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-20150022-CBB2-EN
ECO EPD Ref. No.	ECO-00000174
Issue date	20.04.2015
Valid to	19.04.2020

Glass Mineral Blowing Wool for Cavity Wall
Supafil Cavity Wall

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
10178 Berlin
Germany

Declaration number
EPD-KNA-20150022-CBB2-EN

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

Issue date
20.04.2015

Valid to
19.04.2020

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

Dr. Burkhart Lehmann
(Managing Director IBU)

Supafil Cavity Wall

Owner of the Declaration
Knauf Insulation
rue E. Franqui, 7
1435 Mont-Saint-Guibert
Belgium

Declared product / Declared unit
1 m³ of Supafil Cavity Wall

Scope:
GM BW (Glass Mineral Blowing Wool) is a loose-fill, binder-free, factory made mineral wool insulation. It is manufactured in the form of flocks of unbounded virgin mineral wool and complies with the requirements of /EN 14064/. The manufacturing company is Knauf Insulation – plants Visé (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 blowing wool insulation products. They are available in the form of loose-fill flocks, having a wooly consistency, compressed and packaged in bags. The target installed density for GM BW Cavity Wall and Timber Frame is 35 kg/m³. In terms of composition, GM BW consists of about ≥ 99% inert material. The inert part is made of recycled glass (external cullet, up to 80% of the composition), sand and limestone. The remaining fraction is made of organic hydrophobic, antistatic and anti-dust compounds. The additive content is typically about 0.5 % in weight.

GM BW is used as a thermal and acoustical insulation product. It is produced as a loose-fill product to be blown with a dedicated blowing machine and installation accessories. 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 14064/ and the /CE-mark/.

Application
Main applications for the GM BW are cavity walls, wood frame structures and light steel framing (walls, partitions, floors and pitched roofs). For the application and use national regulations apply. In Germany, the Allgemeine bauaufsichtliche Zulassung Z-23.15-1461 (building inspection and application approval) issued by the Deutsches Institut für Bautechnik (DIBt) applies.

Technical Data
The GM BW and its 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/	0.034	W/(mK)
Water vapour diffusion resistance factor /EN 13162/	1	-
Water vapor diffusion equivalent air layer thickness	NA	m
Sound absorption coefficient	NA	%
Gross density /EN 1602/	30 - 40	kg/m³
Compressive strength	NA	N/mm²
Longit. air-diffusion resist. /EN 29053/	>=5	kNs/m^4
Water absorption Wp /EN 1609/	< 1	kg/m²
Water absorption Wlp /EN 12087/	< 3	kg/m²
Reaction to fire /EN 13501-1/	A1	-
Specific heat capacity /EN ISO 10456/	850	J/kgK

Settlement /Annex K of EN 14064-1/	S1	

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 and industry. Raw materials used in the production of GMW are sand, limestone, soda ash and a high level of recycled glass (up to 80%).

Reference service life
The RSL or durability of GM BW is as long as the lifetime of the building in which it is used.

LCA: Calculation rules

Declared Unit
The declared unit is 1 m³ of GM BW. The density used for the calculation of the LCA is 35 kg/m³.

Declared unit

Name	Value	Unit
Declared unit	1	m^3
Gross density	35	kg/m^3
Conversion factor to 1 kg	0.0286	-

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 Supafil Cavity Wall, the average transport distance is assumed to be 600 km with a truck capacity utilization of 50%.
Module A5 has been included into this EPD as the blowing machine request electricity to blow the mineral wool into the cavity. The treatment of the packaging waste after the installation of the product has also been considered. The product losses during the construction process stage have not been directly taken into account into the LCA as this depends of the installer experience and represents very low impacts (less than 1%). If relevant, the losses can be taken into account by increasing the production impacts A1-A3 with the loss percentage and transfer this additional impact to A5.

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 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.
Benefits from packaging's incineration with energy recovery are considered 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.

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	600	km
Capacity utilisation (including empty runs)	50	%
Gross density of products transported	35	kg/m^3

Installation into the building (A5)

Name	Value	Unit
Electricity consumption	4,96	MJ
Output substances following waste treatment on site (plastic and wooden packaging)	1.26	kg

Reference service life

Name	Value	Unit
Reference service life	50	a

End-of-life (C1 - C4)

Name	Value	Unit
Landfilling	35	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	X	MND	MND	MND	MND	MND	MND	MND	MND	X	MND	X	X

RESULTS OF THE LCA - ENVIRONMENTAL IMPACT: 1 m³ Supafil Cavity Wall

Parameter	Unit	A1-A3	A4	A5	C2	C4	D
Global warming potential	[kg CO_2-Eq.]	26.00	1.84	3.70	0.12	0.47	-1.67
Depletion potential of the stratospheric ozone layer	[kg CFC11-Eq.]	3.84E-8	7.56E-12	1.97E-9	4.75E-13	7.83E-12	-4.61E-10
Acidification potential of land and water	[kg SO_2-Eq.]	9.69E-2	5.06E-3	3.40E-3	3.37E-4	2.93E-3	-3.80E-3
Eutrophication potential	[kg $(PO_4)^{3-}$-Eq.]	1.06E-2	1.26E-3	2.23E-4	8.39E-5	4.23E-4	-2.76E-4
Formation potential of tropospheric ozone photochemical oxidants	[kg ethene-Eq.]	6.77E-3	-1.46E-3	2.09E-4	-1.01E-4	2.84E-4	-3.45E-4
Abiotic depletion potential for non-fossil resources	[kg Sb-Eq.]	2.28E-3	7.19E-8	1.17E-7	4.52E-9	1.68E-7	-1.38E-7
Abiotic depletion potential for fossil resources	[MJ]	393.00	25.30	7.38	1.59	6.20	-24.20

RESULTS OF THE LCA - RESOURCE USE: 1 m³ Supafil Cavity Wall

Parameter	Unit	A1-A3	A4	A5	C2	C4	D
Renewable primary energy as energy carrier	[MJ]	51.00	IND	IND	IND	IND	IND
Renewable primary energy resources as material utilization	[MJ]	0.00	IND	IND	IND	IND	IND
Total use of renewable primary energy resources	[MJ]	51.00	1.42	2.35	0.09	0.62	-2.33
Non-renewable primary energy as energy carrier	[MJ]	602.00	IND	IND	IND	IND	IND
Non-renewable primary energy as material utilization	[MJ]	2.08	IND	IND	IND	IND	IND
Total use of non-renewable primary energy resources	[MJ]	604.00	25.40	11.60	1.60	6.45	-28.40
Use of secondary material	[kg]	30.17	IND	IND	IND	IND	IND
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]	1.58E-1	2.49E-3	9.25E-3	1.57E-4	1.19E-3	-4.71E-3

RESULTS OF THE LCA – OUTPUT FLOWS AND WASTE CATEGORIES: 1 m³ Supafil Cavity Wall

Parameter	Unit	A1-A3	A4	A5	C2	C4	D
Hazardous waste disposed	[kg]	4.33E-3	1.21E-5	5.49E-7	7.58E-7	2.04E-6	-7.07E-6
Non-hazardous waste disposed	[kg]	1.01E+0	3.62E-3	8.43E-3	2.27E-4	3.50E+1	-7.22E-3
Radioactive waste disposed	[kg]	8.34E-2	3.47E-5	1.68E-3	2.18E-6	9.87E-5	-1.65E-3
Components for re-use	[kg]	IND	IND	IND	IND	IND	IND
Materials for recycling	[kg]	IND	IND	IND	IND	IND	IND
Materials for energy recovery	[kg]	IND	IND	IND	IND	IND	IND
Exported electrical energy	[MJ]	IND	IND	4.53E+0	IND	0.00E+0	0.00E+0
Exported thermal energy	[MJ]	IND	IND	1.33E+1	IND	0.00E+0	0.00E+0

INTERPRETATION

USE OF RESOURCES

The primary energy from non-renewable resources is dominated by the production of glass mineral wool products (especially due to the energy consumption) and the packaging.
The renewable energy is dominated by the packaging (wood pallets) and the 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 glass mineral wool products.
The **Abiotic Depletion Potential elements (ADPe)** are dominated by the raw material consumption.
The **Global Warming Potential (GWP)** is dominated by the production, mostly due to energy consumption (gas and electricity). The raw materials and transport to site also have a limited impact. GWP is reduced by the use of a high percentage of glass cullet (about 80%).
The **Ozone Depletion Potential (ODP)** is influenced by raw materials, production 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 and nitrogen oxides.
The **Euthrophication Potential (EP)** is significantly influenced by the production due to emissions from the furnace and electricity consumption.

The **Potential Ozone Photochemical Oxidants (POCP)** is particularly dominated by the production (electricity consumption). 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

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, 07/2014

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 14064 - Part1
EN 14064:2010 Thermal insulation products for buildings - In-situ formed loosefill mineral wool products - Part 1: Specification for the loosefill products before installation

EN 14064 - Part2
EN 14064:2010 Thermal insulation products for buildings - In-situ formed loosefill mineral wool products - Part 2: Specification for the installed products

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 harmonized 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
Web **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
Web **www.bau-umwelt.com**

Author of the Life Cycle Assessment
PE International
Haupstrasse 111
70771 Leinfelden-Echterdingen
Germany

Tel +497113418170
Fax +4971134181725
Mail info@pe-international.com
Web **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
Web **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
Web **www.knaufinsulation.com**