boards which are used as a thermal, acoustic and fire insulation products. For the applications and use national regulations apply, in Germany the *Allgemeine bauaufsichtliche Zulassung Z-23.15-1475 (building inspection approval) issued by the Deutsches Institut für Bautechnik (DIBt), Berlin.*

Technical Data

The products DP7 and DP8 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 12667/	0.035	W/(mK)
Thermal conductivity /EN 12667/only for DoP R4308LPCPR	0.034	W/(mK)
Water vapor diffusion equivalent air layer thickness /SIST EN 13162/	1	m
Sound absorption coefficient	-	%

Gross density /DIN 1602/	60 - 80	kg/m ³
Longit. air-diffusion resist. /EN 29053/	> 15	kPas/m ²
Water absorption WS /EN 1609/	<= 1	kg/m ²
Reaction to fire /EN 13501-1/	Euroclass A1	-
Specific heat capacity /EN ISO 10456/	1030	J/kgK
Melting point /DIN 4102 / T17/	> 1000	°C
Acoustic absorption (αw) /EN ISO 354:2003/	1	-
Compression strength/resistance	not relevant	

Performance data of the product in accordance with the Declaration of Performance with respect to its Essential Characteristics according to /EN 13162:2012 Thermal insulation products for buildings – Factory made mineral wool products (MW) – Specification.

LCA: Calculation rules

Declared Unit

The declared unit is 1 m³ of rock mineral wool. The density used for the calculation of the LCA is 70 kg/m³

Declared unit

Name	Value	Unit
Declared unit	1	m ³
Gross density	70	kg/m ³
Conversion factor to 1 kg	0.0143	-

System boundary

The system boundary of the EPD follows the modular approach defined by the 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, processing of secondary material input (e.g. recycling processes),
- A2 - transport to the manufacturer and
- A3 - manufacturing.

This includes 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 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 the DP-7 & DP-8 products, the average transport distance is assumed to be 300 km with a truck capacity utilization of 50%.

Module A5 has been included in this EPD. Therefore, the treatment of the packaging waste after the

Base materials / Ancillary materials

The main raw materials are diabase (a rock that is similar to the volcanic rock basalt), dolomite, slags and briquettes. The briquette is made of rock mineral wool waste (internal or external) and cement. Additionally, coke is also added in the cupola as an energy carrier. Further down the manufacturing line, a binder (thermo set resin) is spread on the fibers which contributes to fix the products dimensions and mechanical properties.

Reference service life

The RSL or durability of DP7-DP8 is as long as the lifetime of the building in which it is used.

installation of the product has been considered and the loss on construction site (2%).

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.

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 rock mineral wool products.

Although rock mineral wool product from Knauf Insulation is partly recycled at end-of-life, there is not yet an established collection system, and as such, the assumption chosen in this study, 100% landfilled after the use phase, is the most conservative approach.

Module D includes reuse, 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.

No benefits and loads are considered so module D is not 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.

LCA: Scenarios and additional technical information

The following technical information forms the basis for declared modules or 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	0.0025	l/100km
Transport distance	500	km
Capacity utilisation (including empty runs)	40	%
Gross density of products transported	70	kg/m ³

Installation into the building (A5)

Name	Value	Unit
Output substances following waste treatment on site : plastic foil	0.335	kg
Output substances following waste treatment on site : wooden pallet	4.109	kg
Output substances following waste treatment on site : 2% rock mineral wool losses	1.4	kg

End of life (C1 - C4)

Name	Value	Unit
Landfilling	70	kg
Transport distance	50	km
Capacity utilization	50	%

Reuse, recovery and/or recycling potentials (D), relevant scenario information

Name	Value	Unit
Plastic foil incineration	0.335	kg
wooden pallet incineration	4.1	kg

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	MNR	MNR	MNR	MND	MND	MND	X	MND	X	X

RESULTS OF THE LCA - ENVIRONMENTAL IMPACT: 1 m³ DP7-DP8

Parameter	Unit	A1-A3	A4	A5	C2	C4	D
Global warming potential	[kg CO ₂ -Eq.]	8.94E+1	3.23E+0	1.04E+1	2.41E-1	1.13E+0	-3.45E+0
Depletion potential of the stratospheric ozone layer	[kg CFC11-Eq.]	5.44E-10	1.08E-12	9.40E-10	8.09E-14	1.14E-12	-6.29E-11
Acidification potential of land and water	[kg SO ₂ -Eq.]	4.96E-1	8.46E-3	1.08E-2	1.49E-3	6.68E-3	-5.25E-3
Eutrophication potential	[kg (PO ₄) ³ -Eq.]	4.94E-2	2.04E-3	1.17E-3	3.79E-4	9.10E-4	-5.58E-4
Formation potential of tropospheric ozone photochemical oxidants	[kg ethene-Eq.]	3.74E-2	-2.91E-3	8.22E-4	-6.65E-4	5.26E-4	-5.07E-4
Abiotic depletion potential for non-fossil resources	[kg Sb-Eq.]	2.62E-5	2.59E-7	6.01E-7	1.94E-8	4.05E-7	-6.47E-7
Abiotic depletion potential for fossil resources	[MJ]	1.23E+3	4.46E+1	2.55E+1	3.33E+0	1.46E+1	-4.84E+1

RESULTS OF THE LCA - RESOURCE USE: 1 m³ DP7-DP8

Parameter	Unit	A1-A3	A4	A5	C2	C4	D
Renewable primary energy as energy carrier	[MJ]	1.59E+2	IND	IND	IND	IND	IND
Renewable primary energy resources as material utilization	[MJ]	0.00E+0	IND	IND	IND	IND	IND
Total use of renewable primary energy resources	[MJ]	1.59E+2	2.24E+0	2.44E+0	1.68E-1	1.76E+0	-8.48E+0
Non-renewable primary energy as energy carrier	[MJ]	1.33E+3	IND	IND	IND	IND	IND
Non-renewable primary energy as material utilization	[MJ]	1.05E+2	IND	IND	IND	IND	IND
Total use of non-renewable primary energy resources	[MJ]	1.33E+3	4.47E+1	2.79E+1	3.34E+0	1.51E+1	-5.82E+1
Use of secondary material	[kg]	1.38E+1	0.00E+0	2.77E-1	0.00E+0	0.00E+0	0.00E+0
Use of renewable secondary fuels	[MJ]	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0
Use of non-renewable secondary fuels	[MJ]	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0
Use of net fresh water	[m ³]	3.04E-1	4.16E-3	2.63E-2	3.10E-4	2.88E-3	-1.21E-2

RESULTS OF THE LCA – OUTPUT FLOWS AND WASTE CATEGORIES:

1 m³ DP7-DP8

Parameter	Unit	A1-A3	A4	A5	C2	C4	D
Hazardous waste disposed	[kg]	1.19E-2	2.35E-6	1.86E-4	1.75E-7	2.39E-7	-1.39E-8
Non-hazardous waste disposed	[kg]	1.57E+1	3.42E-3	1.73E+0	2.55E-4	7.01E+1	-2.03E-2
Radioactive waste disposed	[kg]	4.25E-2	6.10E-5	9.48E-4	4.56E-6	2.06E-4	-3.88E-3
Components for re-use	[kg]	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0
Materials for recycling	[kg]	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0
Materials for energy recovery	[kg]	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0
Exported electrical energy	[MJ]	0.00E+0	0.00E+0	1.11E+1	0.00E+0	0.00E+0	0.00E+0
Exported thermal energy	[MJ]	0.00E+0	0.00E+0	2.75E+1	0.00E+0	0.00E+0	0.00E+0

INTERPRETATION

RESOURCES USE

The primary energy demand from non-renewable resources is dominated by the production of rock mineral wool products (especially due to the energy carrier, coke) and the binder.

The renewable energy demand regarding the product is dominated by the production, mostly due to electricity consumption, and the packaging.

ENVIRONMENTAL IMPACT

Every impact category except the abiotic ADP elements is dominated by the production. This is due to the consumption of energy (electricity and thermal energy) during the production of rock mineral wool products.

The **ADP elements** are dominated by the binder production, followed by the supply of basic materials such as cement for briquettes.

The **GWP** is dominated by the production, mostly due to CO₂ emissions from raw materials and energy consumption. The production of the binder represents more than 15% of the impact.

The **ODP** is most notably influenced by the production and the binder.

The **AP** is also dominated by the production due to the emissions related to the processes and the energy consumption. Mostly, the impact refers to emissions to air of sulphur dioxide and nitrogen oxides.

The **EP** is significantly influenced by the production due to emissions from the cupola furnace, curing oven and other unit processes.

The **POCP** is particularly dominated by the production (emissions in the cupola furnace and other unit processes). The results from the transport are negative due to the NO emissions; NO counteracts the POCP.

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DoPs R4305MPCPR/ R4308LPCPR/ R4238KPCPR/ R4309MPCPR/

Declaration of Performance

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