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-20240591-IBA1-EN
Issue date	07.03.2025
Valid to	06.03.2030

AQUAPANEL® Cement Board Outdoor- Plant Neuburg

Knauf AQUAPANEL GmbH & Co. KG

Institut Bauen und Umwelt e.V.

ECO PLATFORM EPD VERIFIED

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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-20240591-IBA1-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

07.03.2025

Valid to

06.03.2030

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 Outdoor- Plant Neuburg

Owner of the declaration

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

Declared product / declared unit

1 m² *AQUAPANEL® Cement Board Outdoor* with a thickness of 12,5 mm produced in Neuburg, Germany.

Scope:

This environmental product declaration refers to *AQUAPANEL® Cement Board Outdoor* with the DoP No. KAGE_002 produced in Neuburg, Germany, and is only valid for variants which fulfil Category A according to *EN 12467*.
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

The AQUAPANEL® Cement Board Outdoor is an aggregated Portland cement board comprising a coated glass fibre mesh with longitudinally and transversally arranged glass fibres embedded in the back and front surfaces of the panel. AQUAPANEL® Cement Board Outdoor is certified to *EN 12467* and therefore a product according to *CPR* based on an *ETA*. 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 panel - product specification and test methods and the CE marking. The product has a declaration of performance taking into consideration *ETA -07/ 0173.*
For the use of the product, the respective national regulations apply.

2.2 Application

The AQUAPANEL® Cement Board Outdoor panel is used as a non-load-bearing wall element in outdoor areas.

2.3 Technical Data

Technical Data

Name	Value	Unit
Thermal conductivity acc to ISO 10456	0.35	W/(mK)
Water vapour diffusion resistance factor acc. to ISO 12467	66	-
Gross density acc to EN 12467	1150	kg/m^3
Flexural strength acc to EN 12467	9.6	N/mm^2
Coefficient of thermal expansion	7	$10^{-6}K^{-1}$
Moisture expansion parameter acc to EN 318	0.23	%

AQUAPANEL® Cement Board Outdoor *(Product according to CPR with ETA)*
• Performance values of the product according to the declaration of performance with respect to its essential characteristics according to *ETA-07/ 0173.*
• Voluntary information for the product: *Technical Data Sheet 11/16*; aquapanel.com

2.4 Delivery status

The panels are sold in widths of 1200/1250 mm and lengths of 900/2000/2400/2500/2600/3000 mm. Layer thickness is 12.5 mm.

2.5 Base materials/Ancillary materials

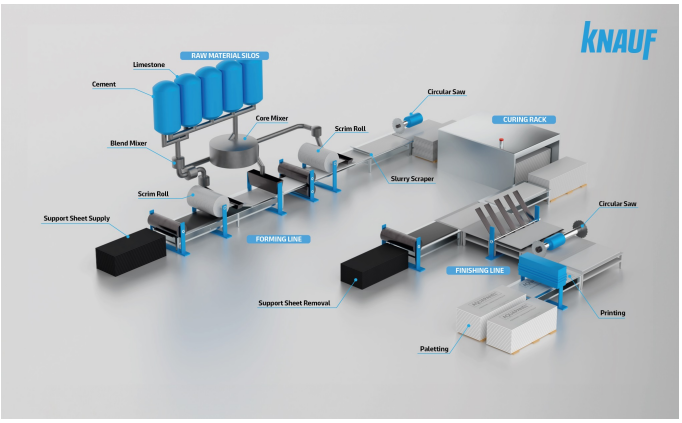
AQUAPANEL® Cement Board Outdoor consists mainly of cement and limestone, as well as other basic materials such as perlite, recycled material (By-product) glass fibre fabrics and hydrophobic agents. During the production process water is added to start the cement hydration. The final product contains around 10 % residual moisture when leaving the plant. The proportions averaged for the EPD from the various products are as follows:

Name	Value	Unit
Cement	20-30	Mass-%
Limestone	30-50	Mass-%
Perlite Core	5-20	Mass-%
By product	5-7.5	Mass-%
Glass fibre scrim	<2	Mass-%
Hydrophobic agents	<1	Mass-%

In this context, By-product refers to production scrap which is reused directly within 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 carcinogenic, mutagenic, reprotoxic *(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 *Regulation (EU) on Biocide Products No. 528/2012)*: **no.**

2.6 Manufacture



Expanded perlite is produced On-site from perlite ore using natural gas as an energy source for the expansion process. The resulting product is stored in a designated silo, situated externally to the production hall, along with the silos for aggregates and binders. The raw materials for the panel core are dosed over belt scales and loss-in-weight feeders according to the formula, then transported to the weighing container and the core mixer via a central conveyor where the material is homogeneously mixed with water to 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 glass fibre mesh required for production is stored in the basement of the production hall and fed via rolls into the production line.

In the forming line, reusable support sheets are continuously fed into the forming conveyor belt, providing structural support for the production and forming of the panels. Prior to the application of the core material, the bottom glass fibre mesh is coated with the slurry and then attached to the support sheets. Subsequently, the loose earth-moist core material is applied and compressed into a dense core material by rollers. Thereafter, the slurry-coated top glass fibre mesh is applied. Any excess slurry is removed, and the boards are cut to the requisite lengths, stacked on reusable curing pallets and transferred to the curing rack. Once the curing process is complete, the boards are destacked and the support sheets are removed and returned to the production line. Before the boards are pelleted, they are flipped regularly, both horizontally and vertically, to ensure even stacking, cut to the final lengths, and printed. All cut-off material and sawdust are recirculated and reused in the production process directly, without being sent to

a separate disposal area.

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. 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-use 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

The product has no adverse effects on the environmental or human health during its operational lifespan. 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. There is no possibility of dust emission.

AQUAPANEL® Cement Board Outdoor is able to remove carbon dioxide from the atmosphere through recarbonation. Tests have shown that one declared unit (1 m²) can absorb up to 0.8 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 Outdoor is at least 50 years.

2.13 Extraordinary effects

Fire

AQUAPANEL® Cement Board Outdoor is a non-combustible building material of building material class A1 regarding *EN 13501.*

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 Outdoor, the waste code *170904* mixed construction and demolition waste other than those falling under *170901, 170902* and *170903 i*s recommended.

2.16 Further information

For further information please refer to the website at www.aquapanel.com

3. LCA: Calculation rules

3.1 Declared Unit

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

Declared unit and mass reference

Name	Value	Unit
Declared unit	1	m²
Gross density EN 12467*	1150	kg/m^3
conversion factor to 1 kg	0.0625	-
Grammage	16.0	kg/m^2
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.

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 phases A1-A3, the construction phases A4-A5 and the disposal stages C1-C4, as well as possible benefits outside the system boundary -D. The use phases included modules B1-B5 related to the building fabric and B6-B7 relating to the operation. 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 for the cement board production was determined on-site. The assessment considered the formula and starting materials used, the electrical energy consumed, and all direct production waste (by-product).
Also, 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 correspond to 0.14 % 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 0.020 %. An application of the cut-off criteria beyond the above-mentioned

processes was not necessary. The total mass cut-off regarding the declared mass is about 0.16 %.

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 assessment 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 database: *LCA for Experts-Software*

4. LCA: Scenarios and additional technical information

Characteristic product properties of biogenic carbon

AQUAPANEL® Cement Board Outdoor consists almost exclusively of inorganic materials. The proportion of biogenic carbon in the total mass of the product is far less than 1 %. Note: 1 kg of biogenic carbon is equivalent to 44/12 kg of CO_2.

Manufacturing (A1-A3)

The information modules A1-A3 about the manufacturing phase have been partially described above in section 2.

Construction phase (A4-A5)

Transport to the building 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 Neuburg was determined by the declaration holder.

Name	Value	Unit
Transport distance *	754	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 by the LCA, only the energy demand.

Name	Value	Unit
Electricity consumption	0.012	kWh

Use Stage (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 relating to the 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 conducted using a mechanical excavator with a power output of 100 kW, which is specifically 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/recycling (C3)

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

Removal (C4)

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

Name	Value	Unit
Demolition load constr. machine	16.6	kg
Transport C2	100	km
Recycling C3	13,3	kg
Landfilling C4	3,3	kg

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 Outdoor for the considered life cycle phases 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 Outdoor

Parameter	Unit	A1	A2	A3	A4	A5	B1	B2	B6	B7	C1	C2	C3	C4	D
GWP-total	kg CO_2 eq	3.9	0.18	0.287	0.98	0.00523	0	0	0	0	0.0101	0.13	0.035	0.0417	0
GWP-fossil	kg CO_2 eq	3.87	0.18	0.286	0.979	0.00516	0	0	0	0	0.0101	0.13	0.0349	0.0431	0
GWP-biogenic	kg CO_2 eq	3.09E-02	-6.46E-04	5.39E-04	-4.44E-03	6.84E-05	0	0	0	0	-3.57E-05	-5.89E-04	-3.57E-05	-1.48E-03	0
GWP-luluc	kg CO_2 eq	6.36E-04	9.09E-04	1.09E-05	5.93E-03	7.98E-07	0	0	0	0	5.97E-05	7.86E-04	1.71E-04	1.36E-04	0
ODP	kg CFC11 eq	1.28E-11	4.17E-14	2.2E-14	2.45E-13	1.59E-13	0	0	0	0	2.46E-15	3.24E-14	1.07E-13	1.12E-13	0
AP	mol H^+ eq	5.42E-03	1.66E-03	1.71E-04	7.04E-03	7.94E-06	0	0	0	0	5.06E-05	9.34E-04	1.78E-04	3.1E-04	0
EP-freshwater	kg P eq	3.53E-06	3.64E-07	2.32E-08	2.34E-06	2.96E-08	0	0	0	0	2.35E-08	3.1E-07	9.23E-08	8.83E-08	0
EP-marine	kg N eq	1.24E-03	7.86E-04	7.84E-05	3.51E-03	2.57E-06	0	0	0	0	2.4E-05	4.66E-04	8.29E-05	8.01E-05	0
EP-terrestrial	mol N eq	1.35E-02	8.66E-03	8.67E-04	3.88E-02	2.66E-05	0	0	0	0	2.66E-04	5.15E-03	9.15E-04	8.81E-04	0
POCP	kg NMVOC eq	3.73E-03	1.7E-03	2.22E-04	6.69E-03	6.18E-06	0	0	0	0	6.71E-05	8.87E-04	2.23E-04	2.42E-04	0
ADPE	kg Sb eq	1.47E-07	1.13E-08	3.1E-09	7.17E-08	9.41E-10	0	0	0	0	7.22E-10	9.51E-09	3.79E-08	2.03E-09	0
ADPF	MJ	2.39E+01	2.43E+00	4.86E+00	1.35E+01	7.24E-02	0	0	0	0	1.36E-01	1.79E+00	6.82E-01	5.81E-01	0
WDP	m^3 world eq deprived	1.17E-01	8.27E-04	2.26E-04	5.2E-03	1.52E-04	0	0	0	0	5.24E-05	6.9E-04	6.18E-03	4.78E-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 Outdoor

Parameter	Unit	A1	A2	A3	A4	A5	B1	B2	B6	B7	C1	C2	C3	C4	D
PERE	MJ	6.28	0.141	0.0213	0.904	0.0707	0	0	0	0	0.0091	0.12	0.075	0.0952	0
PERM	MJ	0	0	0	0	0	0	0	0	0	0	0	0	0	0
PERT	MJ	6.28	0.141	0.0213	0.904	0.0707	0	0	0	0	0.0091	0.12	0.075	0.0952	0
PENRE	MJ	23.9	2.43	4.86	13.5	0.0724	0	0	0	0	0.136	1.79	0.682	0.582	0
PENRM	MJ	0	0	0	0	0	0	0	0	0	0	0	0	0	0
PENRT	MJ	23.9	2.43	4.86	13.5	0.0724	0	0	0	0	0.136	1.79	0.682	0.582	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	7.36E-03	1.25E-04	2.36E-05	8.04E-04	2.41E-05	0	0	0	0	8.09E-06	1.07E-04	1.8E-04	1.47E-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 Outdoor

Parameter	Unit	A1	A2	A3	A4	A5	B1	B2	B6	B7	C1	C2	C3	C4	D
HWD	kg	6.76E-10	4.33E-12	1.14E-09	2.28E-11	-1.38E-11	0	0	0	0	2.29E-13	3.02E-12	-7.3E-12	1.25E-11	0
NHWD	kg	8.46E-02	3.49E-04	1.37E-03	2.02E-03	6.8E-05	0	0	0	0	2.03E-05	2.68E-04	1.91E-04	2.91E+00	0
RWD	kg	6.6E-04	3.05E-06	1.45E-06	1.78E-05	7.09E-06	0	0	0	0	1.79E-07	2.36E-06	5.59E-06	6.54E-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 Outdoor

Parameter	Unit	A1	A2	A3	A4	A5	B1	B2	B6	B7	C1	C2	C3	C4	D
PM	Disease incidence	9.39E-08	1.92E-08	1.02E-09	2.43E-08	6.26E-11	0	0	0	0	5.77E-10	3.22E-09	3.44E-09	3.81E-09	0
IR	kBq U235 eq	7.2E-02	3.23E-04	1.85E-04	1.9E-03	7.39E-04	0	0	0	0	1.92E-05	2.52E-04	5.87E-04	7.44E-04	0
ETP-fw	CTUe	7.7	1.78	0.028	9.84	0.0275	0	0	0	0	0.099	1.3	0.49	0.315	0
HTP-c	CTUh	4.19E-10	3.51E-11	3.51E-11	1.96E-10	1.42E-12	0	0	0	0	1.97E-12	2.6E-11	1.07E-11	4.89E-11	0
HTP-nc	CTUh	2.64E-08	1.43E-09	1.76E-09	8.22E-09	2.05E-11	0	0	0	0	8.3E-11	1.09E-09	3.74E-10	5.16E-09	0
SQP	SQP	4.82	0.737	0.0144	4.8	0.0468	0	0	0	0	0.0483	0.636	0.172	0.147	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

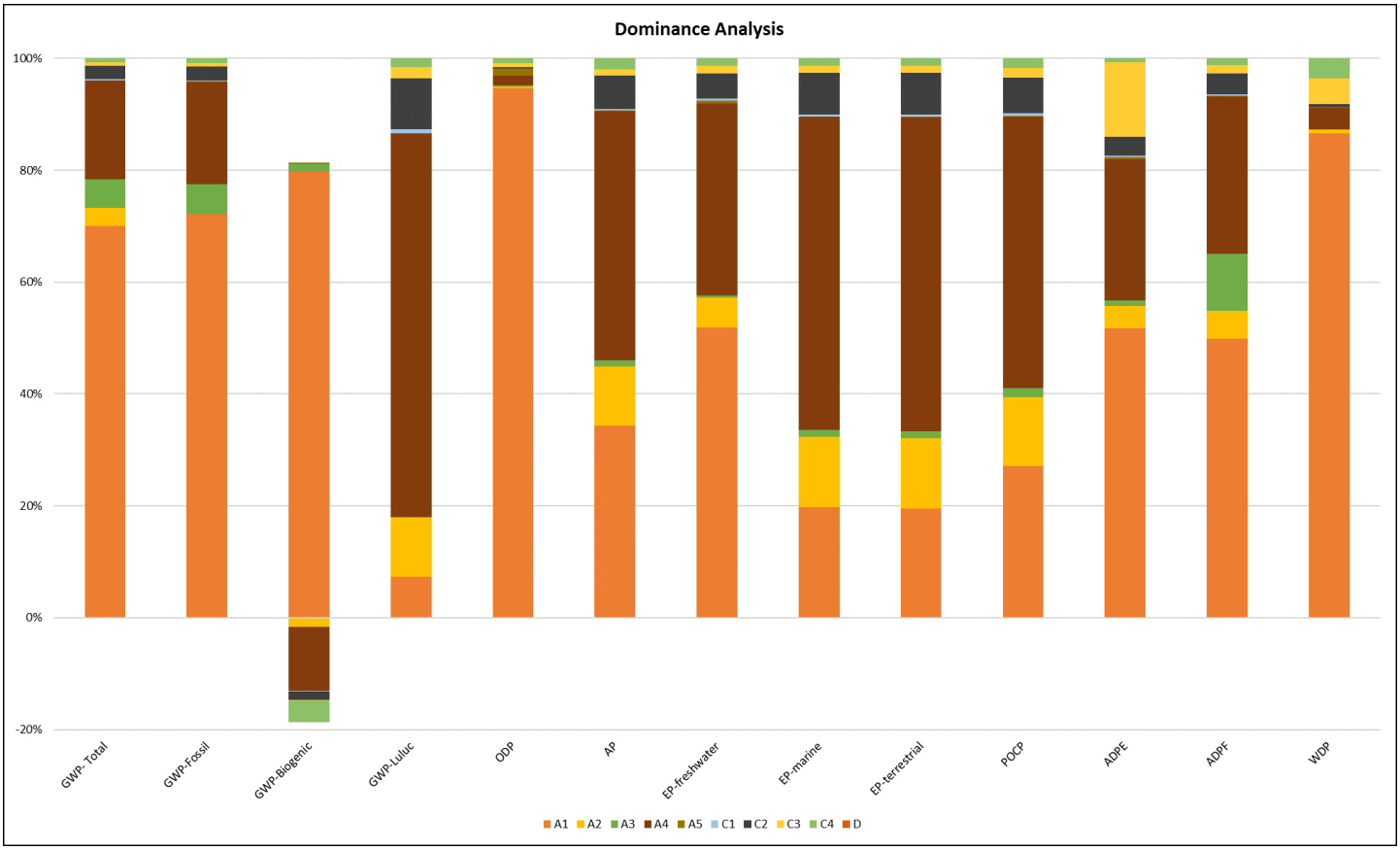
Disclaimer 1 – for the indicator “Potential Human exposure efficiency relative to U235”. This impact category deals mainly with the eventual impact of low-dose ionizing radiation on human health of the nuclear fuel cycle. It does not consider effects due to possible nuclear accidents, occupational exposure 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.

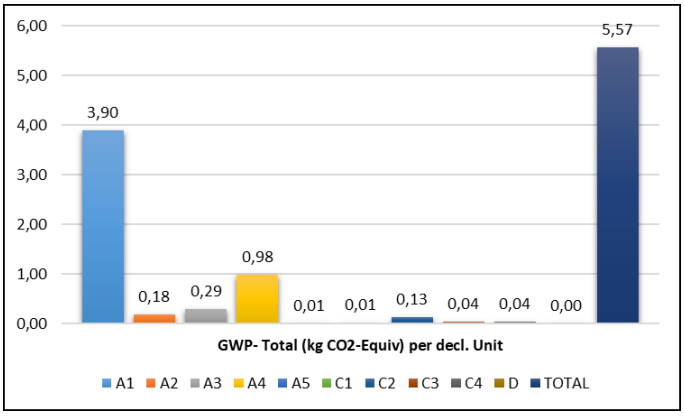
This EPD was created using a software tool.

6. LCA: Interpretation

The results of the dominance analysis indicate that the most significant impact across the majority of impact categories is raw material procurement and processing (module A1). The mineral raw materials used in this context are extracted as non-renewable resources and in certain cases also thermally treated (glass melting, expansion, cement burning). The transportation of raw materials and the production at the Neuburg plant have only a minor impact. The impact of the production process in the factory itself is rather subordinate to the eco-balance and can be largely attributed to the thermal energy used for the perlite expansion process.
The processes employed here are primarily mixing and moulding processes, which have a minimal environmental impact. The curing process is driven by exothermic chemical reactions, eliminating the need for additional thermal energy. It is also notable that the transportation to the construction site (A4) has a significant impact on individual impact categories. This is due to the average distance by truck, as well as the associated expenditure on diesel. It is estimated that 99 % of the GWP is composed of emissions from fossil sources, which is largely attributed to the near-total reliance on mineral-based composition.



The following bar chart illustrates the impact of the climate change category, with approximately 82 % of greenhouse gas emissions attributed to Module A1. With regard to the raw materials used, it is notable that approximately 64 % of the Global Warming Potential (GWP) is contributed by the cement used in the product, which is a result of the energy-intensive firing processes upstream. The second major influence on the global warming potential in A1 represents the use of fibreglass followed by limestone and perlite ore. The transportation of raw materials (A2) is responsible for approx 3.82 % of the total greenhouse gas emissions, this percentage is primarily attributable to the significance of the perlite ore sourced from Greece and the fibreglass, which is imported from Spain and France. Given the disparate quantities imported by each country, a weighted average of the distances was employed for the assessment.



The production process (A3) accounts for 6.77 % of the total and comprises the electrical and thermal energy demand associated with mostly the expansion of the perlite. However, the transportation of materials to the construction site (A4) contributed 17.62 % to the total global warming potential (GWP) of the declared unit.

7. Requisite evidence

7.1 Quality Management System

The location in Neuburg 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. 3024-1461 from May 2024.*

7.3 VOC Emissions

Emissions of volatile organic compounds (VOCs) from the AQUAPANEL® Cement Board Outdoor in accordance with the *AgBB* scheme were tested in 2024 by the Institute for Building Biology Rosenheim (IBR). The product fulfils the requirements of the Committee for Health-related Evaluation of Building Products *(AgBB)* scheme in terms of type and scope. *Institute for Building Biology Rosenheim GmbH Test Report No. 3024-1461.*

AgBB overview of results (28 days [µg/m³])

Name	Value	Unit
TVOC (C6 - C16)	862	µg/m^3
Sum SVOC (C16 - C22)	<5	µg/m^3
R (dimensionless)	0.21	-
VOC without NIK	<5	µg/m^3
Carcinogenic Substances	<1	µg/m^3

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 2024. 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.3024-1461.*

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/kg
Cadmiun	<0.0005	mg/kg
Chromium	0.0231	mg/kg
Copper	<0.005	mg/kg
Lead	<0.005	mg/kg
Nickel	<0.005	mg/kg
Mercury	<0.0001	mg/kg
Zinc	0.072	mg/kg

8. References

EN 15804
EN 15804:2012+A2:2019+AC:2021, Sustainability of construction works — Environmental Product Declarations — Core rules for the product category of construction products.

ISO 14025
EN ISO 14025:2011, Environmental labels and declarations — Type III environmental declarations — Principles and procedures.

DIN 38414
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 (S4).

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
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 318
DIN EN 318:2002-06: Wood-based panels - Determination of dimensional changes associated with changes in relative humidity

ISO 9001
DIN EN ISO 9001:2008, Quality management systems - Requirements (ISO 9001:2008).

ISO 17294
DIN EN ISO 17294-2:2017-01, Water quality - Application of inductively coupled plasma mass spectrometry (ICP-MS)- Part2: Determination of selected elements including uranium isotopes.

ISO 10456:2010-05
DIN EN ISO 10456:2010-05: Building materials and products - Hygrothermal properties - Tabulated design values and procedures for determining declared and design thermal values

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).

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.

CANDIDATE LIST
List of substances of very high concern for authorisation according to Article 59(10) of the REACH Regulation.

REGULATION (EU) No 528/2012
Regulation of the European Parliament and of the Council, concerning the making available on the market and use of biocidal products.

EAD 210024-00-0504
European Assessment Document, January 2018, Cement Bonded Board.

PCR 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 according to EN15804+A2:2019, V1.4, 04/2024.

PCR 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. 04/2024.

LCA FOR EXPERTS SOFTWARE
Software and data base, content version of database 2023.2

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.

TECHNICAL DATASHEET 11/16
Technical datasheet AQUAPANEL® Cement Board Indoor, September 2021.

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Institute for Building Biology Rosenheim, Test report Nr. 3024-1461 for AQUAPANEL® Cement Board Indoor/Outdoor, May 2024.

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