

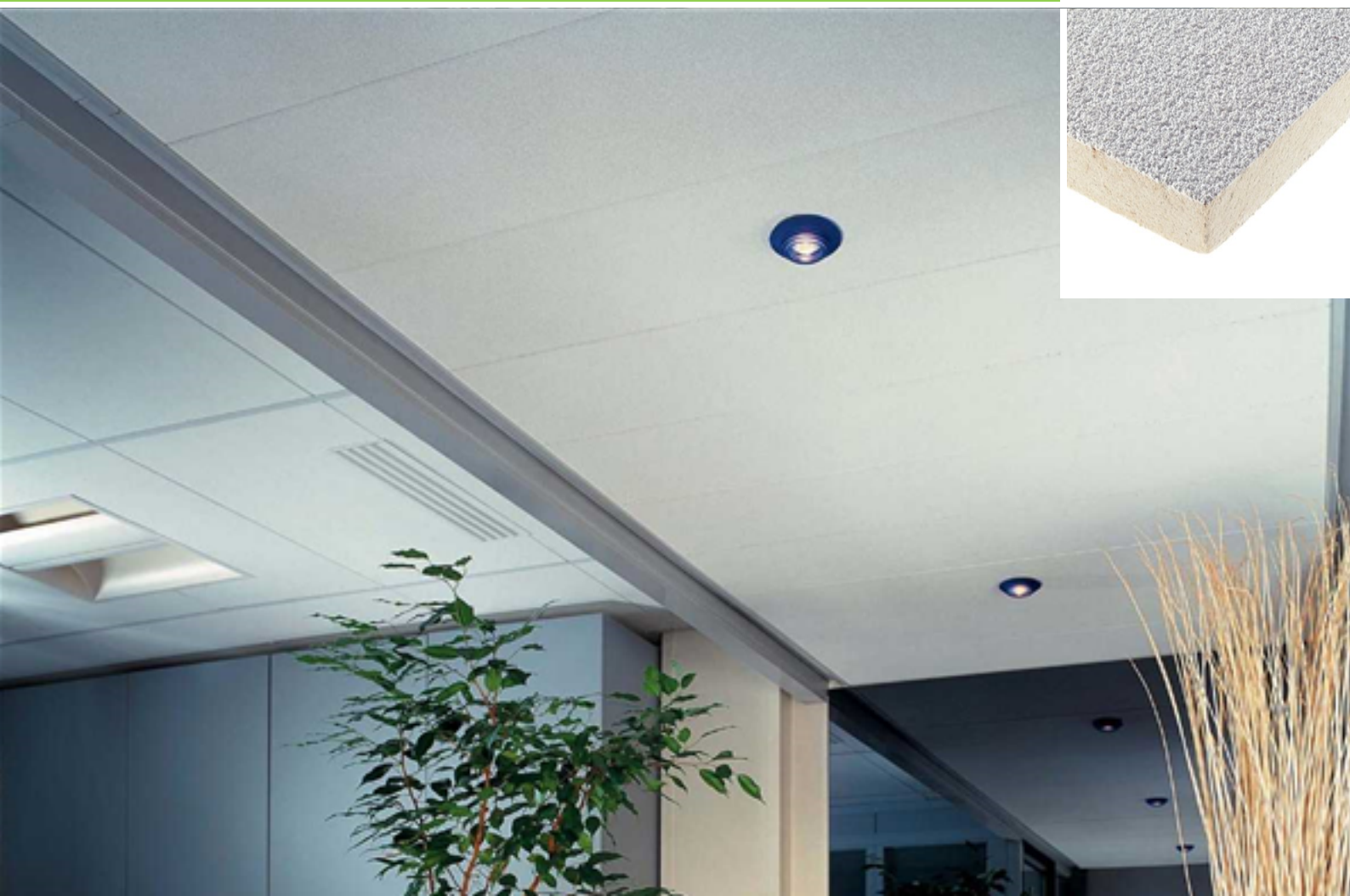
ENVIRONMENTAL PRODUCT DECLARATION

as per /ISO 14025/ and /EN 15804/

Owner of the Declaration	WETEC – Wet-felt Technical Committee
Programme holder	Institut Bauen und Umwelt e.V. (IBU)
Publisher	Institut Bauen und Umwelt e.V. (IBU)
Declaration number	EPD-WTC-20170171-IAF1-EN
Issue date	22.01.2018
Valid to	21.01.2023

Mineral boards (wet-felt) 15 mm Wet-felt Technical Committee

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



1. General Information

Wet-felt Technical Committee

Programme holder

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

Declaration number

EPD-WTC-20170171-IAF1-EN

This Declaration is based on the Product Category Rules:

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

Issue date

22.01.2018

Valid to

21.01.2023



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



Dr. Burkhard Lehmann
(Managing Director IBU)

Mineralplatte (wet-felt) 15mm

Owner of the Declaration

Wet-felt Technical Committee
Possartstraße 9
81679 München
Germany

Declared product / Declared unit

Mineral board (wet-felt) 15mm / 1m²

Scope:

The LCA is based on data from the production year 2016 for 15 mm mineral boards, manufactured using the wet-felt process.

It represents 100% of the WETEC association, which is composed of the following companies:

Armstrong Building Products GmbH
Robert-Bosch-Str. 10
48153 Münster | Deutschland

Knauf AMF GmbH & Co. KG
Elsenthal 15
94481 Grafenau

Odenwald Faserplattenwerk GmbH
Dr.-F.-A.-Freund-Strasse 3
63916 Amorbach

This EPD is an association EPD.

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



Mr Olivier Muller
(Independent verifier appointed by SVR)

2. Product

2.1 Product description / Product definition

Mineral boards are factory produced boards by the wet felt process (raw boards or finished boards). They meet the requirements of /DIN 18177/ and the /regulation (EU) Nr. 1272/2008/EU/ as well as German legislation on hazardous substances. Mineral boards (wetfelt) consist of mineral wool(s), fillers and binders, etc., mixed with the use of water (auxiliary) to produce

a slurry, which is then spread to form a board and dried.

The different surface finishes range from smooth, perforated, micro-perforated, fissured, regularly perforated, laminated, printed, embossed, eroded, sanded and textured compositions. The surface finish of the mineral board can be coated with watersoluble dispersion paint, glass fibre fleece, foil or printed with

ink. There are different edge configurations e.g. square, bevelled or grooved.

The product range of this EPD comprises of 1 m² mineral boards of differing dimensions, as a single layer of 15 mm thickness. The nominal density typically varies between 200 kg/m³ and 350 kg/m³. The results do not correlate to the nominal density.

The results of the ecobalance do not correlate with the raw density, which means that they can not be converted by the raw density.

For placing the product on the market in the EU/EFTA (with the exception of Switzerland) the /Regulation (EU) No. 305/2011 (CPR)/ applies.

The product needs a Declaration of Performance taking into consideration /EN13964/ and the CE-marking.

For the application and use the respective national provisions apply.

2.2 Application

Mineral boards (wet-felt) are typically used as facings for suspended ceiling structures, door inlays, cladding of structures or wall and ceiling elements etc. The essential constituents are mineral wool, clay, perlite and starch. They are available as raw boards as well as with different surface finish structures and coatings. They are used primarily as an aesthetic facing, but are also used for sound absorption and sound insulation, fire resistance and fire propagation, clean rooms, for high hygiene requirements and low emission applications.

2.3 Technical Data

wet-felt mineral boards are regulated by /EN 13964/ and have the according labeling and declaration of performance.

An overview of the data:

Technical specification (according to /EN 13964/ & /DIN 18177/)

Name	Value	Unit
Gross density to /DIN 18177/	200 - 350	kg/m ³
Sound absorption coefficient to /EN ISO 354/, /EN 16487/ und /EN ISO 11654/	0.1 - 0.9	%
Airborne sound reduction to /EN ISO 10848-2/ and /EN ISO 717-1/	34	dB
Thermal conductivity to /EN 13964/	0.048 - 0.09	W/(mK)
Reaction to fire to /EN 13501-1/	A2-s1,d0	
Resistance to fire to /EN 13501-2/	REI 30 to REI 180	
Durability / FTS to /EN 13964/	Classes A to C	

Performance data of the wet-felt mineral boards are in accordance with the declaration of performance in terms of its essential characteristics according to /EN 13964/.

Emission tests for wet-felt mineral boards according to /ISO 16000-3/, /ISO 16000-9/ and /ISO 16000-10/ are available from every manufacturer.

2.4 Delivery status

The EPD is valid for 15mm thick boards with variable length and width dimensions. The standard module is normally 625 x 625mm (in Germany).

2.5 Base materials / Ancillary materials

Composition wet felt mineral board:

Name	Value	Unit
Binder (mainly starch)	0 - 10	%
Mineral fibre	20 - 60	%
Cellulose fibre	0 - 10	%
Fillers (e.g. clay, talcum, limestone)	20 - 50	%
Perlite	10 - 50	%
Other	< 1	%

Dispersion paint and mineral coatings are additionally used for the surface finish as well as water during the production process. Flame retardants are not used. Isothiazolinone based products are used as preservatives.

2.6 Manufacture

The described mineral boards are produced using the traditional wet-felt process by the three listed association members. The initial materials are mixed with water to a homogenous suspension that is then pumped onto a belt conveyor (Fourdrinier). The water is removed both mechanically (gravity and vacuum) and by evaporation in a drying oven. The process water is reused as much as possible. It is treated and refed into the process water circuit. The boards can be sanded, painted, patterned, eroded or perforated depending on the required appearance. Production waste and dust are reused in the production process. The three association members are also /ISO 9001/, /ISO 14001/ and /ISO 50001/ certified.

2.7 Environment and health during manufacturing

All three of the listed manufacturers meet the European and German regulations for the production of wet-felt mineral boards:

- Exclusive use of mineral fibre according to /Regulation (EU) No. 1272/2008 Annex Q/
- Ban on manufacturing and using bio-persistent fibres (Ordinance on Hazardous Substances, Annex II, no. 5);
- Ban on circulating bio-persistent fibres (Chemicals Prohibition Ordinance, no. 23 of the Annex to § 1).
- Not subject to declaration according to /REACH/

In the production process low-dust and low-noise production procedures are respected. The exhaust air streams are externally monitored. Waste water and waste out of the production process are avoided as far as possible by internal recycling systems.

2.8 Product processing/Installation

There are safety measures to be noted in accordance with section 3 of the guideline /Handling mineral boards based on handling mineral wool (glass wool ,rock wool)/ edition 2015:

Work safety and environmental protection measures are in accordance with the European guidelines for handling man-made mineral fibres.

2.9 Packaging

The boards are packed in cardboard cartons and sealed with polyethylene film. These cartons are stacked on chemically untreated wooden pallets. The so formed pallets are wrapped with polyethylene stretch film. Film, paper and wood can be recycled in the usual way.

2.10 Condition of use

When used properly, the mineral boards maintain their mechanical and physical properties for their entire useful life. Direct contact with water should be avoided due to the bio-soluble binder starch.

Mineral boards that are exerted to increased temperatures of over 100 °C for an extended time period during their useful life can lead to yellowing of the surface finish or coating.

2.11 Environment and health during use

When correctly installed no dust / particles will be released during the period of use.

The limits for formaldehyde, VOC's and TVOC's are in compliance with /DIN 18177/ .

2.12 Reference service life

The useful life of the mineral boards (wet-felt) is up to 50 years depending on application, loading and level of maintenance, based on the experience of the three manufacturers with products being in use for more than 50 years.

Under the terms of use no aging effects are to be expected apart from an optical discoloration caused by airflow.

2.13 Extraordinary effects

Fire

The declared products have the building material class A2-s1,d0 according to /EN 13501-1/. They are

therefore designated by lots of European and the German national building regulations as "non-combustible" with negligible smoke development and no burning droplets in the case of fire.

Fire protection

Name	Value
Building material class	A2
Smoke gas development	s1
Burning droplets	d0

Water

Prolonged contact with water dissolves the binding starch which can lead to a loss of structure. Should the soluble components be carried into the sewage system they are biodegradable, increasing COD and BOD.

Mechanical destruction

The mineral boards (wet-felt) can be broken by hand and the surface finishes be damaged, whereby low dust emission can be caused.

2.14 Re-use phase

Correctly demounted boards can be reinstalled. Lightly damaged boards can be used as cut boards or insulation. Correctly sorted mineral boards with sufficient material quality can be returned to the production process. The recyclability is up to 100%.

2.15 Disposal

The waste code number for production waste of mineral boards is according to the /European Waste Index/ 101103. The waste code number for construction site waste (off-cuts) is 17 06 04. If the boards are not recycled as described in 2.14 they are disposed of in a landfill.

2.16 Further information

Additional information is available at www.wetec.info and also from the websites of the participating manufacturers.

3. LCA: Calculation rules

3.1 Declared Unit

This declaration refers to 1 m² of standard product, mineral board with a thickness of 15 mm and an average nominal density of 252.6 kg/m³. The averages of the individual producers were carried out by surveying the respective years total production data that was then broken down into sales volume in terms of area and recipe of the standard 15 mm boards.

Declared unit

Name	Value	Unit
Declared unit	1	m ²
Grammage	3.789	kg/m ²
Thickness of the boards	15	mm
Conversion factor to 1 kg	0.264	-

3.2 System boundary

Type of EPD: "cradle to gate - with options".

This LCA addresses the life cycle stages of product manufacture including pre-product stages (A1 – A3), as well as the modules B1 - B5 according to /EN 15804/.

Since the three companies recorded at different production facilities, the stages A1 – A3 were compiled and shown in the tables.

3.3 Estimates and assumptions

As the production facilities of the three companies were different, the modules A1 to A3 were compiled and presented. Primary data is available from two companies for the production of mineral wool and the expansion of perlite. These were included in module A1 due to the different production facilities. No assumptions were necessary as all primary product data was available.

3.4 Cut-off criteria

All inputs that contribute were considered in that study, also those contributing less than 1% of the total mass, energy or environmental effects of the system.

3.5 Background data

The primary data was provided by the three companies of the WETEC association. The background data was taken from the GaBi database software from thinkstep

AG (GaBi ts 2017). The electricity mix from Germany was used.

3.6 Data quality

To model the life cycle of the production of mineral boards, data was used which was collected from the three companies over the 2016 production year. All other relevant background data was taken from the GaBi database software 2017 and is under 10 years old.

3.7 Period under review

The data is representative of the manufacturing processes of 2016.

3.8 Allocation

By thermal utilisation in an incinerator (MSWI), input specific credits for electricity and thermal energy, including taking element composition and calorific value into account, are considered in A3. Germany is the area of reference for the credited processes due to

production locations. It can be assumed, that in terms of thermal energy used, the quality of the thermal energy by the incineration of waste is of equal value as the thermal energy to produce the product, whereby a credit is allowed in A3.

Thermal utilisation is modelled for production waste. The assignment of the production data for the regarded products was carried out directly by the companies (allocation from multi-output processes). The allocation of the data is carried out in terms of sales volume per area and the recipe of the 15mm standard boards.

3.9 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. The used background database has to be mentioned.

4. LCA: Scenarios and additional technical information

The following technical information is the basis for the declared modules or can be used for the development of a specific scenario in the context of building assessment, if modules can not be declared (MND). The use of packaging material was balanced in module A3, but the module 5 with the disposal of the packaging material on the construction site was not declared. Therefore the balanced amounts of packaging material are declared in "Installation in building (A5)" as technical scenario information.

Installation in building (A5)

Name	Value	Unit
Product packaging Polyethylen-foil	1,33E-03	kg/m ²
Product packaging Paper	1,48E-02	kg/m ²
Product packaging Palets	3,13E-02	kg/m ²

5. 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	MND	MND	X	X	X	X	X	MND	MND	MND	MND	MND	MND	MND

RESULTS OF THE LCA - ENVIRONMENTAL IMPACT: 1 m² mineral board (thickness 15 mm)

Parameter	Unit	A1-A3	B1	B2	B3	B4	B5
Global warming potential	[kg CO ₂ -Eq.]	4.48E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0
Depletion potential of the stratospheric ozone layer	[kg CFC11-Eq.]	6.45E-12	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0
Acidification potential of land and water	[kg SO ₂ -Eq.]	9.29E-3	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0
Eutrophication potential	[kg (PO ₄) ³⁻ -Eq.]	1.52E-3	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0
Formation potential of tropospheric ozone photochemical oxidants	[kg ethene-Eq.]	6.92E-4	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0
Abiotic depletion potential for non-fossil resources	[kg Sb-Eq.]	7.34E-6	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0
Abiotic depletion potential for fossil resources	[MJ]	6.88E+1	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0

RESULTS OF THE LCA - RESOURCE USE: 1 m² mineral board (thickness 15 mm)

Parameter	Unit	A1-A3	B1	B2	B3	B4	B5
Renewable primary energy as energy carrier	[MJ]	1.14E+1	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0
Renewable primary energy resources as material utilization	[MJ]	1.85E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0
Total use of renewable primary energy resources	[MJ]	1.32E+1	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0
Non-renewable primary energy as energy carrier	[MJ]	7.18E+1	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0
Non-renewable primary energy as material utilization	[MJ]	2.30E-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]	7.20E+1	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0
Use of secondary material	[kg]	3.02E-1	0.00E+0	0.00E+0	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]	3.30E-2	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0

RESULTS OF THE LCA – OUTPUT FLOWS AND WASTE CATEGORIES:

1 m² mineral board (thickness 15 mm)

Parameter	Unit	A1-A3	B1	B2	B3	B4	B5
Hazardous waste disposed	[kg]	1.51E-7	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0
Non-hazardous waste disposed	[kg]	2.26E-1	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0
Radioactive waste disposed	[kg]	1.30E-3	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0
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	0.00E+0	0.00E+0	0.00E+0	0.00E+0
Exported thermal energy	[MJ]	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0

6. LCA: Interpretation

A dominance analysis of this ecobalance results for the production of mineral boards, related to the declared unit of 1 m² was conducted. The relevant influences of individual categories in the individual impact categories as well as the primary energy demand was identified.

The pre-chains of the pre-product production including transportation to the plant are approx. 40% of the non-renewable primary energy demand.

Especially the perlite and mineral wool productions show their influence. The remaining 60% are related to the production of the mineral board itself, which is mainly based on the demand on electricity and thermal energy.

The **abiotic resource consumption (ADP fossil)** results by approx. 40 % of the production of raw

materials and energy (including transportation) and by approx. 60 % out of the production of mineral boards. The complete abiotic resource consumption is mainly caused by natural gas and oil.

The **abiotic resource consumption (ADP elementary)** is caused by approx. 90 % by the production of raw materials and energy (including transportation) and by approx. 10 % by the production of the mineral board. Mainly sodium chloride and lead-zinc ore contribute to the total ADP elementary, because of the used mineral wool and the zinc-oxides.

The **acidification potential (AP)** is caused by approx. 80 % by the pre-chain (including transportation) and by approx. 20 % by the production of the mineral boards.

Mainly the electricity production and the thermal energy release nitrogen oxide and sulphur dioxide.

The main contribution to the **Eutrophication potential (EP)** is given by the production due to the energy demand and the related nitrogen oxide- (mainly) and the ammonia - emission.

The **global warming potential (GWP, 100 years)** result by approx. 60 % directly out of the production process. Approx. 40 % of the global warming gas emissions are caused by the provision of the pre-products. Especially the thermal energy and the electricity-mix contribute to the total GWP. The shares of the most important global warming gases to the total GWP are the following:

CO₂: 93 %, CH₄: 6 % and N₂O: 1 %.

The **Ozone depletion potential (ODP)** is mainly caused by the electricity production. There is no direct emission of halogenated hydrocarbons during the production.

The **Photochemical ozone creation potential (POCP)** is stronger influenced by the

provision of the pre-products. By 50% the input is caused by that module. The production of the mineral board plays with 40 % also a important role. In particular nitrogen oxides, sulphur dioxide and the group of NMVOC and POCP.

Variance of the LCA-results of the three manufacturers

For almost all indicators an even distribution of the contributions would be given, if the three products would be rated equally. Only for the indicators ADPe as well as AP one product shows an disproportionately high share (62% and 48%).

Comparison of the LCA-results and the EPD-Update

Overall the ecobalance results per m² improved. This is especially based on the lower average area weight or a lower average raw density.

Major discrepancies in the category "Utilisation of fresh water" and "Non-hazardous waste disposal" result from the changed methods of calculating the background data sets.

7. Requisite evidence

7.1 Radioactivity

Measurements on radioactivity had been carried out from every manufacturer with no indications of artificial radioactivity over the natural background radiation.

7.2 Biopersistence

The used wool types are in accordance with the /Regulation (EU) No. 1272/2008/ Annex Q and therefore meets the criteria for exoneration. The manufacturing and use of non criteria conform fibres is prohibited by the /Ordinance on Hazardous

Substances/ and the /Chemicals Prohibition Ordinance/.

7.3 Formaldehyde and VOC emissions

The limit values according to classes (1 or 2) as per /DIN 18177/ are fulfilled. Due the fact that this is a association EPD, no measured values are stated. The individual results can be requested from every single manufacturer.

8. References

Institut Bauen und Umwelt

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/ISO 14025/

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/EN 15804/

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

Product Category Rules for construction products

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Product Category Rules for construction products

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/European Waste Code/

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/Chemicals Prohibition Ordinance/

Verordnung über Verbote und Beschränkungen des Inverkehrbringens und über die Abgabe bestimmter Stoffe, Gemische und Erzeugnisse nach dem Chemikaliengesetz, 20.01.2017

/Ordinance on Hazardous Substances/

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/REACH/

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/EN ISO 10848-2/

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/ISO 16000-3/

/ISO 16000-3:2011/, Indoor air. Determination of formaldehyde and other carbonyl compounds in indoor air and test chamber air. Active sampling method

/ISO 16000-9/

/EN ISO 16000-9:2006/, Indoor air. Determination of the emission of volatile organic compounds from building products and furnishing. Emission test chamber method

/ISO 16000-10/

/EN ISO 16000-10:2006/, Indoor air. Determination of the emission of volatile organic compounds from building products and furnishing. Emission test cell method

/ISO 9001/

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/ISO 14001/

/EN ISO 14001:2015/, Environmental management systems. Requirements with guidance for use.

/ISO 50001/

/EN ISO 50001:2011/, Energy management systems. Requirements with guidance for use.

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/REGULATION (EU) No 305/2011/,

/REGULATION (EU) No 305/2011/ OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL of 9 March 2011 laying down harmonised conditions for the marketing of construction products and repealing Council Directive 89/106/EEC

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