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-20260339-IBA1-EN
Issue date	15/10/2026
Valid to	14/10/2031

AQUAPANEL® Cement Board Rooftop 6 mm

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-20260339-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

15/10/2026

Valid to

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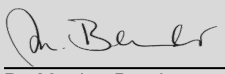
Dipl.-Ing. Hans Peters
(Chairman of Institut Bauen und Umwelt e.V.)



Dr. Martina Bender
(Managing Director Institut Bauen und Umwelt e.V.)

AQUAPANEL® Cement Board Rooftop 6 mm

Owner of the declaration

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

Declared product / declared unit

1 m² AQUAPANEL® Cement Board Rooftop with a thickness of 6 mm.

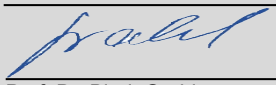
Scope:

This environmental product declaration refers to the AQUAPANEL® Cement Board Rooftop 6mm 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



Prof. Dr. Birgit Grahl,
(Independent verifier)

2. Product

2.1 Product description/Product definition

AQUAPANEL® Cement Board Rooftop is a lightweight, non-combustible cementitious board designed for flat roof assemblies in commercial and industrial buildings. It features a Portland cement-based core with mineral aggregates, reinforced with glass fibre mesh. The board provides mechanical stability, moisture and mould resistance, and protects insulation and roofing membranes from damage. It supports roof-mounted systems like photovoltaic panels and contributes to the roof's acoustic and fire performance. Manufactured according to regulatory standards, AQUAPANEL® is CE marked, ensuring compliance with relevant harmonised standards. The AQUAPANEL® Cement Board Rooftop is certified according to *EN 12467* and is therefore a product according to CPR with hEN. *Regulation (EU) No. 305/2011* (CPR) applies to the placing of the product on the market in the *European Union/ European Free Tarde Association* (EU/EFTA) (with the exception of Switzerland). The product requires a declaration of performance according to the CPR taking into account *DIN EN 12467:2018-12*, Fibre cement boards - Product specification and test methods and the CE marking.

AQUAPANEL Cement Board Rooftop 6 mm used as cover board with mechanically attached membranes has passed the FM Approval Certification Norm (class 4470 - Single-Ply, Polymer-Modified Bitumen Sheet, Built-Up Roof (BUR) and Liquid Applied Roof Assemblies for Use in Class 1 and Noncombustible Roof Deck Construction).

2.2 Application

It improves the performance of the flat roof in several ways: as a cover board between the insulation and the roof sealing, it protects the underlying thermal insulation, reduces stress on the sealing membranes, adds structural strength to the entire roof system, and provides a solid substrate for accessible roofs and roofs with ballast.

2.3 Technical Data

Constructional data

Name	Value	Unit
Thermal conductivity (dry) acc. to EN 12664	0.385	W/(mK)
Thermal Conductivity (23°C/ 80%) acc. to EN 12664	0,413	
Water vapour diffusion resistance factor acc. to EN ISO 12572	48	-
Density (dry) acc. to EN 12467	1250	kg/m^3
Length variation from 65 % to 85 % humidity acc. to EN 318	0.38	mm/m
Length variation from 65% to 30% acc. to EN 318	-0,32	mm/m
Thickness variation from 65% to 85% humidity acc. to EN 318	0,3	%
Thickness variation from 65% to 30% humidity acc. to EN 318	-0,3	%
Coefficient of thermal expansion	7	$10^{-6}K^{-1}$
pH value	12	-

AQUAPANEL® Cement Board Rooftop (product according to CPR with hEN.

• Performance values of the product according to the declaration of performance No KAGR_021 in relation to its essential characteristics in accordance with *DIN EN 12467:2018-12*, Fibre cement boards - Product specification and test methods.

• Voluntary information for the product: Technical Data Sheet 02/26 (www.aquapanel.com).

2.4 Delivery status

The AQUAPANEL® Cement Board Rooftop is supplied in dimensions of 900 mm x 1200 mm and 900 mm x 2400 mm, with a layer thickness of 6 mm.

2.5 Base materials/Ancillary materials

The AQUAPANEL® Cement Board Rooftop consists mainly of cement and limestone, as well as other basic materials such as perlite, glass fibre fabrics, and hydrophobic agents.

AQUAPANEL® Cement Board Rooftop 6mm

Name	Value	Unit
Cement	15-30	Mass-%
Limestone	35-55	Mass-%
Perlite Core	5-10	Mass-%
Glass fibre scrim	2.5	Mass-%
Hydrophobic agents	0.3	Mass-%

• This product contains substances listed in *the candidate list* (date: 02/2026) 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**

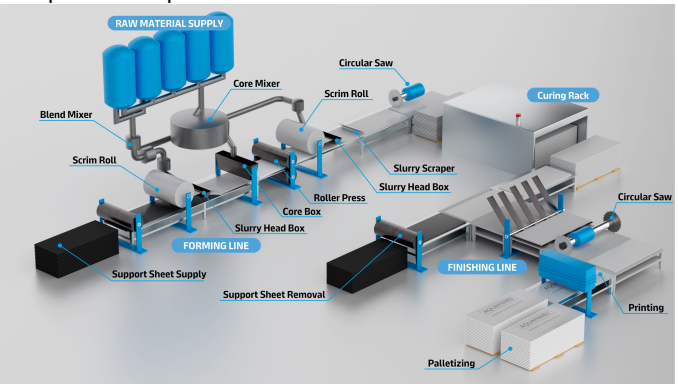
2.6 Manufacture

The raw materials are stored in designated silos, situated externally to the production hall. 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 to produce 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.

The production process is *DIN EN ISO 9001* certified.



2.7 Environment and health during manufacturing

According to *Regulation (EC) No 1907/2006 (REACH),* cement and cement-containing mixtures may not be used or placed on the market if the content of soluble chromium (VI) in the dry mass of the cement exceeds 2 mg/kg (0.0002 %) after hydration. Only low-chromate cement is used in the production process. Beyond compliance with legal requirements, no additional specific measures are necessary. Further environmental protection measures implemented in the production process include:
a) Minimization of waste: Non-conforming boards and edge trimmings generated during finishing are recycled internally and reused as raw material.
b) Optimization of energy consumption: A high degree of automation ensures optimized process control and stable operating parameters, thereby minimizing unnecessary energy consumption.
c) Renewable Energy: Since July 2025, the plant operates on 100 % renewable electricity, which is the energy profile modeled for this EPD.

2.8 Product processing/Installation

Knauf Aquapanel GmbH & Co. KG provides technical data sheets for its cement-bonded building boards. This information is available in printed form as well as on the website www.aquapanel.com. The boards can be fastened mechanically or bonded with adhesive and can be processed using commercially available tools.

2.9 Packaging

The cement-bound building panels with glass fibre reinforcement are supplied on single-use wooden pallets. The boards are secured with PP strapping containing, together with cardboard edge protectors. These packaging elements are used to protect the product during transport and handling. The recycled-content values reported for the packaging components are based on supplier declarations and related material documentation.

2.10 Condition of use

No changes in material composition occur during service life

2.11 Environment and health during use

Based on the available test results, no chromium release at critical concentrations was detected for the assessed product (see Chapter 7). Under normal conditions of use, the constituents remain bound within the matrix of the installed product. Accordingly, no relevant emissions to water or soil are expected during service life under intended use conditions, and dust emission is not expected during normal use. These statements relate to the intended use of the installed product and to the scope of the tests performed.

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 the AQUAPANEL® Cement Board Rooftop is at least 50 years

2.13 Extraordinary effects

Fire

Non-combustible building material of building material class A1 acc 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. 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

At end of use, the product is generally not intended for reuse. Where separately collected and fully segregated from other materials, the material may be processed for recycling use as filling material. The feasibility of such recycling depends on the quality of material separation and the availability of suitable recycling routes. This statement relates to a potential end-of-life route and does not imply that such recycling is available in all markets or for all waste streams.

2.15 Disposal

According to the *Waste Catalogue Regulation (Abfallverzeichnis-Verordnung- AVV),* the AQUAPANEL® Cement Board Rooftop, 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 refer to website at *www.aquapanel.com.*

3. LCA: Calculation rules

3.1 Declared Unit

The declared unit of the study is 1 m² of AQUAPANEL® Cement Board Rooftop with a thickness of 6 mm, corresponding to a mass of 8.5 kg. The product is manufactured at the production plant in Iserlohn, Germany. The reference year for the determination and presentation of the data is 2025.

Declared unit and mass reference

Name	Value	Unit
Declared Unit	1	m^2
Density (dry) acc. to EN 12467	1250	kg/ m^3
Grammage approx.	8.5	kg/m^2
Layer thickness	0.006	m
conversion factor to m2/t	117.647	-

The declared unit is 1 m². To convert the LCA results from the declared unit (1m²) to 1 ton (1,000 kg), the results must be multiplied by a conversion factor of 117.65 m²/t. Conversely, to convert results from 1 ton to 1 m², the results must be divided by 117. 65.
This conversion factor is essential for calculating the environmental impacts in the modules where weight in tonnes (t) serves as the central calculation basis. According to the 'PCR B: Requirements on the EPD for Fibre cement/Fibre concrete', the declared unit is 1 tonne. Other declared units are permissible provided that the conversion to 1 tonne is presented in a transparent manner.

- 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 bulk density do not correlate.

3.2 System boundary

This environmental information is based on a cradle-to-grave approach, EPD type C "cradle to grave and module D (A + B +C + D)". The system boundaries include the product stage (A1–A3), the construction process stage (A4–A5), the use stage(B1-B7), the end-of-life stage (C1–C4), and the supplementary information module (D). According to the *PCR Part A+A2, Version 1.4,* as standard, modules B3 to B5 are labelled 'MNR' (module not relevant) and should not be declared at product level as they are only relevant at building level. The use stage modules B1, B2, B6 and B7 are reported as 0. No modelling was performed for these modules, as no product-specific processes occur during the use phase.
Module A3
Covers the core manufacturing process at the fully electrified Iserlohn facility, capturing all upstream impacts of electricity generation. Process water is either chemically bound within the board, retained as moisture, or evaporated during curing. Finally, this module includes the extraction and production of all final packaging materials (wood, cardboard and PP) required for transport to the construction site. The renewable electricity supply is documented through the purchase and cancellation of Guarantees of Origin (GoOs) corresponding to the plant´s annual electricity consumption.
Scenarios
C3 Scenario: 50 % Resource Recovery/ C4: 50 % Landfill/ D
C3.1 Scenario: 10 0% Resource Recovery/ C4.1: 0 % Landfill/ D.1
C3.2 Scenario: 0 % Resource Recovery/ C4.2: 100 % Landfill/ D.2

3.3 Estimates and assumptions

Transport (Modules A2 & A4): Distances for raw material supply and final distribution are based on representative averages.
End-of-Life (Module C): Waste scenarios assume standard European practices, utilizing a recycling rate of 50% and a landfill rate of 50 %.
Substitution (Module D): It is assumed that the recycled cement board substitutes primary natural aggregates (1:1 mass ratio) and that packaging incineration generates energy recovery.
Electricity (Module A3): Modelling assumes that market-based Guarantees of Origin (GoOs) offset generation impacts, while accounting for local transmission losses. The 100 % renewable electricity dataset used in the manufacturing stage (Module A3) has an emission factor of GWP-Total: 0.01 kg CO_2-eq/kWh.

3.4 Cut-off criteria

This LCA uses cut-off criteria for the release of a hydrophobic agent utilised in the production area. The total mass cut-off in relation to the declared mass is less than 1 %.

3.5 Background data

All the background data used were taken from the *LCA-for Experts-Software (Content Version 2025.2).*

3.6 Data quality

The data collection and measurement process includes all known significant contributors to the environmental impact of the product system, including processes, materials and emissions. All background data records relevant for the calculation were provided by the declaration owner and processed with the database of the accounting software.

3.7 Period under review

The quantities of raw materials, energy, and consumables used were taken into account as average values for twelve months of 2025 at the production plant. In July 2025, the facility transitioned to a permanent contract for 100 % renewable electricity. To ensure the data accurately represents the product's environmental profile throughout the EPD's five-year validity, electricity consumption has been transparently modelled as 100 % renewable, replacing the conventional grid mix used in the first half of the reference year.

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

Product Stage (Modules A1-A3): No allocation is required. All relevant input flows (raw materials, energy, water, etc.) are explicitly measured and directly attributed to the declared cement board, as there are no shared input flows between different products.

Upstream Scrim and Perlite Production: The glass fabric mesh (scrim) the exp. perlite are manufactured internally at a separate facility and modelled as an intermediate product. No allocation is necessary because both components are a single product with known physical material flows,its impacts are fully assigned to its role as a material input, while external sales of the scrim fall strictly outside the system boundaries.

Renewable Energy: Guarantees of Origin for 100 % renewable electricity are retired for the entire manufacturing facility rather than for specific product lines. This plant-wide accounting methodology strictly eliminates the risk of double-counting or improper allocation of green energy.

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. *LCA for Experts-Software from Sphera. (content version 2025.2)*

4. LCA: Scenarios and additional technical information

Characteristic product properties of biogenic carbon

The AQUAPANEL® Cement Board Rooftop is composed predominantly of inorganic materials. The proportion of biogenic carbon in the total mass of the product is 0 %.

Information on describing the biogenic carbon content

Biogenic carbon occurs only in packaging materials, specifically wooden pallets and carton packaging.

Name	Value	Unit
Biogenic carbon content in product	-	kg C
Biogenic carbon content in accompanying packaging	0.0597	kg C

Note: 1 kg of biogenic carbon is equivalent to 44/12 kg of CO_2.

Transport to the building site (A4)

For the calculation, weighted average transport distances to local warehouses were determined based on the delivered volumes during the reference period. The weighted transport distances are based on 2025 data for truck transport in various European countries. Fuel consumption corresponds to the standard value for a Euro 6 truck per 100 km. Empty return journeys are not considered. kg CO_2 eq

Name	Value	Unit
Litres of fuel	32	l/100km
Transport distance	528	km
GWP-Total-A4	6.98E-4	kg CO2 eq/m2*km
GWP-Total -A4	8,21E-2	kg CO_2 eq/tonne·km

Installation into the building (A5)

The installation of the cement board itself is not considered in this LCA. Due to the wide range of possible installation variants, no representative and technically justified average installation scenario can be defined. The module includes the environmental impacts associated with the disposal of packaging materials generated at the construction site. During the installation stage, all the packaging materials are removed from the product and treated as waste. In accordance with the standard European scenarios, the plastic packaging and wooden packaging waste is assumed to be sent to a local municipal waste incineration plant with energy recovery.

Name	Value	Unit
One-way wooden pallet	0.1118	kg
Carton	0.0087	kg
PP-straps 0.0078	0.0078	kg

Reference service life

Name	Value	Unit
Reference service life (according to ISO 15686-1, -2, -7 and -8)	50	a

End of life (C1-C4)

Deconstruction/ demolition (C1)

In this scenario, the deconstruction is conducted using a 100 kW mechanical excavator, which is specifically related to the product under consideration. The scenario considers the environmental impacts caused by operating the excavator, including the use of diesel fuel, in accordance with the declared unit.

Transport for waste processing (C2)

The transportation of the deconstructed or demolished material to any treatment facility. The transport is estimated to be 100 km in an average truck.

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

The declared cement board product is assumed to be deconstructed and managed as construction and demolition waste (C&D waste). Construction and demolition waste represents a significant proportion of the waste produced within the European Union and is increasingly managed according to the circular economy objectives. While the *Directive 2008/98/EC* of the European Parliament established a target of 70 % recovery for non-hazardous C&D waste, the average recycling rate across EU Member States is approximately 50 %, reflecting differences in national waste management systems and market conditions for secondary materials.

Scenario C3.1: 100 % Resource Recovery

This scenario models a 'best- case' pathway where 100 % of the cement board is diverted from landfill and recovered for further use. This scenario serves to quantify the maximum potential environmental benefit of total material circularity.

Scenario C3.2: 0 % Resource Recovery

Module C4: Disposal

After waste processing, the remaining 50 % of the cement board material is assumed to be disposed of in a landfill for inert or mineral construction waste, reflecting current average disposal rates for construction and demolition waste in Europe.

Scenario C4.1: 0 % Landfill

Scenario C4.2: 100 % Landfill

This scenario represents a conservative approach where no material recovery occurs. All product waste is transported to and disposed of an inert landfill. It is included to provide a 'worst case' and to ensure transparency for projects where local recycling infrastructure may be unavailable.

Module D: Reuse, recovery, and recycling potential

Includes substitution credits from two main streams. First, the crushed cement board (Modules C3/C3.1) reaches end-of-waste status as a secondary aggregate for low-grade civil engineering. It substitutes primary natural aggregates, modelled using a Sphera dataset for primary undried crushed stone to prevent unwarranted thermal credits. Second, packaging waste incinerated at the installation site (Module A5) generates energy credits based on its Lower Heating Value (LHV), assuming standard European incinerator efficiencies (R1 > 0.60).

Scenario D1: Benefits and loads beyond the system boundary resulting from the recovery of 100% of the material. This scenario assumes that all cement board waste is directed to a recovery process and subsequently used as a secondary material. No material is disposed of in landfill. The associated Module D results represent the maximum potential benefits achievable under complete resource recovery.

Scenario D2: No benefits beyond the system boundary. This scenario assumes that all cement board waste is disposed of in landfill and no resource recovery takes place. Consequently, no environmental credits associated with secondary material substitution are generated in Module D.

Name	Value	Unit
Collected as mixed construction waste	8.47	kg
Recycling (0.13 kg loss)	4.11	kg
Energy recovery (A3-A5)	0.518	kg
Landfilling	4.24	kg

5. LCA: Results

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 Rooftop 6 mm

Parameter	Unit	A1-A3	A4	A5	B1	B2	B6	B7	C1	C2	C3	C3/1	C3/2	C4	C4/1	C4/2	D	D/1	D/2
GWP-total	kg CO_2 eq	2.67E+00	3.68E-01	2.11E-01	0	0	0	0	5.5E-03	6.66E-02	1.14E-02	2.29E-02	0	6.35E-02	0	1.27E-01	-1.05E-01	-1.3E-01	-7.93E-02
GWP-fossil	kg CO_2 eq	2.45E+00	3.61E-01	2.29E-02	0	0	0	0	4.51E-03	5.48E-02	1.15E-02	2.31E-02	0	6.34E-02	0	1.27E-01	-1.04E-01	-1.3E-01	-7.87E-02
GWP-biogenic	kg CO_2 eq	2.12E-01	5.87E-03	1.88E-01	0	0	0	0	9.64E-04	1.15E-02	-1.35E-04	-2.7E-04	0	-9.54E-05	0	-1.91E-04	-4.6E-04	-4.59E-04	-4.62E-04
GWP-luluc	kg CO_2 eq	1.41E-03	1.52E-03	4.14E-06	0	0	0	0	2.31E-05	2.84E-04	4.23E-05	8.46E-05	0	1.15E-04	0	2.3E-04	-2.11E-04	-3E-04	-1.22E-04
ODP	kg CFC11 eq	3.45E-11	1.68E-13	5.19E-14	0	0	0	0	2.55E-15	3.14E-14	4.55E-14	9.09E-14	0	3.15E-13	0	6.3E-13	-2.33E-12	-2.89E-12	-1.77E-12
AP	mol H^+ eq	5.32E-03	5.32E-04	3.64E-05	0	0	0	0	2.79E-05	9.92E-05	5.88E-05	1.18E-04	0	4.57E-04	0	9.14E-04	-1.78E-04	-2.4E-04	-1.16E-04
EP-freshwater	kg P eq	1.04E-05	9.02E-07	3E-09	0	0	0	0	1.37E-08	1.68E-07	2.61E-08	5.21E-08	0	8.06E-08	0	1.61E-07	-8.84E-08	-1.32E-07	-4.43E-08
EP-marine	kg N eq	1.65E-03	2.1E-04	1.09E-05	0	0	0	0	1.33E-05	3.93E-05	2.73E-05	5.46E-05	0	1.19E-04	0	2.38E-04	-5.21E-05	-7.18E-05	-3.23E-05
EP-terrestrial	mol N eq	1.77E-02	2.27E-03	1.55E-04	0	0	0	0	1.45E-04	4.23E-04	2.97E-04	5.95E-04	0	1.3E-03	0	2.61E-03	-6.1E-04	-8.44E-04	-3.75E-04
POCP	kg NMVOC eq	4.66E-03	4.89E-04	2.95E-05	0	0	0	0	3.64E-05	9.13E-05	7.31E-05	1.46E-04	0	3.56E-04	0	7.12E-04	-1.33E-04	-1.84E-04	-8.21E-05
ADPE	kg Sb eq	8.21E-07	2.58E-08	4.6E-10	0	0	0	0	3.91E-10	4.81E-09	1.19E-08	2.38E-08	0	4.42E-09	0	8.83E-09	-1.54E-08	-1.96E-08	-1.12E-08
ADPF	MJ	1.69E+01	4.64E+00	5.59E-02	0	0	0	0	7.06E-02	8.67E-01	2.13E-01	4.27E-01	0	8.09E-01	0	1.62E+00	-1.77E+00	-2.17E+00	-1.36E+00
WDP	m^3 world eq deprived	9.32E-02	1.44E-03	2.3E-02	0	0	0	0	2.2E-05	2.69E-04	2.03E-03	4.05E-03	0	6.97E-03	0	1.39E-02	-1.94E-02	-3.08E-02	-7.93E-03

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 Rooftop 6 mm

Parameter	Unit	A1-A3	A4	A5	B1	B2	B6	B7	C1	C2	C3	C3/1	C3/2	C4	C4/1	C4/2	D	D/1	D/2
PERE	MJ	1.64E+01	3.31E-01	2.06E+00	0	0	0	0	5.02E-03	6.17E-02	2.14E-02	4.28E-02	0	1.69E-01	0	3.38E-01	-7.75E-01	-9.69E-01	-5.81E-01
PERM	MJ	2.04E+00	0	-2.04E+00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
PERT	MJ	1.84E+01	3.31E-01	1.62E-02	0	0	0	0	5.02E-03	6.17E-02	2.14E-02	4.28E-02	0	1.69E-01	0	3.38E-01	-7.75E-01	-9.69E-01	-5.81E-01
PENRE	MJ	1.69E+01	4.64E+00	3.99E-01	0	0	0	0	7.06E-02	8.67E-01	2.13E-01	4.27E-01	0	8.09E-01	0	1.62E+00	-1.77E+00	-2.17E+00	-1.36E+00
PENRM	MJ	2.85E+00	0	-3.43E-01	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
PENRT	MJ	1.97E+01	4.64E+00	5.59E-02	0	0	0	0	7.06E-02	8.67E-01	2.13E-01	4.27E-01	0	8.09E-01	0	1.62E+00	-1.77E+00	-2.17E+00	-1.36E+00
SM	kg	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4.11E+00	8.22E+00	0
RSF	MJ	0	0	0	0	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	0	0	0	0
FW	m^3	5.73E-03	1.03E-04	5.42E-04	0	0	0	0	1.57E-06	1.93E-05	5.33E-05	1.07E-04	0	1.99E-04	0	3.98E-04	-6.94E-04	-1.02E-03	-3.68E-04

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 Rooftop 6 mm

Parameter	Unit	A1-A3	A4	A5	B1	B2	B6	B7	C1	C2	C3	C3/1	C3/2	C4	C4/1	C4/2	D	D/1	D/2
HWD	kg	4.96E-08	2.15E-10	3.3E-11	0	0	0	0	3.26E-12	4.01E-11	3.31E-11	6.62E-11	0	2.03E-10	0	4.05E-10	-1.52E-09	-1.89E-09	-1.16E-09
NHWD	kg	3.51E-01	8.95E-04	5.68E-03	0	0	0	0	1.36E-05	1.67E-04	6.21E-05	1.24E-04	0	4.24E+00	0	8.48E+00	-1.05E-03	-1.3E-03	-8.04E-04
RWD	kg	2.51E-04	7.31E-06	2.31E-06	0	0	0	0	1.11E-07	1.36E-06	2.24E-06	4.47E-06	0	5.7E-06	0	1.14E-05	-1.38E-04	-1.71E-04	-1.05E-04
CRU	kg	0	0	0	0	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	4.11E+00	8.22E+00	0	0	0	0	0	0	0
MER	kg	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
EEE	MJ	1.36E-01	0	3.57E-01	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
EET	MJ	0	0	7.15E-01	0	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 Rooftop 6 mm

Parameter	Unit	A1-A3	A4	A5	B1	B2	B6	B7	C1	C2	C3	C3/1	C3/2	C4	C4/1	C4/2	D	D/1	D/2
PM	Disease incidence	1.32E-07	5.13E-09	2.55E-10	0	0	0	0	3.3E-10	9.58E-10	1.14E-09	2.27E-09	0	5.72E-09	0	1.14E-08	-3.48E-09	-6.01E-09	-9.54E-10
IR	kBq U235 eq	2.66E-02	9.54E-04	3.4E-04	0	0	0	0	1.45E-05	1.78E-04	3.31E-04	6.61E-04	0	6.09E-04	0	1.22E-03	-2.11E-02	-2.61E-02	-1.6E-02
ETP-fw	CTUe	8.61E+00	3.99E+00	2.58E-02	0	0	0	0	6.07E-02	7.45E-01	1.62E-01	3.24E-01	0	5.03E-01	0	1.01E+00	-3.81E-01	-5.73E-01	-1.89E-01
HTP-c	CTUh	5.07E-10	7.92E-11	2.19E-12	0	0	0	0	1.2E-12	1.48E-11	3.35E-12	6.7E-12	0	1.07E-11	0	2.14E-11	-2.15E-11	-2.79E-11	-1.5E-11
HTP-nc	CTUh	1.48E-08	4.11E-09	1.22E-10	0	0	0	0	6.26E-11	7.67E-10	1.33E-10	2.67E-10	0	4.18E-10	0	8.36E-10	-6.41E-10	-8.97E-10	-3.85E-10
SQP	SQP	2.39E+01	1.25E+00	1.58E-02	0	0	0	0	1.89E-02	2.32E-01	5.04E-02	1.01E-01	0	2.62E-01	0	5.25E-01	-4.58E-01	-5.99E-01	-3.17E-01

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

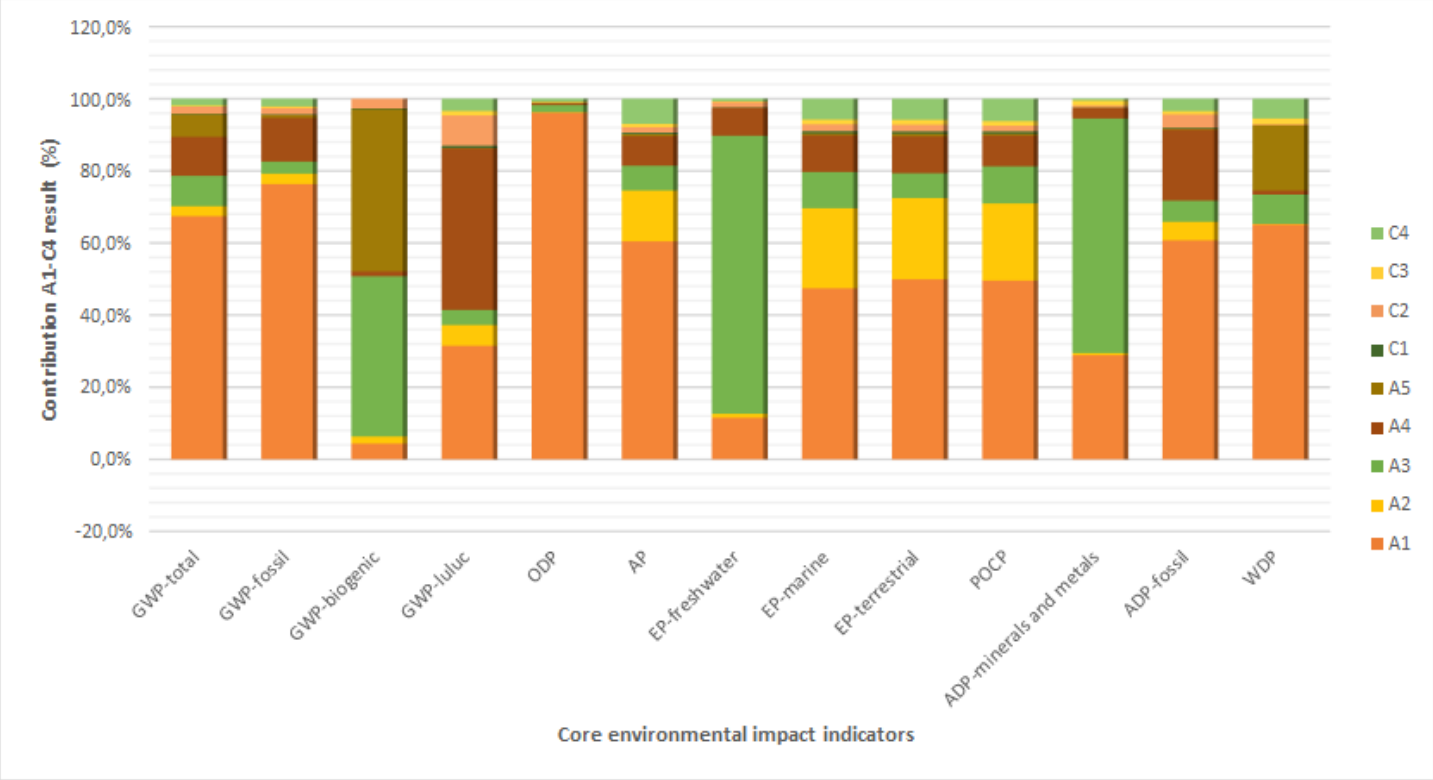
Disclaimer 1 – for the indicator “Potential Human exposure efficiency relative to U235”. This impact category deals mainly with the eventual impact of low-dose ionizing radiation on human health of the nuclear fuel cycle. It does not consider effects due to possible nuclear accidents, occupational exposure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

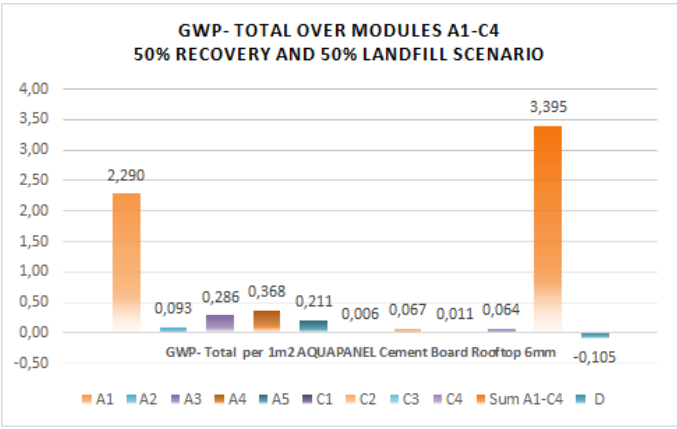
6. LCA: Interpretation

The environmental performance of AQUAPANEL® Cement Board Rooftop 6 mm is primarily determined by the product stage, particularly the upstream production of cement and the other constituent materials. The cementitious binder is expected to be the main contributor to GWP-Total in modules A1-A3, due to the energy demand and process emissions associated with cement production. Transport to the construction site also represents a relevant contribution, reflecting the product mass of approximately 8.5 kg/m² and the assumed weighted average delivery distance of 528 km. The manufacturing-stage results are influenced by the modelled use of renewable electricity. According to the study, the Iserlohn facility changed to a contracted renewable electricity supply in July 2025, while the LCA models the manufacturing electricity for the entire reference period as 100% renewable. The interpretation of the A1-A3 results is therefore dependent on the validity, representativeness, and continued application of the contractual electricity assumptions documented in the background report.
The following figure shows the dominance analysis. The contribution shares were calculated separately for each indicator using the module results over A1-C4 for the 50 %

recovery and 50 % landfill scenario. Module D is excluded from the percentage calculation. Raw material supply in module A1 represents the largest contribution to GWP-total, GWP-fossil, ODP and several other indicators. Module A3 has a comparatively high influence on GWP-freshwater and ODP-minerals and metals, while module A5 is particularly relevant for GWP-biogenic. Transport to the construction site in module A4 contributes to several indicators associated with fuel consumption and transport emissions.



The sum of GWP-total over modules A1-C4 is approximately 3.40 kg CO_2 eq. per declared unit under the 50 % recovery and 50 % landfill scenario. The product stage A1–A3 contributes approximately 2.67 kg CO_2 eq. and therefore dominates the product life-cycle result. Within the product stage, raw material supply in A1 represents the largest module contribution. Transport to the construction site in A4 is the second-largest individual module contribution, followed by the installation stage A5. The contributions from modules C1-C4 are comparatively smaller under the selected end-of-life scenario. Module D represents potential benefits and loads beyond the product system boundary and is reported separately from the sum over modules A1-C4.



7. Requisite evidence

Leaching

An eluate was prepared according to *DIN EN 12457-4:2003-01* and analysed for selected elements using ICP-MS in accordance with *DIN EN ISO 17294-2:2024-12.* The measured concentrations are presented in the following table.

Parameter	*Messwert*	*Bestimmungs-grenze*	*Einheit*
As	<0,005	0,005	mg/l
Cd	<0,001	0,001	mg/l
Cr	0,008	0,005	mg/l
Cu	<0,005	0,005	mg/l
Hg	<0,001	0,001	mg/l
Ni	<0,005	0,005	mg/l
Pb	<0,001	0,001	mg/l
Zn	<0,005	0,005	mg/l

Solid material analysis

Representative samples were subjected to microwave pressure digestion according to *DIN EN 16171:2016-02.* The concentrations of the investigated elements were subsequently determined by ICP-MS in accordance with *DIN EN ISO 17294-2:2024-12.* The measured concentrations are presented in the following table.

Parameter	*Messwert*	*Bestimmungs-grenze*	*Einheit*
As	2	1	mg/kg
Cd	<0,2	0,2	mg/kg
Cr	15	2	mg/kg
Cu	16	2	mg/kg
Hg	<0,1	0,1	mg/kg
Ni	7	2	mg/kg
Pb	7	1	mg/kg
Zn	30	5	mg/kg

8. References

ISO 14025:2011
Environmental labels and declarations - Type III environmental declarations - Principles and procedures.
ISO 14040:2006
Environmental management - Life cycle assessment - Principles and framework.
EN 15804:2012+A2
Sustainability of construction works - Environmental Product Declarations - Core rules for the product category of construction products.
EN 12467:2018
Fibre cement boards - Product specification and test methods.
EN 12664
Standard used for determining thermal conductivity (dry and at 23°C/ 80%).
EN ISO 12572
Standard used for determining the water vapour diffusion resistance factor.
EN 318
Standard used for determining length and thickness variation from changes in humidity.
EN ISO 9001
Standard for quality management systems certification of the production process.
EN 13501-1:2019-05
Fire classification of construction products and building elements.
ISO 15686-1, -2, -7 and -8
Standards referenced for determining the Reference Service Life.
EN 12457-4:2003-01
Characterization of waste - Leaching; Compliance test for leaching of granular waste materials and sludges - Part 4: One stage batch test at a liquid to solid ratio of 10 l/kg for materials with particle size below 10 mm (without or with limited size reduction).
EN 16171:2017-01: Sludge, treated biowaste and soil - Determination of elements using inductively coupled plasma mass spectrometry (ICP-MS).
ISO 17294-2: Water quality - Application of inductively coupled plasma mass spectrometry (ICP-MS) - Part 2: Determination of selected elements including uranium isotopes (ISO 17294-2:2023, Corrected version 2024-02); German version EN ISO 17294-2:2023.
Regulation (EU) No. 305/2011 (CPR)
Applies to the placing of the product on the market in the EU/EFTA and requires a declaration of performance.
Regulation (EC) No 1907/2006 (REACH)
Regulates the content of soluble chromium(VI) in cement-containing mixtures.
Regulation (EU) No. 528/2012
Regulation on Biocide Products.
Directive 2008/98/EC of the European Parliament
Established a target of 70% recovery for non-hazardous construction and demolition waste.
Waste Catalogue Regulation
Abfallverzeichnis-Verordnung - AVV
Used to recommend the waste code 170904 for disposal.
PCR Part A:
Product Category Rules for building-related products and services, Part A
Calculation rules for the life cycle assessment and requirements for the project report, Version 1.4, 04/2024.
PCR Part B:
Product Category Rules for Construction Products Part B
EPD requirements for fibre cement / fibre concrete, 08/2021.
FM Approval Certification Norm class 4470
Norm for Single-Ply, Polymer-Modified Bitumen Sheet, Built-Up Roof (BUR) and Liquid Applied Roof Assemblies for Use in Class 1 and Noncombustible Roof Deck Construction.
European Assessment Document (EAD 210024-00-0504)
Referenced for the durability and reference service life of cement-bonded-boards.
IBU General InstructionsGeneral
Instructions for the EPD programme of Institut Bauen und Umwelt e. V., Version 2.0 (2021).
European Commission (2020)
Publication on Construction and Demolition Waste (CDW) by the Directorate-General for Environment.
Candidate List of Substances
Reference to the REACH candidate list (date: 02/2026) regarding substance mass thresholds.
Technical Data Sheet 02/26
Voluntary product information available from the manufacturer.
LCA for Experts-Software from Sphera. Content version 2025.2





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