

# ENVIRONMENTAL PRODUCT DECLARATION

as per ISO 14025 and EN 15804

Owner of the Declaration	<b>Knauf Insulation</b>
Programme holder	Institut Bauen und Umwelt e.V. (IBU)
Publisher	Institut Bauen und Umwelt e.V. (IBU)
Declaration number	EPD-KIN-20150172-CBB1-EN
ECO EPD Ref. No.	ECO-
Issue date	13.07.2015
Valid to	12.07.2020

**Glass Mineral Wool 032-033 slabs  
TP 132B, Cavitec 032, FACADE 032B, INDUPAN 032, TP  
KD 432, NATURBOARD 031, NATURBOARD 033  
with ECOSE® Technology**

**Knauf Insulation**

[www.bau-umwelt.com](http://www.bau-umwelt.com) / <https://epd-online.com>



## General Information

### Knauf Insulation

#### Programme holder

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

#### Declaration number

EPD-KIN-20150172-CBB1-EN

#### This Declaration is based on the Product Category Rules:

Mineral insulating materials, 07.2014  
(PCR tested and approved by the SVR)

#### Issue date

13.07.2015

#### Valid to

12.07.2020



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



Dr. Burkhard Lehmann  
(Managing Director IBU)

### GMW 032 - 033 slabs with ECOSE

#### Owner of the Declaration

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

#### Declared product / Declared unit

1 m<sup>3</sup> of GMW 032-033 slabs

#### Scope:

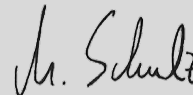
GMW (Glass Mineral Wool) 032-033 slabs are insulation product faced or unfaced. They are manufactured in the form of slabs and comply with the requirements of /EN 13162/. The thickness is ranging from 40 mm to 240 mm. The manufacturing company is Knauf Insulation - plants Krupka (Czech Republic), Vise (Belgium) and Lannemezan (France). 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

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/m<sup>3</sup>. 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 032-033 slabs with ECOSE® Technology, TP 132B, Cavitec 032, FACADE 032B, INDUPAN 032, TP KD 432, NATURBOARD 031, NATURBOARD 033 are products unfaced or faced with a glass veil, and they are used for their thermal, acoustical and fire characteristics. A representative double faced 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 (with the exception of Switzerland) /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 032-033 slabs are in external walls: ventilated façades, cavity walls or timber frames. 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 032-033 slabs and their technical characteristics meet a number of technical requirements. The most important ones are summarized in the table below, which also includes references to testing methods.

### Technical characteristics

Name	Value	Unit
Thermal conductivity /EN 12667/	0.032	W/(mK)
Thermal conductivity /EN 12667/	0.033	W/(mK)
Water vapour diffusion resistance factor /EN 13162/	1	-
Gross density /EN 1602/	29 - 33	kg/m <sup>3</sup>
Longit. air-diffusion resist. /EN 29053/	$\geq 5$	kNs/m <sup>4</sup>

Water absorption Wp /EN 1609/	< 1	kg/m <sup>2</sup>
Water absorption Wlp /EN 12087/	< 3	kg/m <sup>2</sup>
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

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 032-033 is as long as the lifetime of the building in which it is used.

## LCA: Calculation rules

### Declared Unit

The declared unit is 1 m<sup>3</sup> of glass mineral wool. The density used for the calculation of the LCA is 32 kg/m<sup>3</sup>.

### Declared unit

Name	Value	Unit
Declared unit	1	m <sup>3</sup>
Gross density	32	kg/m <sup>3</sup>
Conversion factor to 1 kg	0.03125	-

### 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 032-033 slabs, the average transport distance is assumed to be 600 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 GMW 032-033 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 glass mineral wool products.

Although glass mineral wool products from Knauf Insulation are partly recycled at their 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	0.0025	l/100km
Transport distance	600	km
Capacity utilisation (including empty runs)	50	%
Gross density of products transported	32	kg/m <sup>3</sup>

**Reference service life**

Name	Value	Unit
Reference service life	50	a

**End-of-life (C1 - C4)**

Name	Value	Unit
Landfilling	32	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	MND	MND	MND	MND	MND	MND	MND	MND	MND	X	X	MND	MND

### RESULTS OF THE LCA - ENVIRONMENTAL IMPACT: 1 m<sup>3</sup> GMW 032 - 033 slabs

Parameter	Unit	A1-A3	A4	C2	C3/1
Global warming potential	[kg CO <sub>2</sub> -Eq.]	40.90	2.45	0.11	0.46
Depletion potential of the stratospheric ozone layer	[kg CFC11-Eq.]	2.58E-8	1.17E-11	5.40E-13	6.26E-12
Acidification potential of land and water	[kg SO <sub>2</sub> -Eq.]	3.41E-1	6.90E-3	3.44E-4	2.93E-3
Eutrophication potential	[kg (PO <sub>4</sub> ) <sup>3-</sup> -Eq.]	5.73E-2	1.43E-3	7.29E-5	4.02E-4
Formation potential of tropospheric ozone photochemical oxidants	[kg ethene-Eq.]	2.72E-2	-1.82E-3	-9.75E-5	2.75E-4
Abiotic depletion potential for non-fossil resources	[kg Sb-Eq.]	2.17E-3	9.20E-8	4.24E-9	1.73E-7
Abiotic depletion potential for fossil resources	[MJ]	707.00	33.80	1.56	6.06

### RESULTS OF THE LCA - RESOURCE USE: 1 m<sup>3</sup> GMW 032 - 033 slabs

Parameter	Unit	A1-A3	A4	C2	C3/1
Renewable primary energy as energy carrier	[MJ]	101.00	-	-	-
Renewable primary energy resources as material utilization	[MJ]	0.00	-	-	-
Total use of renewable primary energy resources	[MJ]	101.00	1.33	0.06	0.52
Non-renewable primary energy as energy carrier	[MJ]	836.00	-	-	-
Non-renewable primary energy as material utilization	[MJ]	53.40	-	-	-
Total use of non-renewable primary energy resources	[MJ]	890.00	33.90	1.56	6.34
Use of secondary material	[kg]	26.40	-	-	-
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 <sup>3</sup> ]	2.57E-1	9.39E-4	4.33E-5	-2.42E-2

### RESULTS OF THE LCA – OUTPUT FLOWS AND WASTE CATEGORIES:

#### 1 m<sup>3</sup> GMW 032 - 033 slabs

Parameter	Unit	A1-A3	A4	C2	C3/1
Hazardous waste disposed	[kg]	4.59E-2	7.72E-5	3.56E-6	2.84E-4
Non-hazardous waste disposed	[kg]	2.01	0.00	0.00	34.10
Radioactive waste disposed	[kg]	7.23E-2	4.44E-5	2.05E-6	1.11E-4
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 impact 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 glass mineral wool products.

The **Abiotic Depletion Potential elements (ADPe)** are dominated by the basic material production, followed by the supply of materials for facing (glass veil).

The **Global warming Potential (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 no overall impact.

The **Ozone Depletion Potential (ODP)** is influenced by basic materials, production, facing and packaging.

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

The **Potential Ozone Photochemical Oxidants (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.

## References

### Institut Bauen und Umwelt

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

### General principles

for the EPD range of Institut Bauen und Umwelt e.V.  
(IBU), 2013/04  
[www.bau-umwelt.de](http://www.bau-umwelt.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 2013 Part B

PCR -Part B: Requirements on the EPD for Mineral  
insulating materials (in German „Anforderungen an die  
EPD für Mineralische Dämmstoffe“), Version 1.3  
Institut Bauen und Umwelt e.V., [www.bau-umwelt.com](http://www.bau-umwelt.com),  
04/2013

### GaBi 6 2012

GaBi 6: Software and database for life cycle  
engineering. LBP, University of Stuttgart and PE  
INTERNATIONAL AG, Leinfelden-Echterdingen, 2012.

### GaBi 6 2012B

GaBi 6: Documentation of GaBi6-Datasets for life cycle  
engineering. LBP University of Stuttgart and PE  
INTERNATIONAL AG, 2012.  
<http://documentation.gabi-software.com/>

### DIN 4108-10

DIN 4108-00 (2004-09): Thermal insulation and energy  
economy in buildings - Part 10: Application-related  
requirements for thermal insulation materials - Factory  
made products

### EN 13162

EN 13162:2012 Thermal insulation products for  
buildings - Factory made mineral wool (MW) products -  
Specification

### EN 12667

EN 12667: 2001 Thermal performance of building  
materials and products - Determination of thermal  
resistance by means of guarded hot plate and heat

flow meter methods - Products of high and medium  
thermal resistance

### EN 1602

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

### EN 29053

EN 29053: 1993 Acoustics; materials for acoustical  
applications; determination of airflow resistance

### EN 1609

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

### EN 12087

EN 12087: 2013 Thermal insulating products for  
building applications - Determination of long term water  
absorption by immersion

### 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

### ISO 10456

ISO 10456: 2007 Building materials and products -  
Hygrothermal properties - Tabulated design values and  
procedures for determining declared and design  
thermal values

### DIN 4102 / T17

DIN 4102 / T17: 1990 Fire behaviour of building  
materials and elements; determination of melting point  
of mineral fibre insulating materials; concepts,  
requirements and testing

### 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 .

### Regulation (EC) No 765/2008

Regulation (EC) No 765/2008 setting out the  
requirements for accreditation and market surveillance  
relating to the marketing of products and repealing  
Regulation (EEC) No 339/93

### Zulassung Z-23. 15-1461

Zulassung Z-23. 15-1461 Building inspection approval  
issued by the Deutsches Institut für Bautechnik (DIBt),  
Berlin. Wärmedämmstoffe aus Mineralwolle (MW)  
nach DIN EN 13162:2009-02.

**Publisher**

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

Tel +49 (0)30 3087748- 0  
Fax +49 (0)30 3087748- 29  
Mail [info@bau-umwelt.com](mailto:info@bau-umwelt.com)  
Web [www.bau-umwelt.com](http://www.bau-umwelt.com)

**Programme holder**

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

Tel +49 (0)30 - 3087748- 0  
Fax +49 (0)30 – 3087748 - 29  
Mail [info@bau-umwelt.com](mailto:info@bau-umwelt.com)  
Web [www.bau-umwelt.com](http://www.bau-umwelt.com)

**PE INTERNATIONAL****Author of the Life Cycle Assessment**

PE International  
Hauptstrasse 111  
70771 Leinfelden-Echterdingen  
Germany

Tel +497113418170  
Fax +4971134181725  
Mail [info@pe-international.com](mailto:info@pe-international.com)  
Web [www.pe-international.com](http://www.pe-international.com)



Université de Liège  
Allée du 6 Aout B6  
4000 Sart-Tilman (Liège)  
Belgium

Tel +3243663547  
Fax +3243664435  
Mail [saicha.gerbinet@ulg.ac.be](mailto:saicha.gerbinet@ulg.ac.be)  
Web [www.chimapp.ulg.ac.be](http://www.chimapp.ulg.ac.be)

**Owner of the Declaration**

Knauf Insulation  
Rue E. Francqui 7  
1435 Mont-Saint-Guibert  
Belgium

Tel +3210488458  
Fax +3210488474  
Mail [sustainability@knaufinsulation.com](mailto:sustainability@knaufinsulation.com)  
m  
Web [www.knaufinsulation.com](http://www.knaufinsulation.com)