ENVIRONMENTAL PRODUCT DECLARATION

as per *ISO 14025* and *EN 15804*

Owner of the Declaration	Knauf AQUAPANEL GmbH & Co. KG
Programme holder	Institut Bauen und Umwelt e.V. (IBU)
Publisher	Institut Bauen und Umwelt e.V. (IBU)
Declaration number	EPD-USG-20190110-IAA1-EN
Issue date	16.08.2019
Valid to	15.08.2024

AQUAPANEL® Cement Board Indoor

Knauf AQUAPANEL GmbH & Co. KG

Institut Bauen und Umwelt e.V.

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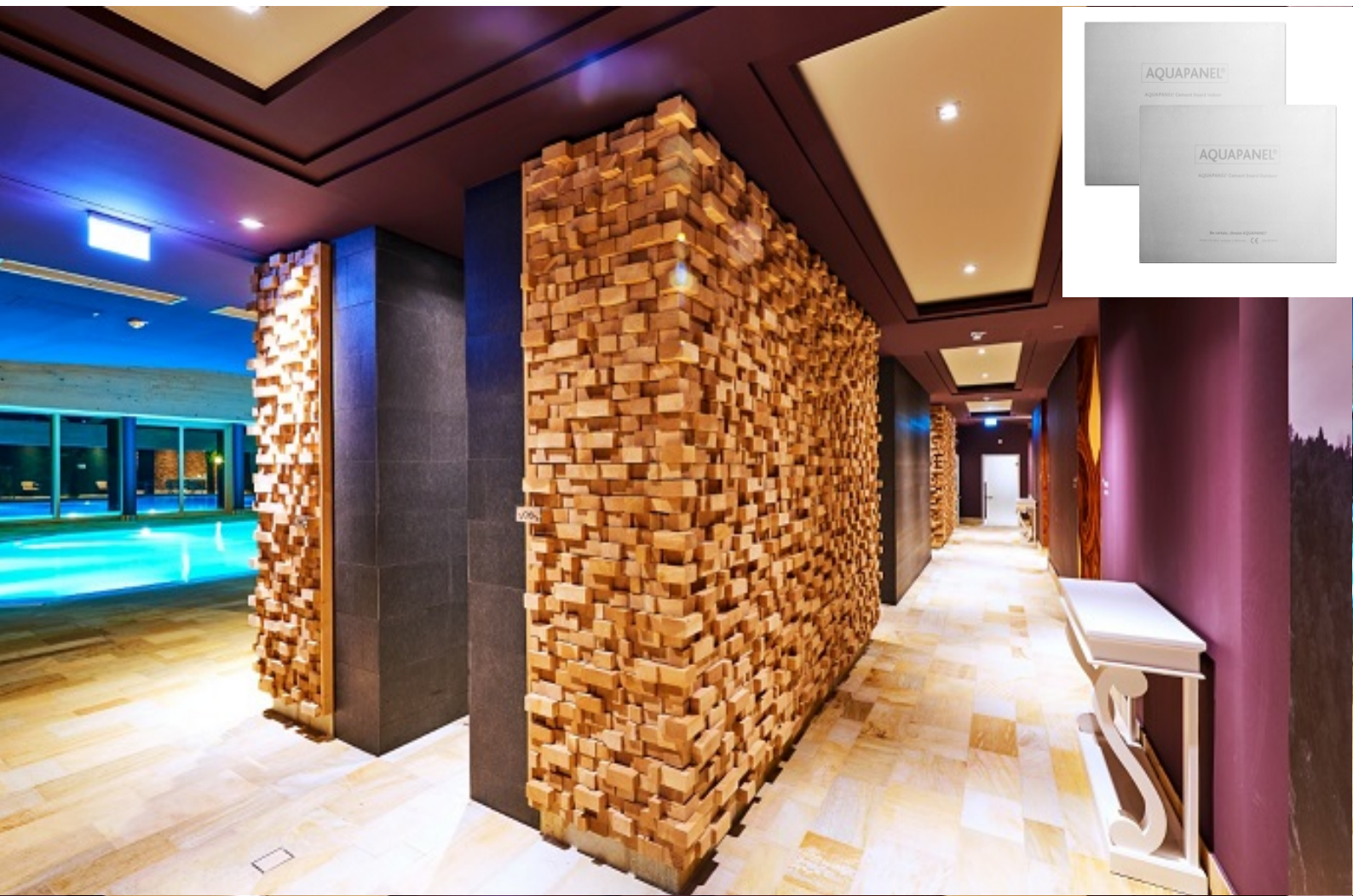


1. General Information

Knauf AQUAPANEL GmbH & Co. KG	AQUAPANEL® Cement Board Indoor
Programme holder IBU – Institut Bauen und Umwelt e.V. Panoramastr. 1 10178 Berlin Germany	**Owner of the declaration** Knauf AQUAPANEL GmbH & Co. KG Kipperstraße 19 44147 Dortmund Deutschland
Declaration number EPD-USG-20190110-IAA1-EN	**Declared product / declared unit** 1 m² AQUAPANEL® Cement Board Indoor with a thickness of 12,5 mm.
This declaration is based on the product category rules: Fibre cement / Fibre concrete, 07.2014 (PCR checked and approved by the SVR)	**Scope:** This environmental product declaration refers to AQUAPANEL® Cement Board Indoor produced in Iserlohn, Germany.
Issue date 16.08.2019	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.
Valid to 15.08.2024	**Verification** The standard *EN 15804* serves as the core PCR Independent verification of the declaration and data according to *ISO 14025:2010* ☐ internally ☒ externally
 Dipl. Ing. Hans Peters (chairman of Institut Bauen und Umwelt e.V.)	 Prof. Dr. Birgit Grahl (Independent verifier appointed by SVR)
 Dr. Alexander Röder (Managing Director Institut Bauen und Umwelt e.V.))	

2. Product

2.1 Product description/Product definition

Cement-bound, mineral building panel with planar lattice structures of longitudinally and transversely arranged glass fibre mats for indoor use.

The AQUAPANEL® Cement Board Indoor is certified to /EN 12467/ and therefore a product according to CPR with harmonized European standard (hEN). The placing on the market of the product in the European Union/European Free Trade Association (EU/EFTA) (with the exception of Switzerland) is governed by Regulation (EU) No 305/2011 (/CPR/). The product requires a declaration of performance taking into account the /EN 12467/, fibre cement panels - product specification and test methods and the CE marking.

For the use of the product, the respective national regulations apply.

2.2 Application

The „AQUAPANEL® Cement Board Indoor“ building board is used as a non-load-bearing wall element in interiors.

2.3 Technical Data

Technical Data

Name	Value	Unit
Thermal conductivity acc to /EN 12664/	19	W/(mK)
Water vapour diffusion resistance factor acc to /ISO 7783/	25	-
Moisture expansion parameter acc to /EN 12467/	0.0606	%
Gross density acc to /EN 12467/	750	kg/m³
Flexural strength acc to /EN 12467/	>=7	N/mm²
Modulus of elasticity	5000	N/mm²
Coefficient of thermal expansion	7	$10^{-6}K^{-1}$

AQUAPANEL® Cement Board Indoor (Product according to CPR with hEN)

- Performance values of the product according to the declaration of performance with respect to its essential characteristics according to /EN 12467/.
- Voluntary information for the product: /Technical Data Sheet 01/18/ (www.aquapanel.com).

(not part of the CE marking)

2.4 Delivery status

The panels are sold in widths of 900 mm and lengths of 1200/1250/2400/2500 mm. Layer thickness is 12.5 mm.

2.5 Base materials/Ancillary materials

AQUAPANEL® Cement Board Indoor

Name	Value	Unit
Cement	25-35	Mass-%
Limestone	15-35	Mass-%
Perlite	20-30	Mass-%
Recyclate/ filler material	0-10	Mass-%
Glas fiber scrim	< 2	Mass-%
Hydrophobic agent	< 1	Mass-%

2.6 Manufacture

The aggregates and binders are stored in silos outside the production hall. The raw materials for the panel core are dosed over belt scales and loss-in-weight feeders according to formula and transported to the weighing container via a central conveyor.
The binder for the production of the cover layer is transported directly via a screw conveyor to the slurry production unit. The glass fabrics required for production are stored in the basement of the production hall. The dry mixture in the weighing container is emptied into the compulsory mixer underneath and water is added according to the formula. The core mixture is mixed homogeneously and earth-moist and then conveyed by belt to the forming station. At the same time, the slurry for the surface layer is premixed homogeneously and conveyed by screw pumps through hoses to the forming station. In the forming station, the 3-layer element is produced by continuous extrusion and cut in the subsequent cutting apparatus to the appropriate length. The tailored boards are hardened in the shelf storage.
The production process is /DIN EN ISO 9001/ certified.

2.7 Environment and health during manufacturing

According to /Regulation (EC) No 1907/2006/, cement and cementitious mixtures may not be used or placed on the market if the soluble chromium (VI) content in the dry matter of the cement after hydration exceeds 2 mg/kg (0 ,0002%). In the production only low-chromium cements are used. In addition to the legal requirements, no further special measures are required.

2.8 Product processing/Installation

Knauf Aquapanel GmbH & Co. KG provides technical data sheets for the cement-bonded building boards. This information is printed and available online at www.aquapanel.com. The panels can be fastened to studs (aluminium, wood, etc.) with screws and sawn and processed using standard tools.

2.9 Packaging

The cement-bound building panels with glass fibre reinforcement are shipped on reusable Euro pallets, secured with metal strapping.

2.10 Condition of use

No changes in material composition occur during service life.

2.11 Environment and health during use

During the service life, there are no environmental and health effects. The results of the Volatile Organic Compound (VOC) analysis all remained below the respective detection limit (see chapter 7.3). There is no release of chromium (VI) -containing substances. There are no hazards to water, air or soil. In use, the ingredients of the products are firmly bound. Dust emission is not possible.

2.12 Reference service life

From experience, a service life of approximately 50 years can be achieved when used as intended.

2.13 Extraordinary effects

Fire

Non-combustible building material of building material class A1 /EN 13501-1/.

Fire Protection

Name	Value
Building material class acc to /EN 13501-1/	A1

Water

Chromium elution is to be expected in case of unforeseen effects of water in non-relevant quantities (see chapter 7.4). Further elutions of other heavy metals are not expected.

Mechanical destruction

No sharp break edges are created upon mechanical destruction.

2.14 Re-use phase

Once used, the products are practically un-reusable, but are suitable for recycling as filling material if fully separated.

2.15 Disposal

According to /AVV/ AQUAPANEL® Cement Board Indoor, the waste code 170904 mixed construction and demolition waste other than those falling under 170901, 170902 and 170903 is recommended.

2.16 Further information

For further information please go to www.aquapanel.com

3. LCA: Calculation rules

3.1 Declared Unit

The declared unit of the study is 1 m² AQUAPANEL® Cement Board Indoor with a thickness of 12,5 mm.

Declared Unit

Name	Value	Unit
Declared Unit	1	m²
Conversion factor to 1 kg	0.09	-
Grammage	11	kg/m²
Gross density /EN 12467/*	750	kg/m³

* The density according to /EN 12467/ is the density after complete drying. Therefore, the data in the above table on surface weight at delivery and the gross density do not correlate.

3.2 System boundary

Type of EPD: cradle to gate. The life cycle assessment takes into account the production or provision and transport of the raw materials as well as the production of the final product. The packaging material, the transport and the thermal utilisation of the packaging material are not considered because the amounts used are low. Production-related waste is returned to the production process.

3.3 Estimates and assumptions

No estimates or assumptions were made in the assessment.

3.4 Cut-off criteria

The data of the cement plate production was determined on site. The formula and the starting materials used, the electrical energy used and all direct production waste were taken into account in the balancing. The transport routes have been taken into account for all starting materials considered.
The Life Cycle Assessment uses the cut-off criteria for a release agent in the production area. The material corresponds to <0.07% of the mass use for the declared unit.
Also, the use of wooden pallets used for storage and transportation is cut off within the scope of consideration. Due to frequent reuse, the share to be considered for a declared unit is very small and has no significant contribution to the result.
An application of the cut-off criteria beyond the above-mentioned processes was not necessary.

3.5 Background data

All the background data used was taken from the /GaBi-ts/ software (Professional Database, version number 8.6, Service Pack 34).

3.6 Data quality

All background data records relevant for the calculation were provided by the declaration owner and processed with the database of the accounting software /GaBi ts/. The manufacturer-specific data used comes from the year 2017. All material and energy flows have been completely recorded and taken into account with the exception of the balancing processes described in chapter 3.4.

3.7 Period under review

The observation period for the data collection is the year 2017.

3.8 Allocation

No allocations were used in the present assessment

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. (Professional Database, version number 8.6, Service Pack 34)

4. LCA: Scenarios and additional technical information

In the current assessment, compulsory modules A1 to A3 (production of the product) were taken into account. Further consideration of the product life cycle did not take place. Also, no assumptions / scenarios regarding the construction, use and disposal phases were considered.

5. LCA: Results

The results of the LCA of the AQUAPANEL® Cement Board Indoor for the considered life cycle phases (A1-A3) are shown below.

DESCRIPTION OF THE SYSTEM BOUNDARY (X = INCLUDED IN LCA; MND = MODULE NOT DECLARED; MNR = MODULE NOT RELEVANT)

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	MND	MND	MNR	MNR	MNR	MND	MND	MND	MND	MND	MND	MND

RESULTS OF THE LCA - ENVIRONMENTAL IMPACT: 1 m² AQUAPANEL® Cement Board Indoor

Parameter	Unit	A1-A3
Global warming potential	[kg CO_2-Eq.]	4.98
Depletion potential of the stratospheric ozone layer	[kg CFC11-Eq.]	1.94E-12
Acidification potential of land and water	[kg SO_2-Eq.]	7.83E-3
Eutrophication potential	[kg $(PO_4)^{3-}$-Eq.]	8.64E-4
Formation potential of tropospheric ozone photochemical oxidants	[kg ethene-Eq.]	7.58E-4
Abiotic depletion potential for non-fossil resources	[kg Sb-Eq.]	6.95E-7
Abiotic depletion potential for fossil resources	[MJ]	36.24

RESULTS OF THE LCA - RESOURCE USE: 1 m² AQUAPANEL® Cement Board Indoor

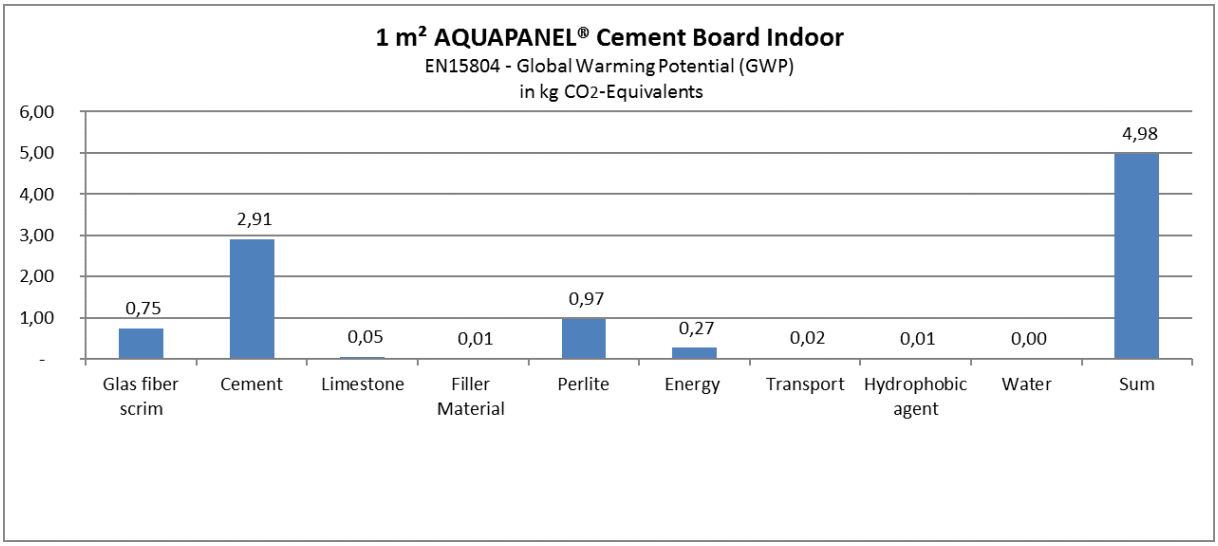
Parameter	Unit	A1-A3
Renewable primary energy as energy carrier	[MJ]	5.50
Renewable primary energy resources as material utilization	[MJ]	0.01
Total use of renewable primary energy resources	[MJ]	5.51
Non-renewable primary energy as energy carrier	[MJ]	39.30
Non-renewable primary energy as material utilization	[MJ]	0.16
Total use of non-renewable primary energy resources	[MJ]	39.46
Use of secondary material	[kg]	0.00
Use of renewable secondary fuels	[MJ]	1.84E-20
Use of non-renewable secondary fuels	[MJ]	2.16E-19
Use of net fresh water	[m³]	8.45E-3

RESULTS OF THE LCA – OUTPUT FLOWS AND WASTE CATEGORIES: 1 m² AQUAPANEL® Cement Board Indoor

Parameter	Unit	A1-A3
Hazardous waste disposed	[kg]	9.62E-6
Non-hazardous waste disposed	[kg]	6.28E-2
Radioactive waste disposed	[kg]	1.15E-3
Components for re-use	[kg]	0.00
Materials for recycling	[kg]	0.00
Materials for energy recovery	[kg]	0.00
Exported electrical energy	[MJ]	0.00
Exported thermal energy	[MJ]	0.00

6. LCA: Interpretation

The dominance analysis of resource use shows that the most important impact on the climate is the procurement of raw materials / processing of raw materials (module A1). The mineral raw materials used in this context are extracted as non-renewable resources (limestone, silica) and in certain cases also thermally treated (glass melting, expansion, cement burning). The cement used in the product, CEM I, is produced without the use of secondary fuels, but contributes to about 60% of the GWP due to the energy-intensive burning process, whereas the production process contributes only about 5% to the GWP (see graph). In the other impact categories considered as well, raw material procurement and processing (A1), especially mineral raw materials, are relevant processes in the overall system, whereas the transport of raw materials and production at the Iserlohn plant have only minor impacts. The impact of the production process in the factory itself is rather subordinate to the eco-balance and largely attributable to the electrical energy requirement. The processes used here are for the most part mixing and molding processes that have little environmental impact. The drying process takes place due to exothermic processes without the use of additional thermal energy.



7. Requisite evidence

7.1 Quality Management System DIN EN ISO 9001

The location in Iserlohn is certified according to DIN EN /ISO 9001/ (as of 2018).

7.2 Radioactivity

The Activity Concentration Index (ACI) was determined to be 0.18. The tested product complies with the official guideline value of ACI <1 as well as the test condition ACI <0.75 of the Institute for Building Biology Rosenheim (IBR). Institute for Building Biology Rosenheim GmbH /Report No. 3018-1018/ from October 2018.

7.3 VOC Emissions
Emissions of volatile organic compounds (VOCs) from the AQUAPANEL® Cement Board Indoor in accordance with the AgBB scheme were tested in 2018 by the Institute for Building Biology Rosenheim (IBR) in October 2018. The product fulfills the requirements of the Commitee for Health-related Evaluation of Building Products (AgBB) scheme in terms of type and scope. Institute for Building Biology Rosenheim GmbH /Test Report No. 3018-1018/

AgBB result overview (28 days [µg / m³])

Name	Value	Unit
TVOC (C6 - C16)	< 1000	µg/m³
Sum SVOC (C16 - C22)	< 100	µg/m³
R (dimensionless)	0.1	-
VOC without NIK	< 100	µg/m³
Carcinogenic Substances	<1	µg/m³

7.4 Heavy metal concentration

Determination of the heavy metal concentration in both the original and the eluate was performed by the Institute for Building Biology Rosenheim (IBR) in October 2018. The determination in the original substance took place according to. /ISO 17294-2/, in the eluate according to /DIN 38414-4/.
Institute for Building Biology Rosenheim GmbH /Test Report No. 3018-1018/

Heavy metal concentration in the original substance

Name	Value	Unit
Arsenic	1.6	mg/kg
Lead	6.0	mg/kg
Cadmium	< 0.3	mg/kg
Chromium	22.1	mg/kg
Copper	35.1	mg/kg
Nickel	9.61	mg/kg
Mercury	< 0.05	mg/kg
Zinc	< 30	mg/kg

Heavy metal concentration in the eluate

Name	Value	Unit
Arsenic	< 0.010	mg/l
Lead	< 0.005	mg/l
Cadmium	< 0.0005	mg/l
Chromium	0.0231	mg/l
Copper	< 0.005	mg/l
Nickel	< 0.005	mg/l
Mercury	< 0.0001	mg/l
Zinc	0.072	mg/l

8. References

/DIN 38414-4/
DIN 38414-4:1984-10, German standard methods for the examination of water, waste water and sludge; sludge and sediments (group S); determination of leachability by water (S 4).
/EN 12467/

DIN EN 12467:2018-12, Fibre-cement flat sheets - Product specification and test methods.
/EN 12664/
DIN EN 12664:2001-05, Thermal performance of building materials and products - Determination of thermal resistance by means of guarded hot plate and heat flow meter methods - Dry and moist products with medium and low thermal resistance.
/EN 13501-1/
DIN EN 13501-1:2010-01 Fire classification of construction products and building elements - Part 1: Classification using data from reaction to fire tests.
/EN 15804/
DIN EN 15804:2014, Sustainability of construction works - Environmental product declarations - Core rules for the product category of construction products.
/ISO 7783/
ISO 7783:2018-10, Paints and varnishes - Determination of water-vapour transmission properties - Cup method.
/ISO 9001/
DIN EN ISO 9001:2008, Quality management systems - Requirements (ISO 9001:2008).
/ISO 14025/
DIN EN ISO 14025:2011-10, Environmental labels and declarations - Type III environmental declarations - Principles and procedures.
/ISO 17294-2/
DIN EN ISO 17294-2:2017-01, Water quality - Application of inductively coupled plasma mass spectrometry (ICP-MS) - Part 2: Determination of selected elements including uranium isotopes.
/GaBi ts/
GaBi ts: Software and database, Professional database, Versionnumber 8.6, Service Pack 34. LBP, Universität Stuttgart and thinkstep, 2018. Documentation: http://www.gabi-software.com/deutsch/my-gabi/gabi-documentation/.
/IBU 2016/
IBU (2016): Generally EPD-program instruction from Institut Bauen und Umwelt e.V. (IBU). Version 1.1, Institut Bauen und Umwelt e.V., Berlin.
/AVV/
Ordinance on the European list of waste (Abfallverzeichnis-Verordnung - AVV) 10.12.2001.
/CPR/
Regulation (EU) No 305/2011 of the european parliament and the council of 9 March 2011 laying down harmonised conditions for the marketing of construction products and repealing
/Regulation (EG) No. 1907/2006/
Regulation (EC) No 1907/2006 of the european parliament and the council of 18 December 2006 concerning the Registration, Evaluation, Authorisation and Restriction of Chemicals (REACH), establishing a European Chemicals Agency, amending Directive 1999/45/EC and repealing Council Regulation (EEC) No 793/93 and Commission Regulation (EC) No 1488/94 as well as Council Directive 76/769/EEC and Commission Directives 91/155/EEC, 93/67/EEC, 93/105/EC and 2000/21/EC
/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 Text with EEA relevance.
/Technical datasheet 01/18/
Technical datasheet AQUAPANEL® Cement Board Indoor, January 2018.
/Test report No. 3018 - 1018/
Institute for Building Biology Rosenheim, Test report Nr. 3018-1018 for AQUAPANEL® Cement Board Indoor/Outdoor, 16.10.2018.
PCR Guidance-Texts for Building-Related Products and Services - Part B:
PCR Guidance-Texts for Building-Related Products and Services. Part B: Requirements on the EPD for Fibre cement / Fibre concrete. Berlin: Institut Bauen und Umwelt e.V. 07/2014.
Product Category Rules for Building-Related Products and Services – Part A:
Product Category Rules for Building-Related Products and Services. Part A: Calculation Rules for the Life Cycle Assessment and Requirements on the Project Report, V1.7, 03/2018.

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