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-20250754-ICA1-EN
Issue date	26.06.2026
Valid to	25.06.2031

Permarock® Cement Board Indoor- Plant Volos

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-20250754-ICA1-EN

This declaration is based on the product category rules:

Fibre cement / Fibre concrete, 01.08.2021
(PCR checked and approved by the SVR)

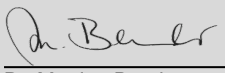
Issue date

26.06.2026

Valid to

25.06.2031

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



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

Permarock® Cement Board Indoor- Plant Volos

Owner of the declaration

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

Declared product / declared unit

1 m² PERMAROCK® Cement Board Indoor with a thickness of 12,5 mm produced in Volos, Greece.

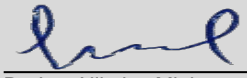
Scope:

This environmental product declaration refers to PERMAROCK® Cement Board Indoor produced in Volos, Greece, for the Australian market.
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

PERMAROCK® Cement Board Indoor is an solid aggregated Portland cement board comprising a coated glass fibre mesh with longitudinally and transversally arranged glass fibres embedded in back and front surfaces of the panel. The board is classified as non-combustible according to the test criteria specified in Clause 3.4 of AS 1530.1-1994.
The placing on the market of this product within the European Union/European Free Trade Association (EU/EFTA), excluding Switzerland, is governed by Regulation (EU) No 305/2011 (CPR). Compliance necessitates a Declaration of Performance (DoP), which must align with EN 12467, 'Fibre cement panels – Product specification and test methods,' and subsequent CE marking. Furthermore, the product requires adherence to the equivalent Australian market standard.

2.2 Application

The PERMAROCK® Cement Board Indoor panel is used as a tile and render carrier board within non-load-bearing wall and ceiling constructions, suited for wetroom applications.

2.3 Technical Data

Constructional data

Name	Value	Unit
Thermal conductivity acc to EN 12664	0.19	W/(mK)
Water vapour diffusion resistance factor acc. to ISO 12467	25	-
Gross density acc to EN 12467	750	kg/m^3
Coefficient of thermal expansion	7	$10^{-6}K^{-1}$
Bending strength acc. to EN 12467	>=7	N/mm^2

PERMAROCK® Cement Board Indoor (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-17/0856.
• Voluntary information for the product: Technical Data Sheet 2025 (www.knauf.com/en-AU).

2.4 Delivery status

The panels are available in a width of 1200 mm and a length of 3000 mm. The layer thickness is 12.5 mm.

2.5 Base materials/Ancillary materials

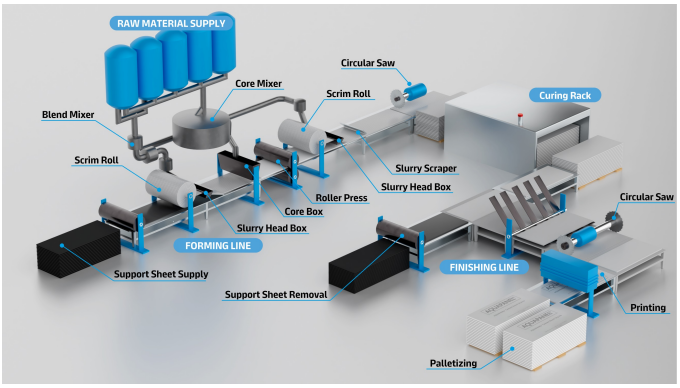
The PERMAROCK® Cement Board Indoor consists mainly of cement and limestone, as well as other basic materials such as perlite, recycled material (by-product), glass fibre fabrics and hydrophobic agents. During the production process water is added to start the cement hydration and the final product contains 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	25-35	Mass-%
Limestone	15-35	Mass-%
Perlite Core	10-25	Mass-%
By-product	3-5	Mass-%
Fibreglass scrim	2.5-5	Mass-%
Hydrophobic agents	<1	Mass-%

In this context, the By-Product refers to production scrap which is reused directly within the production process.

- This product contains substances listed in *the candidate list* (date: 07/2025) 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 production of expanded perlite is carried out on-site, and the expansion process requires very high temperatures for preheating, heating and expansion. Natural gas combustion is the heating method used here. 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 a formula and 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 a dedicated area 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.knauf.com/en-AU. 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 boards are packed on single-use wooden pallets. They are secured with a security belt and with EPS, wooden stops and cardboard edges 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 environment 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. During the use of the product, the ingredients are firmly bonded. It is important to note that dust cannot be emitted during use.
PERMAROCK® Cement Board Indoor is able to remove carbondioxide from the atmosphere through recarbonation. Tests have demonstrated that one declared unit (1 m²) has the capacity to absorb up to 1.0 kg of CO_2 from the atmosphere.
This contribution is excluded from the life cycle assessment of the EPD under consideration.

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 PERMAROCK® Cement Board Indoor is at least 50 years

2.13 Extraordinary effects

Fire
PERMAROCK® Cement Board Indoor is not deemed combustible according to the test criteria specified in Clause 3.4 of AS 1530.1-1994.

Fire protection

Name	Value
Group number classification acco. to AS 5637.1:2015	1-S

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

Although the products are practically unreusable once used, they are suitable for recycling as filling material if fully separated.

2.15 Disposal

According to AVV for PERMAROCK® 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 refer to website at www.knauf.com/en-AU

3. LCA: Calculation rules

3.1 Declared Unit

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

Declared unit and mass reference

Name	Value	Unit
Declared unit	1	m²
Gross density * EN 12467	750	kg/m^3
Grammage	11	kg/m^2
Layer thickness	0.0125	m
Conversion factor **	90.91	

* 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.
**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.

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).

Module A3 covers the core manufacturing process at the fully electrified Volos facility, capturing all upstream impacts of electricity generation. Process water is either chemically bound within the board, retained as moisture, or evaporated during curing. All production offcuts are continuously reground and recirculated in a closed-loop system, with the required processing energy fully accounted for in the plant's total electricity data. 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
C3.1 Scenario: 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, reflecting Australian federal policy directions toward ' Zero Waste' in the built environment.
C4.2 Scenario: 100% Landfill
This scenario represents a conservative approach where no material recovery occurs. All product waste is transported to and disposed of in a inert landfill. It is included to provide a 'worst case' and to ensure transparency for projects where local recycling infrastructure may be unavailable.

3.3 Estimates and assumptions

Transport (Modules A2 & A4): Distances for raw material supply and final distribution to Australia are based on representative averages.
End-of-Life (Module C): Waste scenarios assume standard Australian practices, utilizing a proxy of 84% recycling and 16% landfilling.
Substitution (Module D): It is assumed that the recycled board substitutes primary natural aggregates (1:1 mass ratio) and that packaging incineration yields 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 the cut-off criteria for a release and hydrophobic agent utilised in the production area. The total mass cut-off regarding the declared mass is less than 1 %.

3.5 Background data

All the background data used was taken from the *LCA-for Experts-Software (Content Version 2025.1)*.

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. The manufacturer-specific data used is from year 2025. Some data sets from Germany were used instead of data sets from Australia, as the corresponding data for Australia was not available in the software. This applies, for example, to the final disposal of materials, where the situation in Australia is comparable to that in Germany.

3.7 Period under review

The data collection period will span the period the year 2025.

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: Australia

3.9 Allocation

Allocations were not 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

The declared cement board consists exclusively of mineral and synthetic materials and therefore contains no biogenic carbon. Biogenic carbon occurs only in packaging materials, specifically wooden pallets and carton packaging. The carbon content of these materials is calculated assuming 50 % carbon content by dry mass.

Information on describing the biogenic carbon content at factory gate

Name	Value	Unit
Biogenic carbon content in product	-	kg C
Biogenic carbon content in accompanying packaging	0.011	kg C

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

The following technical information is a basis for the declared modules.
Transport to the building site (A4)
The transport of goods to a construction site in Australia. In this scenario, goods are transported by an average truck and cargo ship over the specified distances. Empty return journeys have not been considered.

Name	Value	Unit
Transport distance Container ship	16.642	km
Transport distance Truck	208	km
Transport vehicle	Truck,40 t / Containership	-
Fuel	Diesel; Heavy Fuel Oil	-

For the calculation, weighted transport distances to local warehouses were determined based on the delivered volume during the period of November 2024 to June 2025. Transportation directly to specific construction sites was excluded due to the variability of distances. For transportation, the stacked pallets are packed into overseas containers. Each container accommodates 12 pallets, equivalent to 1296 m² of Permarock Cement Board Indoor.

Installation in the building (A5)
It is assumed that the installation of the declared product is carried out with the use of stainless steel screws and electric energy. According to the manufacturer, approximately 20 screws are required per square meter. The screws are not taken into account by the LCA, only the energy demand is considered. The treatment of packaging materials (Incineration) after being discarded at the construction site was taken into account. Below is information regarding the energy consumption for installation and the packaging material required per square meter of product.

Name	Value	Unit
Electricity consumption	0.012	kWh
Exp. PS	0.0006	kg/m²
Cardboard Corner Protectors	0.0010	kg/m²
Wooden pallets	0.0206	kg/m²
Wooden stops	0.0013	kg/m²
Security belt	0.0077	kg/m²

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)
Based on average Australian waste management data, it is assumed that approximately 84% of the cement board material undergoes waste processing for recovery as mineral material (for use in construction-related applications).

Scenario C3.1: 100 % Resource Recovery
A "best-case" pathway where 100 % of the board is recovered for secondary use. This quantifies the maximum benefits of material circularity, reflecting Australian "Zero Waste" policy directives.

Disposal (C4)
After waste processing, the remaining 16 % 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.

Scenario C4.2: 100 % Landfill
A conservative "worst-case" pathway assuming 100 % disposal in an inert landfill. This provides transparency for projects in regions lacking local recycling infrastructure.

Benefits loads beyond the system boundary (D)
Energy recovered from the process of utilisation (incineration) of materials used in the packaging process, outside the product system.

Name	Value	Unit
Demolition load constr. machine	11	kg
Transport C2	100	km
Recycling C3	9.62	kg
Energy recovery A5	0.0311	kg

This Life Cycle Assessment of the Permarock® Cement Board Indoor for the Australian market incorporates updated data. Please note that the transport data (module A4) differs from module A4 in earlier published EPDs due to transportation from Greece to Australia.
Module A5 also covers the managing of packaging materials following their disposal on the construction site. For module C3, which focused on waste processing for reuse, recovery and/or recycling, it was estimated that 100 % of products reach the construction waste treatment plant at the end of their life cycle.

5. LCA: Results

The results of the LCA of the PERMAROCK® Cement Board Indoor 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 PERMAROCK® Cement Board Indoor

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	3.23E+00	1.23E+00	5.19E-02	0	0	0	0	8.12E-03	9.85E-02	2.71E-02	3.19E-02	0	2.83E-02	0	1.77E-01	-6.76E-01	-7.93E-01	-1.6E-02
GWP-fossil	kg CO_2 eq	3.25E+00	1.2E+00	3.8E-02	0	0	0	0	7.81E-03	9.8E-02	2.73E-02	3.21E-02	0	2.83E-02	0	1.77E-01	-9.24E-01	-1.08E+00	-1.6E-02
GWP-biogenic	kg CO_2 eq	-2.44E-02	2.71E-02	1.38E-02	0	0	0	0	3.18E-04	4.26E-04	-3.19E-04	-3.76E-04	0	-4.26E-05	0	-2.66E-04	2.48E-01	2.92E-01	-1.42E-05
GWP-luluc	kg CO_2 eq	1.55E-03	7.34E-04	9.61E-06	0	0	0	0	1.68E-07	2.06E-06	1E-04	1.18E-04	0	5.14E-05	0	3.21E-04	-8.39E-04	-9.86E-04	-8.86E-06
ODP	kg CFC11 eq	1.58E-11	2.89E-13	1.97E-13	0	0	0	0	5.7E-15	6.99E-14	1.08E-13	1.27E-13	0	1.41E-13	0	8.79E-13	-5.19E-12	-6.07E-12	-2.04E-13
AP	mol H^+ eq	6.86E-03	1.94E-02	6.8E-05	0	0	0	0	4.2E-05	1.76E-04	1.39E-04	1.64E-04	0	2.04E-04	0	1.27E-03	-1.4E-03	-1.63E-03	-6.35E-05
EP-freshwater	kg P eq	1.44E-06	6.51E-07	4.03E-09	0	0	0	0	1.45E-09	1.78E-08	6.17E-08	7.26E-08	0	3.6E-08	0	2.25E-07	-3.7E-07	-4.35E-07	-2.14E-09
EP-marine	kg N eq	1.99E-03	8.2E-03	1.91E-05	0	0	0	0	2.04E-05	7.71E-05	6.47E-05	7.62E-05	0	5.31E-05	0	3.32E-04	-4.44E-04	-5.2E-04	-1.75E-05
EP-terrestrial	mol N eq	2.21E-02	8.98E-02	2.15E-04	0	0	0	0	2.24E-04	8.58E-04	7.05E-04	8.29E-04	0	5.82E-04	0	3.64E-03	-4.91E-03	-5.75E-03	-1.92E-04
POCP	kg NMVOC eq	6.15E-03	2.25E-02	5.09E-05	0	0	0	0	5.77E-05	2.12E-04	1.73E-04	2.04E-04	0	1.59E-04	0	9.92E-04	-1.31E-03	-1.53E-03	-4.72E-05
ADPE	kg Sb eq	1.98E-07	4.57E-08	9.51E-10	0	0	0	0	7.68E-11	9.42E-10	2.83E-08	3.32E-08	0	1.97E-09	0	1.23E-08	-4.83E-08	-5.66E-08	-1.09E-09
ADPF	MJ	2.14E+01	1.51E+01	1.17E-01	0	0	0	0	1.05E-01	1.29E+00	5.06E-01	5.95E-01	0	3.61E-01	0	2.26E+00	-4.76E+00	-5.56E+00	-2.08E-01
WDP	m^3 world eq deprived	2.43E-01	2.4E-03	8.93E-03	0	0	0	0	3.27E-05	4.01E-04	4.8E-03	5.65E-03	0	3.11E-03	0	1.94E-02	-5.14E-02	-5.97E-02	-4.36E-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 PERMAROCK® Cement Board Indoor

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	8.38E+00	2.18E-01	5.45E-02	0	0	0	0	6.3E-04	7.73E-03	5.07E-02	5.97E-02	0	7.54E-02	0	4.71E-01	-5.28E+00	-6.2E+00	-5.56E-02
PERM	MJ	2.13E-01	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
PERT	MJ	8.59E+00	2.18E-01	5.45E-02	0	0	0	0	6.3E-04	7.73E-03	5.07E-02	5.97E-02	0	7.54E-02	0	4.71E-01	-5.28E+00	-6.2E+00	-5.56E-02
PENRE	MJ	2.14E+01	1.51E+01	1.17E-01	0	0	0	0	1.05E-01	1.29E+00	5.06E-01	5.95E-01	0	3.61E-01	0	2.26E+00	-4.76E+00	-5.56E+00	-2.08E-01
PENRM	MJ	7.54E-01	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
PENRT	MJ	2.21E+01	1.51E+01	1.17E-01	0	0	0	0	1.05E-01	1.29E+00	5.06E-01	5.95E-01	0	3.61E-01	0	2.26E+00	-4.76E+00	-5.56E+00	-2.08E-01
SM	kg	0	0	0	0	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	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	7.62E-03	1.16E-04	1.74E-04	0	0	0	0	7.02E-07	8.62E-06	1.26E-04	1.49E-04	0	8.87E-05	0	5.54E-04	-1.63E-03	-1.91E-03	-6.16E-05

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 PERMAROCK® Cement Board Indoor

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	2.79E-08	6.28E-10	7.14E-11	0	0	0	0	1.45E-12	1.77E-11	7.84E-11	9.22E-11	0	9.03E-11	0	5.65E-10	-2.5E-09	-2.93E-09	-7.13E-11
NHWD	kg	4.54E-02	1.31E-03	3.93E-03	0	0	0	0	2.38E-06	2.92E-05	1.47E-04	1.73E-04	0	1.89E+00	0	1.18E+01	-3.46E-01	-4.07E-01	-6.06E-05
RWD	kg	6.18E-04	1.62E-05	6.15E-07	0	0	0	0	2.44E-08	2.99E-07	5.3E-06	6.24E-06	0	2.54E-06	0	1.59E-05	-5.87E-05	-6.91E-05	-3.13E-08
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	9.62E+00	4.62E+04	0	0	0	0	0	0	0
MER	kg	0	0	3.11E-02	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
EEE	MJ	0	0	4.8E-02	0	0	0	0	0	0	0	0	0	0	0	0	-4.8E-02	0	0
EET	MJ	0	0	8.8E-02	0	0	0	0	0	0	0	0	0	0	0	0	-8.8E-02	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 PERMAROCK® Cement Board Indoor

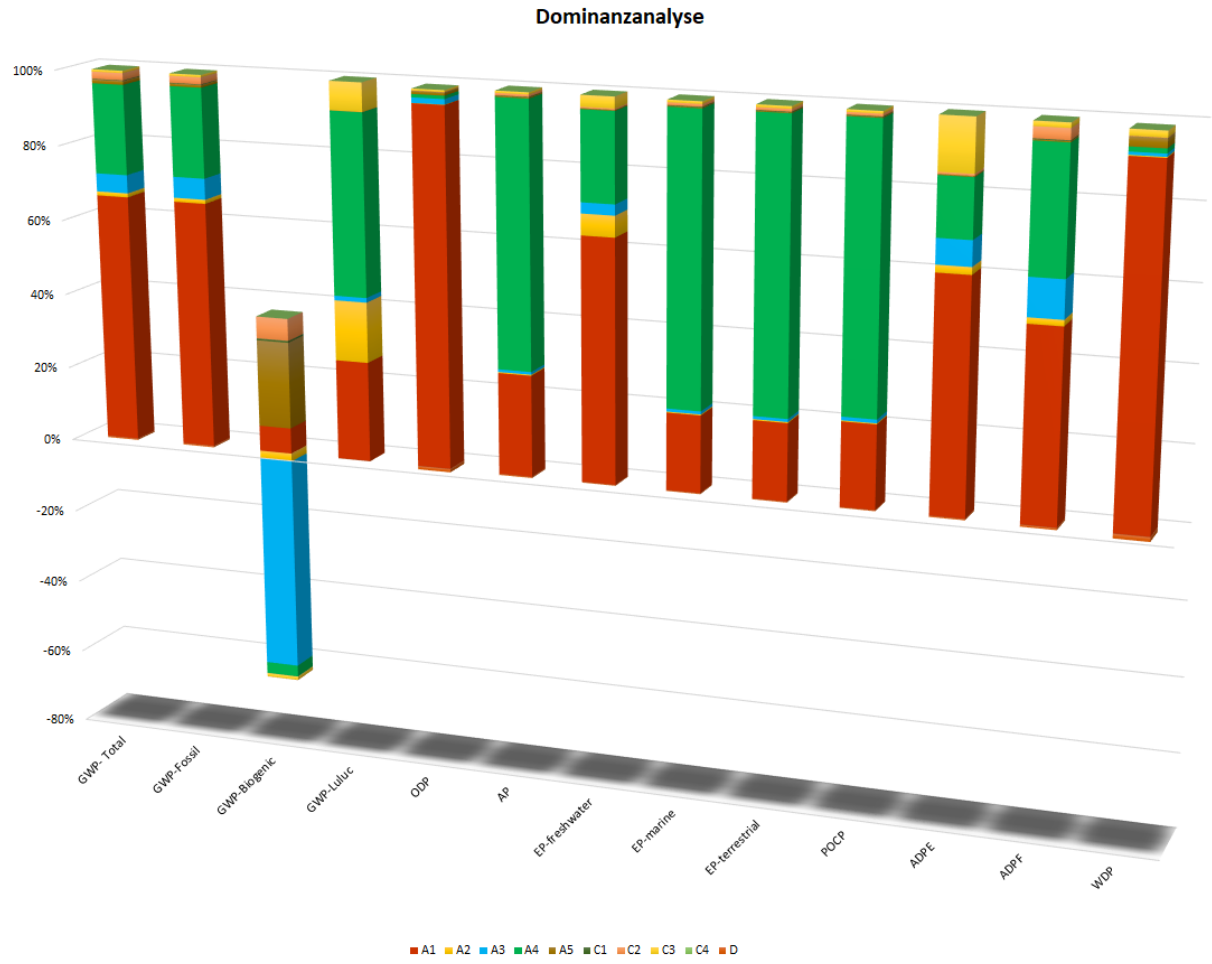
Parameter	Unit	A1-A3	A4	A5	B1	B2	B6	B7	C1	C2	C3	C3/1	C3/2	C4	C4/1	C4/2	D	D/1	D/2
PM	Disease incidence	1E-07	5.1E-07	5.76E-10	0	0	0	0	5.38E-10	2.28E-09	2.69E-09	3.17E-09	0	2.55E-09	0	1.59E-08	-2.73E-08	-3.2E-08	-5.57E-10
IR	kBq U235 eq	8.77E-02	2.04E-03	8.9E-05	0	0	0	0	3.14E-06	3.85E-05	7.83E-04	9.22E-04	0	2.72E-04	0	1.7E-03	-5.47E-03	-6.44E-03	-4.5E-06
ETP-fw	CTUe	9.97E+00	1.12E+01	3.25E-02	0	0	0	0	4.54E-02	5.57E-01	3.83E-01	4.51E-01	0	2.24E-01	0	1.4E+00	-1.84E+00	-2.16E+00	-5.31E-02
HTP-c	CTUh	5.66E-10	1.8E-10	1.61E-12	0	0	0	0	7.05E-13	8.66E-12	7.94E-12	9.34E-12	0	4.78E-12	0	2.99E-11	-3.02E-10	-3.55E-10	-1.91E-12
HTP-nc	CTUh	3.05E-08	4.26E-09	6.63E-11	0	0	0	0	1.2E-11	1.45E-10	3.16E-10	3.72E-10	0	1.87E-10	0	1.17E-09	-4.04E-09	-4.75E-09	-3.32E-11
SQP	SQP	7.253	0.611	0.0112	0	0	0	0	0.000185	0.00227	0.119	0.14	0	0.117	0	0.731	-25.8	-30.4	-0.00772

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

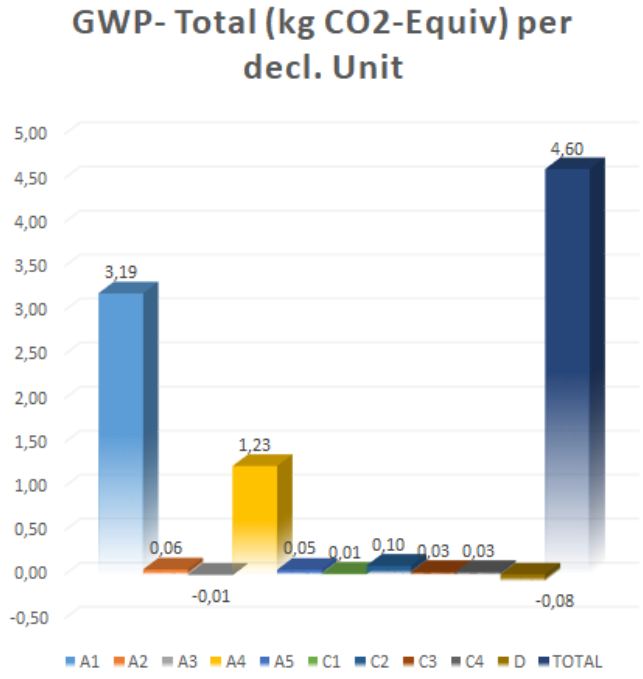
Disclaimer 1 – for the indicator 'Potential Human exposure efficiency relative to U235'. This impact category deals mainly with the eventual impact of low-dose ionizing radiation on human health of the nuclear fuel cycle. It does not consider effects due to possible nuclear accidents, occupational exposure 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.
Disclaimer 3 - Remarks to environmental impacts- The declared core Global Warming Potential (GWP) indicators exclude emissions resulting from the combustion of waste fuels (GWP, net). The verified waste status of these waste-based fuels has been confirmed. GWP indicators that incorporate emissions from waste fuel combustion (GWP, gross) are detailed separately within the 'Additional Environmental Information' section in the LCA Interpretation of this EPD.

6. LCA: Interpretation

As the graph illustrates, the most significant contributors to the environmental impact categories are the module A1 (Raw Material Extraction and Material Production) and the transportation to the construction site (Module A4). This impact is primarily attributed to the considerable average transport distance, particularly the long-haul shipping component (16,642 km), and the resulting diesel consumption: The GWP-Biogenic category clearly shows the carbon cycle of the packaging: the carbon temporarily stored in the wood and cardboard during manufacturing (Module A3) is balanced by emissions from disposal at the installation site (Module A5). Finally, End-of-Life processing (Modules C1-C4) has a marginal impact across all categories, while module D consistently registers environmental credits due to material substitution and energy recovery. It is estimated that 99% of the Global Warming Potential (GWP) is composed of emissions from fossil sources, a factor directly related to the product's nearly complete mineral composition.



The Total Global Warming Potential (GWP-Total) of the declared PERMAROCK® Cement Board Indoor is 4.60 kg CO_2-eq per unit. The environmental profile is heavily dominated by the supply of raw materials (Module A1), which contributes 3.19 kg CO_2-eq, an expected hotspot driven by the energy-intensive processing of cementitious materials and the glass fiber scrims. The second hotspot is transport to the construction site (Module A4), contributing 1.23 kg CO_2-eq, reflecting the significant logistical burden of shipping the final product to the Australian market. The manufacturing stage (Module A3) has a slight negative impact of -0.01 kg CO_2-eq, which demonstrates the environmental benefits of using 100% renewable wind electricity and temporary biogenic carbon storage in the product's packaging materials. Finally, the end-of-life stages (modules C1-C4) represent a negligible portion of the total impact, while module D generate a modest environmental credit of -0.08 kg CO_2-eq resulting from material substitution and energy recovery.



7. Requisite evidence

VOC Emissions

The PERMAROCK® Cement Board Indoor was tested in January 2023 using the Test Method ASTM D5116-2017, - 'Standard Guide for Small-Scale Environmental Chamber Determinations of Organic Emissions from Indoor Materials/Products'. (Expiry date: 18.01.2028)

Emission Data (24 hours)

Green Building Council of Australia Green Star Design & As Built V1.3 13.1.2B & 13.2 Green Star Interiors V1.3 - 12.1.2B	AQUAPANEL® Permarock Indoor
Total Volatile Organic Compound Emission Rate Limit: ≤0.500 mg/m²/hr	Total Volatile Organic Compound Emission Rate: 0.013 mg/m²/hr
Formaldehyde Emission Rate Limit: ≤0.100 mg/m²/hr	Formaldehyde Emission Rate: 0.017 mg/m²/hr

Group Number Classification

The material/product described below was tested by Branz to determine its Group Number Classification and Average Specific Extinction Area in accordance with ISO 5660 Parts 1 and 2. The test was done in December 2022, and the report was released on 21 February 2023. (Expiry date: 21.02.2028) Permarock Indoor Cement Board, a nominally 12.5 mm thick sheet comprised of aggregated Portland cement with coated glass fibre mesh embedded in the back and front surfaces.

Name	Value	Unit
Specimen ID´s	FH16852-1-50-1, 2, 3	-
Mass*	112.4	g
Thickness	11.9	mm
Apparent Density*	945	kg/m^3
Colour	Cream	-

*mean value across replicate specimen

Results

Group Number Classification in accordance with the New Zealand Building Code and NCC Australia

The specimens were deemed suitable for testing and calculations carried out in accordance with NZBC Verification Method C/VM2 Appendix A and AS 5637.1:2015. Classification for the sample as described above is given in the table below.

Building Code Document	Group Number Classification
NZBC Verification Method C/VM2 Appendix A	1-S
NCC 2019 Volume One Specification C1.10 Clause 4 determined in accordance with AS 5637.1:2015	1 The average specific extinction area was less than the 250 m2/kg limit
NCC 2022 Volume One Specification S7C4 determined in accordance with AS 5637.1: 2015	

Material Fire Test Certificate

The test methods carried out by Ignis Labor Pty Ltd were performed on five samples of Permarock Cement Board Indoor in accordance with Australian Standard 1530, 'Methods for fire tests on building materials, components and structures', Part 1, 1994. Combustibility tests for materials. (Expiry date: 19.04.2028)

Result

The specimen achieved the following results:

	Symbol	Arithmetic
Mean furnace thermocouple temperature rise:	ΔTf	0.65 °C
Mean specimen centre thermocouple temperature rise:	ΔTc	0.57 °C
Mean specimen surface thermocouple temperature rise:	ΔTs	0.35 °C
Mean duration of sustained flaming:		0 s
Mean mass loss:		20.79 %

The samples are NOT deemed combustible according to the test criteria specified in Clause 3.4 of AS 1630.1-1994.

8. References

Standard

EN 15804
Sustainability of construction works- Environmental product declarations- Core rules for the product category of construction products

DIN EN ISO 14025
Environmental labels and declarations- Type III environmental declarations- Principles and procedures

DIN 4102-1:1998-05
Fire behaviour of building materials and building components - Part 1: Building materials; concepts, requirements and tests

DIN EN 13501-1:2019-05
Fire classification of construction products and building elements - Part 1: Classification using data from reaction to fire tests

ISO 14040:2006
Environmental management – Life cycle assessment – Principles and framework.

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, 072023

AS 5637.1:2015
Determination of fire hazard properties, Part 1: Wall and ceiling linings

AS 1530.1-1994
Methods for fire tests on building materials, components and structures, Part 1: Combustibility test for materials

Further References

IBU 2021
Institut Bauen und Umwelt e.V.: General Instructions for the EPD programme of Institut Bauen und Umwelt e.V., Version 2.0, Berlin: Institut Bauen und Umwelt e.V., 2021 www.ibu-epd.com

AVV
Abfallverzeichnis-Verordnung (Waste Catalogue Regulation)

AVV of 10 December 2001 (BGBl. I p. 3379), which was last amended by Article 1 of the regulation of 30 June 2020 (BGBl. I p. 3005).

LCA for experts (GaBi)
Software and database for life cycle assessment, professional database, Content Version 2025.1.

Others

BBSR Table
Service lives of building components for life cycle analyses according to the Assessment System for Sustainable Building (BNB) of the Federal Institute for Research on Building, Urban Affairs and Spatial Development at the Federal Office for Building and Regional Planning (BBSR).

DIN EN 16908:2022-06
Cement and building lime - Environmental product declarations - Product category rules complementary to EN 15804; German version EN 16908:2017+A1:2022

DIN EN 12467
Fibre-cement flat sheets - Product specification and test methods; German version EN 12467:2012+A2:2018 (07, 2018).

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.

ISO 5660-1
Reaction-to-fire tests - Heat release, smoke production and mass loss rate - Part 1: Heat release rate (cone calorimeter method) and smoke production rate (dynamic measurement). 2015-03

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