ENVIRONMENTAL PRODUCT DECLARATION

as per *ISO 14025* and *EN 15804+A2*

Owner of the Declaration	Knauf AQUAPANEL GmbH & Co. KG
Publisher	Institut Bauen und Umwelt e.V. (IBU)
Programme holder	Institut Bauen und Umwelt e.V. (IBU)
Declaration number	EPD-KNQ-20240284-IBB1-EN
Issue date	15/10/2024
Valid to	14/10/2029

AQUAPANEL® Cement Board Indoor- Plant Iserlohn

Knauf AQUAPANEL GmbH & Co. KG

Institut Bauen und Umwelt e.V.

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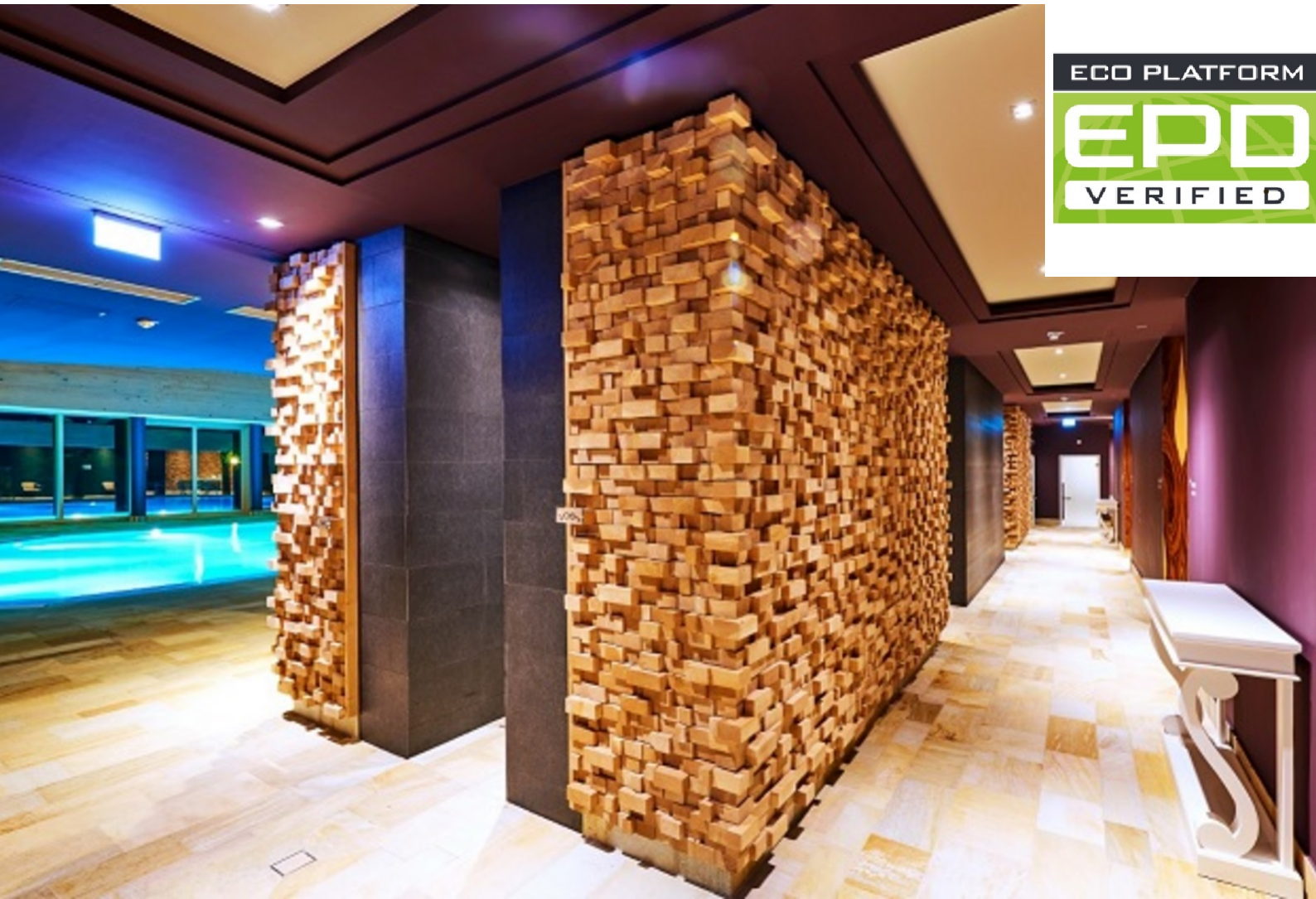


1. General Information

Knauf AQUAPANEL GmbH & Co. KG

Programme holder

IBU – Institut Bauen und Umwelt e.V.
Hegelplatz 1
10117 Berlin
Germany

Declaration number

EPD-KNQ-20240284-IBB1-EN

This declaration is based on the product category rules:

Fibre cement / Fibre concrete, 01/08/2021
(PCR checked and approved by the SVR)

Issue date

15/10/2024

Valid to

14/10/2029

Dipl.-Ing. Hans Peters
(Chairman of Institut Bauen und Umwelt e.V.)

Florian Pronold
(Managing Director Institut Bauen und Umwelt e.V.)

AQUAPANEL® Cement Board Indoor- Plant Iserlohn

Owner of the declaration

Knauf AQUAPANEL GmbH & Co. KG
Zur Helle 11
58638 Iserlohn
Germany

Declared product / declared unit

1 m² AQUAPANEL® Cement Board Indoor with a thickness of 12,5 mm produced in Iserlohn, Germany.

Scope:

This environmental product declaration refers to AQUAPANEL® Cement Board Indoor with the DoP No. KAGE_010 produced in Iserlohn, Germany. 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.

The EPD was created according to the specifications of EN 15804+A2. In the following, the standard will be simplified as *EN 15804*.

Verification

The standard EN 15804 serves as the core PCR
Independent verification of the declaration and data according to ISO 14025:2011
☐ internally ☒ externally

Dr.-Ing. Nikolay Minkov,
(Independent verifier)

2. Product

2.1 Product description/Product definition

AQUAPANEL® Cement Board Indoor is an aggregated portland cement board. A coated glass fabric with longitudinal and transverse glass fibres is embedded in the back and face of the board. 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, fiber cement panel - 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 panel is used as a tile and render carrier board within non-load-bearing wall and ceiling constructions, suited for wet room applications.

2.3 Technical Data

Technical Data

Name	Value	Unit
Thermal conductivity acc to EN 12664	0.19	W/(mK)
Water vapour diffusion resistance factor acc to ISO 12467	25	-
Moisture expansion parameter acc to EN 12467	0.0606	%
Gross density acc to EN 12467	750	kg/m^3
Flexural strength acc to EN 12467	>=7	N/mm^2
Modulus of elasticity	5000	N/mm^2
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 09/211aquapanel.com
  (not part of the CE marking)

2.4 Delivery status

The cement boards 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	20-30	Mass-%
Limestone	30-50	Mass-%
Perlite	5-20	Mass-%
Recyclate/ filler material (by-product)	3-5	Mass-%
Glas fiber scrim	< 2	Mass-%
Hydrophobic agent	< 1	Mass-%

In this context recyclate (by product) refers to production scrap which is reused directly whitim the production process.

This product contains substances listed in the candidate list (date: 14.10.2024) exceeding 0.1 percentage by mass: no.

This product contains other CMR substances in categories 1A or 1B which are not on the candidate list, exceeding 0.1 percentage by mass: no.

Biocide products were added to this construction product or it has been treated with biocide products (this then concerns a treated product as defined by the (EU) Ordinance on Biocide Products No. 528/2012): no.

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 and the core mixer via a central conveyor, where the material is homogeneously mixed with water to form an earth-moist mixture. The binder and aggregate for the production of the cover layer are transported directly via a screw conveyor to the slurry production unit where it is homogeneously mixed with water and conveyed to the forming line through hoses using screw pumps. The fibreglass scrim required for production is stored in the basement of the production hall and fed to the production line via rollers.

In the forming line, reusable support sheets are continuously fed onto the forming conveyor belt to support the production and forming of the panels. Prior to the application of the core material, the bottom glass fiber scrim is coated with slurry and applied to the support sheets. Subsequently, the loose earth moist core material is then applied and pressed to a dense core material by rollers after which the slurry-coated upper fibreglass fabric is applied. Excess of slurry is scraped off and the boards are cut to the respective lengths, stacked on reusable curing pallets and transferred to the curing rack.
In the finishing line after curing, the boards are destacked, and the support sheets are removed and recirculated within the production line. Before pelleting, the boards are regularly flipped horizontally and vertically, to assure even stacking, cut to the final lengths, and printed. All cutoffs material and saw dust is recirculated and reused in the production process directly, without separate disposal.
The production process is certified DIN EN ISO 9001.

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. Chromium reducers may be used by cement suppliers.

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 main intended use is mechanical fixing to a supporting framework (steel, timber, etc.). The panels can be formatted using standard power tools (handheld jigsaw, circular saw, etc.), as well as utility knives and hand saws.

2.9 Packaging

The cement-bound building panels with glass fibre reinforcement are packed on single wooden pallets and secured with 100% post-consumer recycled PET straps and cardboard edges made of 97% recycled paper to prevent

damage to the board edges.

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 negative 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.

AQUAPANEL® Cement Board Indoor is able to remove carbon dioxide from the atmosphere through recarbonation. Tests have shown that one declared unit (1 m²) can absorb up to 1.0 kg of CO_2 from the atmosphere.

2.12 Reference service life

According to the European Assessment Document (EAD 210024-00-0504) for cement-bonded-boards and the requirements of EN 12467 for fibre-cement flat sheets, the durability of AQUAPANEL® Cement Board Indoor is at least 50 years.

2.13 Extraordinary effects

Fire

AQUAPANEL® Cement Board Indoor is a non-combustible building material of building material class A1 regarding to 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 elution of other heavy metals is 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 for 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	0.091	-
Grammage	11	kg/m^2
Gross density EN 12467*	750	kg/m^3
Layer thickness	0,0125	m

* 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.

Other declared units are allowed if the conversion is shown transparently.

3.2 System boundary

This environmental information is based on a cradle-to-grave approach and takes into account the modules of the product stage or production phase A1-A3, about the construction phase A4-A5 and the disposal stage C1-C4. The use phase included the module B1-B5 related to the building fabric and B6-B7 relating to the operation. The information about the benefits and loads beyond de system boundary (D) are considered as well. However B3-B5, these have not been included in the study as there is no impact derived from the declared product during the use phase.

3.3 Estimates and assumptions

No estimates or assumptions were made in the assessment.

3.4 Cut-off criteria

The data of the cement board production was determined on site. The formula and the starting materials used, the electrical energy used, and all direct production waste(by-product) were considered in the Assessment. 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 and hydrophobic agent in the production area. These materials corresponds to <0.12 % of the mass use for the declared unit. In addition, the packaging material is cut off due to missing data sets for recycled PET strapping and cardboard edges. The proportion of packaging materials in relation to a declared unit is around 0.5%.
An application of the cut-off criteria beyond the above-mentioned processes was not necessary. The total mass cut off regarding to the declared mass is about 0,62 %.

3.5 Background data

All the background data used was taken from the LCA-for-Experts-Software (Content Version 2023.2).

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. The manufacturer-specific data used comes from the year 2023. 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 2023.

3.8 Geographic Representativeness

Land or region, in which the declared product system is manufactured, used or handled at the end of the product´s

lifespan: Germany

3.9 Allocation

No allocations were used in the present assessment.

3.10 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. Background data base: LCA for Experts-Software (Sphera), Content Version 2023.2

4. LCA: Scenarios and additional technical information

Characteristic product properties of biogenic carbon

AQUAPANEL® Cement Board Indoor consists almost exclusively of inorganic materials. The proportion of biogenic carbon in the total mass of the Product is far less than 1%.

Construction phase A4-A5

Transport to the construction site (A4)

To show the cost of transport to the construction site, a weighted average transport distance to all markets for the declared product produced in Iserlohn was determined by the declaration holder.

Name	Value	Unit
Transport distance *	620	km
Transport vehicle	Truck, 40 t	-
Fuel	Diesel	-

*For the calculation, the transport distance to the geographical centre of the country was determined and weighted with the delivered volume for the year 2023. No interim transport to local warehouses was considered in this calculation.

Installation in the building (A5)

It is assumed that the installation of the declared product is carried out with stainless steel screws using electric energy. According to the manufacturer, approximately 20 screws are used per square meter. The screws are not taken into account of the LCA, only the energy demand.

Name	Value	Unit
Electricity consumption	0.012	kWh

Use Stage Information- Building fabric (B1-B2)

Use or application of the product (B1)

There are no emissions or environmental impacts during the use phase.

Maintenance (B2)

Product-related maintenance work is not necessary throughout the entire service life.

Use Stage Information- Operation of the building (B6-B7)

Operational energy use (B6)

The declared unit does not require any electric energy during its service life.

Operational water use (B7)

The declared unit does not require any water during its service life.

Disposal Phase (C1-C4)

Deconstruction/demolition (C1)

The deconstruction is carried out mechanically and unspecifically with an excavator (100 kW), related to the product under consideration. The scenario considers the impacts caused by the operation of the excavator (incl. diesel), depending on the mass to be moved (declared unit).

Transport for waste processing (C2)

The transport of the deconstructed/demolished material to any treatment takes place within a radius of 100 km.

Waste processing for reuse, recovery and/ or recycling (C3)

It is estimated that about 80% of the used product is used as filler material in various constructions after waste processing. An appropriate processing and separation is taken into account. The remaining 20% goes to landfill (C4).

C4: Removal (C4)

20 % of the product goes to landfill (inert).

Name	Value	Unit
Demolition load constr. machine	11	kg
Transport C2	100	km
Recycling C3	8.8	kg
Landfilling C4	2.2	kg

Information on the benefits and loads beyond the system boundary (D)

The identified recycling potential regards the use as filler material in other constructions. In this context, no credits are claimed in this EPD.

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 OR INDICATOR 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	X	X	X	X	MNR	MNR	MNR	X	X	X	X	X	X	X

RESULTS OF THE LCA - ENVIRONMENTAL IMPACT according to EN 15804+A2: 1 m² AQUAPANEL® Cement Board Indoor

Parameter	Unit	A1	A2	A3	A4	A5	B1	B2	B6	B7	C1	C2	C3	C4	D
GWP-total	kg CO_2 eq	4.33	0.125	0.278	0.544	0.00502	0	0	0	0	0.00682	0.0878	0.0221	0.0316	0
GWP-fossil	kg CO_2 eq	4.31	0.125	0.274	0.541	0.00496	0	0	0	0	0.00677	0.0872	0.0221	0.0326	0
GWP-biogenic	kg CO_2 eq	1.26E-02	-1.9E-04	3.47E-03	-1.38E-03	6.57E-05	0	0	0	0	-1.09E-05	-2.22E-04	-2.29E-04	-1.12E-03	0
GWP-luluc	kg CO_2 eq	7.96E-04	3.4E-04	5.25E-05	5E-03	7.66E-07	0	0	0	0	6.12E-05	8.06E-04	1.69E-04	1.03E-04	0
ODP	kg CFC11 eq	1.11E-11	1.87E-14	8.37E-12	8.44E-14	1.53E-13	0	0	0	0	1.03E-15	1.36E-14	3.77E-14	8.5E-14	0
AP	mol H^+ eq	4.97E-03	1.74E-03	4.41E-04	3.92E-03	7.62E-06	0	0	0	0	3.45E-05	6.32E-04	1.18E-04	2.34E-04	0
EP-freshwater	kg P eq	3.23E-06	1.49E-07	1.56E-06	1.98E-06	2.85E-08	0	0	0	0	2.42E-08	3.19E-07	7.66E-08	6.68E-08	0
EP-marine	kg N eq	1.36E-03	7.65E-04	1.41E-04	1.94E-03	2.47E-06	0	0	0	0	1.63E-05	3.13E-04	5.39E-05	6.06E-05	0
EP-terrestrial	mol N eq	1.48E-02	8.4E-03	1.46E-03	2.14E-02	2.55E-05	0	0	0	0	1.79E-04	3.45E-03	5.96E-04	6.66E-04	0
POCP	kg NMVOC eq	4.37E-03	1.93E-03	3.44E-04	3.71E-03	5.94E-06	0	0	0	0	4.53E-05	5.98E-04	1.46E-04	1.83E-04	0
ADPE	kg Sb eq	1.38E-07	4.73E-09	4.96E-08	3.63E-08	9.04E-10	0	0	0	0	4.44E-10	5.85E-09	2.41E-08	1.53E-09	0
ADPF	MJ	27	1.61	3.85	7.42	0.0696	0	0	0	0	0.0908	1.2	0.443	0.44	0
WDP	m^3 world eq deprived	9.89E-02	4.12E-04	8.34E-03	6.78E-03	1.46E-04	0	0	0	0	8.3E-05	1.09E-03	4.38E-03	3.62E-03	0

GWP = Global warming potential; ODP = Depletion potential of the stratospheric ozone layer; AP = Acidification potential of land and water; EP = Eutrophication potential; POCP = Formation potential of tropospheric ozone photochemical oxidants; ADPE = Abiotic depletion potential for non-fossil resources; ADPF = Abiotic depletion potential for fossil resources; WDP = Water (user) deprivation potential)

RESULTS OF THE LCA - INDICATORS TO DESCRIBE RESOURCE USE according to EN 15804+A2: 1 m² AQUAPANEL® Cement Board Indoor

Parameter	Unit	A1	A2	A3	A4	A5	B1	B2	B6	B7	C1	C2	C3	C4	D
PERE	MJ	5.71	0.0553	3.72	0.541	0.068	0	0	0	0	0.00663	0.0873	0.0412	0.072	0
PERM	MJ	0	0	0	0	0	0	0	0	0	0	0	0	0	0
PERT	MJ	5.71	0.0553	3.72	0.541	0.068	0	0	0	0	0.00663	0.0873	0.0412	0.072	0
PENRE	MJ	27.1	1.61	3.85	7.45	0.0696	0	0	0	0	0.0912	1.2	0.444	0.44	0
PENRM	MJ	0	0	0	0	0	0	0	0	0	0	0	0	0	0
PENRT	MJ	27.1	1.61	3.85	7.45	0.0696	0	0	0	0	0.0912	1.2	0.444	0.44	0
SM	kg	0	0	0	0	0	0	0	0	0	0	0	0	0	0
RSF	MJ	0	0	0	0	0	0	0	0	0	0	0	0	0	0
NRSF	MJ	0	0	0	0	0	0	0	0	0	0	0	0	0	0
FW	m^3	7.12E-03	5.08E-05	1.28E-03	6.01E-04	2.31E-05	0	0	0	0	7.36E-06	9.69E-05	1.27E-04	1.11E-04	0

PERE = Use of renewable primary energy excluding renewable primary energy resources used as raw materials; PERM = Use of renewable primary energy resources used as raw materials; PERT = Total use of renewable primary energy resources; PENRE = Use of non-renewable primary energy excluding non-renewable primary energy resources used as raw materials; PENRM = Use of non-renewable primary energy resources used as raw materials; PENRT = Total use of non-renewable primary energy resources; SM = Use of secondary material; RSF = Use of renewable secondary fuels; NRSF = Use of non-renewable secondary fuels; FW = Use of net fresh water

RESULTS OF THE LCA – WASTE CATEGORIES AND OUTPUT FLOWS according to EN 15804+A2: 1 m² AQUAPANEL® Cement Board Indoor

Parameter	Unit	A1	A2	A3	A4	A5	B1	B2	B6	B7	C1	C2	C3	C4	D
HWD	kg	1.37E-07	3.95E-12	-7.22E-10	3.82E-11	-1.32E-11	0	0	0	0	4.67E-13	6.15E-12	-1.15E-12	9.48E-12	0
NHWD	kg	6.13E-02	1.92E-04	2.32E-01	1.15E-03	6.53E-05	0	0	0	0	1.41E-05	1.86E-04	1.17E-04	2.2E+00	0
RWD	kg	6.19E-04	2E-06	3.73E-04	1.45E-05	6.82E-06	0	0	0	0	1.78E-07	2.35E-06	5.96E-06	4.95E-06	0
CRU	kg	0	0	0	0	0	0	0	0	0	0	0	0	0	0

MFR	kg	0	0	0	0	0	0	0	0	0	0	0	0	0	0
MER	kg	0	0	0	0	0	0	0	0	0	0	0	0	0	0
EEE	MJ	0	0	0	0	0	0	0	0	0	0	0	0	0	0
EET	MJ	0	0	0	0	0	0	0	0	0	0	0	0	0	0

HWD = Hazardous waste disposed; NHWD = Non-hazardous waste disposed; RWD = Radioactive waste disposed; CRU = Components for re-use; MFR = Materials for recycling; MER = Materials for energy recovery; EEE = Exported electrical energy; EET = Exported thermal energy

RESULTS OF THE LCA – additional impact categories according to EN 15804+A2-optional:
1 m² AQUAPANEL® Cement Board Indoor

Parameter	Unit	A1	A2	A3	A4	A5	B1	B2	B6	B7	C1	C2	C3	C4	D
PM	Disease incidence	1.08E-07	3.67E-08	3.58E-09	1.4E-08	6.01E-11	0	0	0	0	3.91E-10	2.25E-09	2.23E-09	2.88E-09	0
IR	kBq U235 eq	6.78E-02	2.5E-04	3.89E-02	2.13E-03	7.1E-04	0	0	0	0	2.61E-05	3.44E-04	9.58E-04	5.63E-04	0
ETP-fw	CTUe	12.7	1.15	1.47	5.28	0.0264	0	0	0	0	0.0647	0.852	0.295	0.238	0
HTP-c	CTUh	4.63E-10	2.2E-11	7.82E-11	1.07E-10	1.36E-12	0	0	0	0	1.31E-12	1.73E-11	6.5E-12	3.7E-11	0
HTP-nc	CTUh	1.98E-08	8.15E-10	1.48E-09	4.78E-09	1.97E-11	0	0	0	0	5.87E-11	7.71E-10	2.36E-10	3.9E-09	0
SQP	SQP	4.42	0.277	2.47	3.07	0.045	0	0	0	0	0.0376	0.496	0.119	0.111	0

PM = Potential incidence of disease due to PM emissions; IR = Potential Human exposure efficiency relative to U235; ETP-fw = Potential comparative Toxic Unit for ecosystems; HTP-c = Potential comparative Toxic Unit for humans (cancerogenic); HTP-nc = Potential comparative Toxic Unit for humans (not cancerogenic); SQP = Potential soil quality index

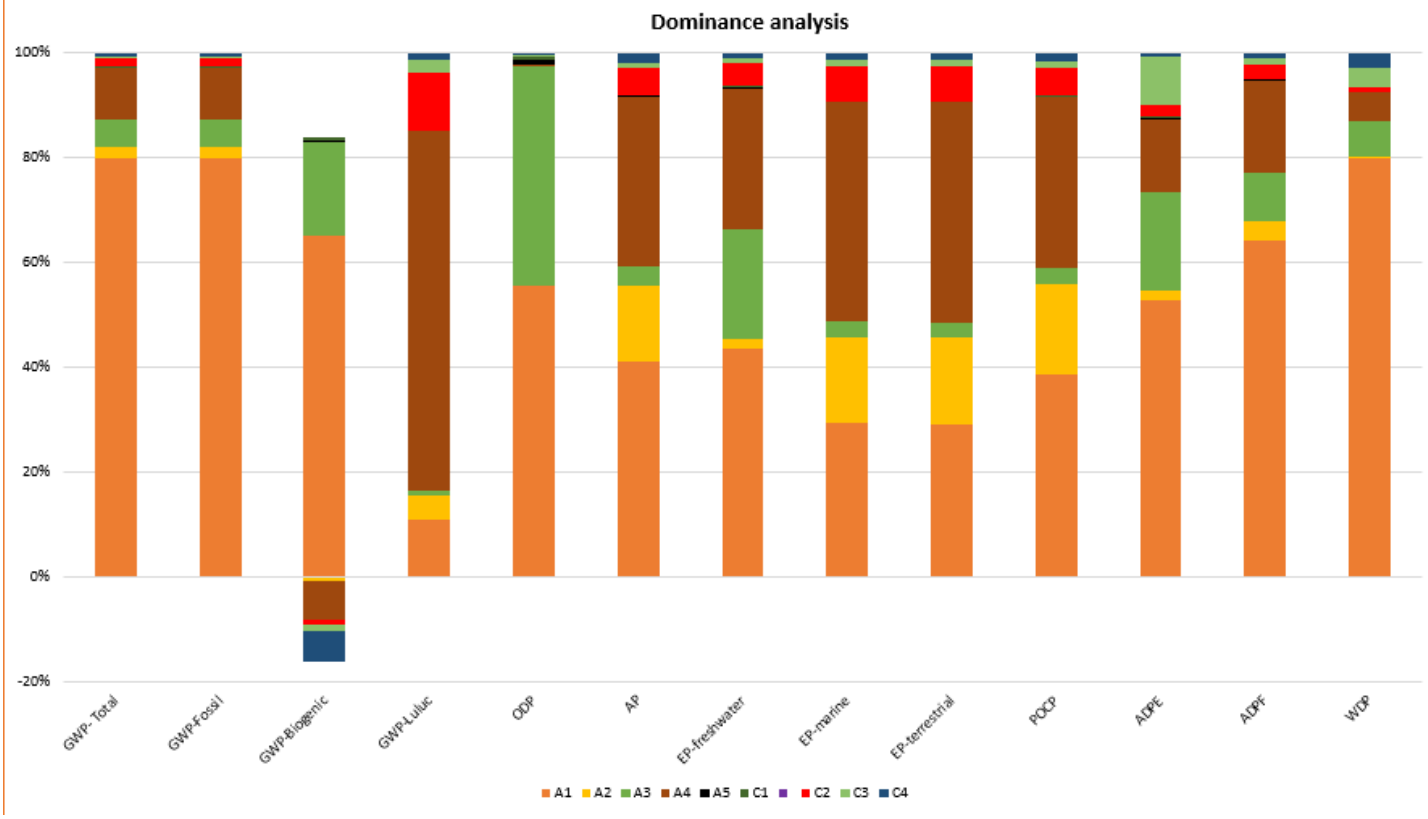
Disclaimer 1 – for the indicator “Potential Human exposure efficiency relative to U235”. This impact category deals mainly with the eventual impact of low-dose ionizing radiation on human health of the nuclear fuel cycle. It does not consider effects due to possible nuclear accidents, occupational exposure or radioactive waste disposal in underground facilities. Potential ionizing radiation from the soil, radon and from some construction materials is also not measured by this indicator.

Disclaimer 2 – for the indicators “abiotic depletion potential for non-fossil resources”, “abiotic depletion potential for fossil resources”, “water (user) deprivation potential, deprivation-weighted water consumption”, “potential comparative toxic unit for ecosystems”, “potential comparative toxic unit for humans – cancerogenic”, “Potential comparative toxic unit for humans - not cancerogenic”, “potential soil quality index”. The results of this environmental impact indicator shall be used with care as the uncertainties on these results are high as there is limited experience with the indicator.

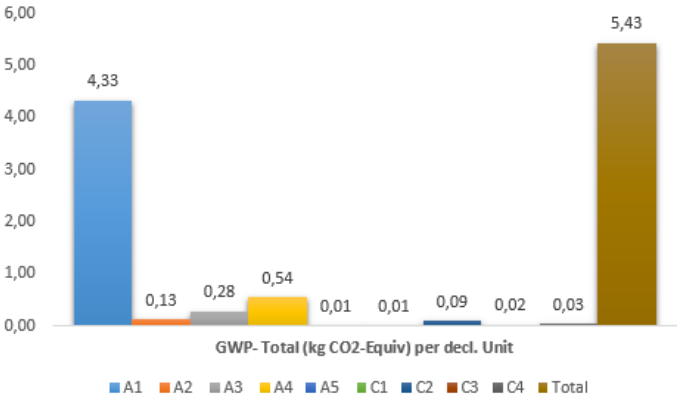
6. LCA: Interpretation

The dominance analysis shows that the most important impact on most of the impact categories 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 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 thermal energy requirement. The processes used here are for the most part mixing and molding processes that have little environmental impact. The curing process takes place due to exothermic chemical reactions without the use of additional thermal energy. Furthermore, the comparatively high influence of the transportation to the construction site (A4) on individual impact categories is striking. This is due to the high average distance of 620 km by truck used and the associated expenditure on diesel. Around 99% of the GWP is made up of emissions from fossil sources, which is due to the almost complete mineral composition.



If only the climate change impact category is considered (see graphic below), A1 is accounting for approximately 80 % of the greenhouse gas emissions. Regarding the used raw materials, the CEM I cement used in the product contributes about 75 % to the Global Warming Potential (GWP) (based on A1), which is due to the energy-intensive firing upstream processes. The second major influence on the global warming potential in A1 represents the use of expanded perlites (13 %) followed by the glass fabric (10 %). The production process is responsible for 5,2 % and consists of the electrical energy demand. While the transport of raw materials is responsible for 2,4 % of the greenhouse gas emissions due to local resourcing (e.g. Limestone, Cement within less than 90 km), the transportation to the construction side (A4) shows a significantly bigger impact on the total GWP.



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 2021).

7.2 Radioactivity

The Activity Concentration Index (ACI) was determined to be 0.17. 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. 3022-1292 from July 2022.

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 2022 by the Institute for Building Biology Rosenheim (IBR). 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. 3022-1292.

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

Name	Value	Unit
TVOC (C6 - C16)	862	µg/m³
Sum SVOC (C16 - C22)	< 5	µg/m³
R (dimensionless)	0.21	-
VOC without NIK	< 5	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 2022. 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. 3022-1292.

Heavy metal concentration in the original substance

Name	Value	Unit
Arsenic	1.6	mg/kg
Cadmium	< 0.3	mg/kg
Chromium	22.1	mg/kg
Copper	35.1	mg/kg
Lead	6.0	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
Cadmium	< 0.0005	mg/l
Chromium	0.0231	mg/l
Copper	< 0.005	mg/l
Lead	< 0.005	mg/l
Nickel	< 0.005	mg/l
Mercury	< 0.0001	mg/l
Zinc	0.072	mg/l

8. References

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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.

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LCA for Experts Software
Software and database, content version of database 2023.2 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.

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Ordinance on the European list of waste (Abfallverzeichnis-Verordnung - AVV) 10.12.2001.

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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 Text with EEA relevance.

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Calculation Rules for the Life Cycle Assessment and Requirements on the Project Report according to EN 15804+A2:2019, V1.4, 04/2024.

Publisher

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