

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-KNA-20140052-CBC1-EN
Issue date	8/05/2014
Valid to	7/05/2019

Glass Mineral Wool 035 - 034 slabs
TP 435B, TP425B, TPM 135, TP 430 KD and FCB 035
with ECOSE® Technology

Knauf Insulation

www.bau-umwelt.com / <https://epd-online.com>



General Information

Knauf Insulation

Programme holder

IBU - Institut Bauen und Umwelt e.V.
Panoramastr. 1
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Germany

Declaration number

EPD-KNA-20140052-CBC1-EN

This Declaration is based on the Product Category Rules:

Mineral insulating materials, 07-2012
(PCR tested and approved by the independent expert committee)

Issue date

8/05/2014

Valid to

7/05/2019



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



Dr. Burkhard Lehmann
(Managing Director IBU)

GMW 035 - 034 slabs with ECOSE

Owner of the Declaration

Knauf Insulation
rue E. Franqui, 7
1435 Mont-Saint-Guibert
Belgium

Declared product / Declared unit

1 m³ of GMW 035-034 slabs

Scope:

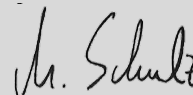
GMW (Glass Mineral Wool) 035-034 slabs are insulation product faced or unfaced. They are manufactured in the form of slabs and comply with the requirements of /EN 13162/. The thickness is ranging from 40 mm to 240 mm. The manufacturing company is Knauf Insulation - plant Krupka (Czech Republic). The 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 tester appointed by SVA)

Product

Product description

Knauf Insulation manufactures glass mineral wool insulation products. They are available in the form of slabs or rolls, and also boards. The density for glass mineral wool ranges from 10 to 85 kg/m³. In general, glass mineral wool consists of $\geq 92.5\%$ inert material. The inert part is made of recycled glass (external cullet, up to 80% of the composition) and mainly sand and dolomite.

The remaining $\leq 7.5\%$ are made of binder components. At Knauf Insulation, the binder used for the GMW products is the ECOSE binder whose origin is plant starch.

GMW 035-034 slabs are products unfaced or faced with a glass veil, and they are used for their thermal, acoustical and fire characteristics. A representative product out of a particular group of products was selected for the calculation.

For the placing on the market of construction products in the European Union and EFTA /Regulation (EU) No 305/2011/ applies. The products need a Declaration of performance (DoP) taking into consideration the harmonized product standard /EN 13162/ and the CE-mark /Regulation (EC) No 765/2008/.

Application

Main applications for GMW 035-034 slabs are in external walls: ventilated façade, cavity wall or timber frame. For the applications and use national regulations apply, in Germany the *Allgemeine bauaufsichtliche Zulassung Z-23.15-1461/ (building inspection approval) issued by the Deutsches Institut für Bautechnik (DIBt), Berlin.*

Technical Data

GMW 035-034 slabs 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. Rem: thermal conductivity is 0.035 W/(mK) but TP 435 B, 0.034 W/(mK).

Technical characteristics

Name	Value	Unit
Thermal conductivity /EN 12667/	0.035	W/(mK)
Thermal conductivity /EN 12667/	0.034	W/(mK)
Water vapour diffusion resistance factor /EN 13162/	1	-
Gross density /EN 1602/	19 - 21	kg/m ³
Longit. air-diffusion resist. /EN 29053/	≥ 5	kNs/m ⁴

Water absorption Wp /EN 1609/	< 1	kg/m ²
Water absorption Wip /EN 12087/	< 3	kg/m ²
Reaction to fire /EN 13501-1/	A1	-
Specific heat capacity /EN ISO 10456/	850	J/kgK
Acoustic absorption	not relevant	
Compression strength/resistance	not relevant	

Base materials / Ancillary materials

GMW is an insulation material of mostly inorganic origin intended for thermal and acoustic insulation, as well as for fire prevention in construction as well

LCA: Calculation rules

Declared Unit

The declared unit is 1 m³ of glass mineral wool. The density used for the calculation of the LCA is 20 kg/m³.

Declared unit

Name	Value	Unit
Declared unit	1	m ³
Gross density	20	kg/m ³
Conversion factor to 1 kg	0.05	-

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, 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 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 GMW 035-034 slabs, the average transport distance is assumed to be 547 km with a truck capacity utilization of 50%.

Module A5 has neither been included nor declared in this EPD, since it depends on the application, and method or tools used which can be very diverse,

as industry. Raw materials used in the production of GMW are sand, limestone, soda ash and high level of recycled glass (up to 80%). A bio-based binder, ECOSE, is spread on the fibers which polymerisation contributes to fix the product dimensions. The cured binder bonds the fibres together thus providing the necessary mat stability and mechanical strength.

Reference service life

The RSL or durability of GMW 035-034 is as long as the lifetime of the building in which it is used.

as GMW 035-034 slabs are used in different external wall applications. Therefore, the treatment of the packaging waste after the installation of the product has not 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.

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 products from Knauf Insulation are 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 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.

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 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	0.0577	l/100km
Transport distance	547	km
Capacity utilisation (including empty)	50	%

runs)		
Gross density of products transported	20	kg/m ³

Reference service life

Name	Value	Unit
Reference service life	50	a

End-of-life (C1 - C4)

Name	Value	Unit
Landfilling	20	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 ¹⁾	Refurbishment ¹⁾	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	MND	MND	MND	MND	MND	MND	MND	MND	MND	X	MND	X	MND

RESULTS OF THE LCA - ENVIRONMENTAL IMPACT: 1 m³ GMW 035 - 034 slabs

Parameter	Unit	A1-A3	A4	C2	C4
Global warming potential	[kg CO ₂ -Eq.]	28.50	1.49	0.07	0.28
Depletion potential of the stratospheric ozone layer	[kg CFC11-Eq.]	3.30E-10	7.12E-12	3.30E-13	3.83E-12
Acidification potential of land and water	[kg SO ₂ -Eq.]	1.99E-1	4.23E-3	2.10E-4	1.79E-3
Eutrophication potential	[kg (PO ₄) ³⁻ -Eq.]	2.47E-2	8.80E-4	4.45E-5	2.46E-4
Formation potential of tropospheric ozone photochemical oxidants	[kg Ethen Eq.]	1.59E-2	-1.12E-3	-5.96E-5	1.68E-4
Abiotic depletion potential for non fossil resources	[kg Sb Eq.]	1.36E-3	5.59E-8	2.59E-9	1.06E-7
Abiotic depletion potential for fossil resources	[MJ]	434.00	20.50	0.95	3.70

RESULTS OF THE LCA - RESOURCE USE: 1 m³ GMW 035 - 034 slabs

Parameter	Unit	A1-A3	A4	C2	C4
Renewable primary energy as energy carrier	[MJ]	56.20	-	-	-
Renewable primary energy resources as material utilization	[MJ]	0.00	-	-	-
Total use of renewable primary energy resources	[MJ]	56.20	0.81	0.04	0.32
Non renewable primary energy as energy carrier	[MJ]	465.00	-	-	-
Non renewable primary energy as material utilization	[MJ]	33.40	-	-	-
Total use of non renewable primary energy resources	[MJ]	498.00	20.60	0.96	3.87
Use of secondary material	[kg]	16.80	-	-	-
Use of renewable secondary fuels	[MJ]	0.00	0.00	0.00	0.00
Use of non renewable secondary fuels	[MJ]	0.00	0.00	0.00	0.00
Use of net fresh water	[m ³]	1.34E-1	5.71E-4	2.65E-5	-1.48E-2

RESULTS OF THE LCA – OUTPUT FLOWS AND WASTE CATEGORIES:

1 m³ GMW 035 - 034 slabs

Parameter	Unit	A1-A3	A4	C2	C4
Hazardous waste disposed	[kg]	1.20E-2	4.69E-5	2.18E-6	1.74E-4
Non hazardous waste disposed	[kg]	9.12E-1	2.59E-3	1.20E-4	2.08E+1
Radioactive waste disposed	[kg]	2.53E-2	2.70E-5	1.25E-6	6.76E-5
Components for re-use	[kg]	-	-	-	-
Materials for recycling	[kg]	-	-	-	-
Materials for energy recovery	[kg]	-	-	-	-
Exported electrical energy	[MJ]	-	-	-	0.00
Exported thermal energy	[MJ]	-	-	-	0.00

INTERPRETATION

USE OF RESOURCES

The primary energy demand from non-renewable resources is dominated by the production of glass mineral wool products (especially due to the energy consumption), the packaging and the facing (glass veil).

The renewable energy demand is dominated by the packaging (wood pallets), the binder (bio-based) and production (electricity mix).

ENVIRONMENTAL IMPACT

Every impacts category except the abiotic ADPe and ODP are 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 basic material production, followed by the supply of materials for facing (glass veil).

The **GWP** is dominated by the production, mostly due to energy consumption (gas and electricity). The facing, the basic materials and transport to site also have a limited impact. The binder (bio-based) has overall no impact.

The **ODP** is influenced by basic materials, production, facing and packaging.

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: sulphur dioxide, ammonia and nitrogen oxides.

The **EP** is significantly influenced by the production due to emissions from the furnace, curing oven and electricity consumption.

The **POCP** is particularly dominated by the production (emissions in curing oven, electricity consumption). The glass veil also contributes to POCP. The results from the transport are negative due to the NO emissions; NO counteracts the POCP.

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