ENVIRONMENTAL PRODUCT DECLARATION

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

Owner of the Declaration	Cembrit Holding A/S
Publisher	Institut Bauen und Umwelt e.V. (IBU)
Programme holder	Institut Bauen und Umwelt e.V. (IBU)
Declaration number	EPD-CEM-20220357-CBA1-EN
Issue date	09.06.2023
Valid to	08.06.2028

Cembrit Multi Force

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Institut Bauen und Umwelt e.V.

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General Information

CEMBRIT

Programme holder

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

Declaration number

EPD-CEM-20220357-CBA1-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

09.06.2023

Valid to

08.06.2028

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

Dipl.-Ing. Hans Peters
(Managing Director Institut Bauen und Umwelt e.V.)

Cembrit Multi Force

Owner of the declaration

Cembrit Holding A/S
Sohngaardsholmsvej 2
9100 Aalborg
Denmark

Declared product / declared unit

1m2 of Cembrit Multi Force fibre cement board

Scope:

This declaration including data collection, represents the production of 1 m² of Cembrit Multi Force fibre cement board on the production site located in Lohja, Finland. Product specific data are based on production values from the year 2019.
The owner of the declaration shall be liable for the underlying information and evidence; the IBU shall not be liable with respect to manufacturer information, life cycle assessment data and evidences.

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. Eva Schmincke,
(Independent verifier)

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Product

Product description/Product definition

Cembrit Multi Force is an indoor interior cladding panel and is produced in both 9mm and 12mm thicknesses. Cembrit Multi Force is easily recognized by its cement grey colour with a glitter on the surface.
It is made of cement and limestone filler, and reinforced with a specially selected fibre material.
Cembrit Multi Force is a versatile building board designed to be moisture and mould resistant, impact resistant, non-combustible, and noise reducing.

This EPD is based on the production of 1m2 of Cembrit Multiforce produced in Lohja, Finland. Both the 9mm board and 12 mm Multiforce are produced at this production site.

Cembrit Multiforce is sold throughout various countries in Europe under the names: *Luja A, Cembrit Sauna, Internit LW*. More information can be found in the Declaration of Performance found on Cembrit's home website in the downloads section: https://www.cembrit.com/downloads?type=dop For the placing on the market of the product in the European Union/European Free Trade Association (EU/EFTA) (with the exception of Switzerland) Regulation (EU) No. 305/2011 (CPR) applies. The product needs a declaration of performance taking into consideration EN12467:2012+A1:2016/ and the CE marking.

Application

Walls, both shaft- and partition walls where fire protection, sound insulation and durability are needed, are natural places for Cembrit Multi Force. It can also be used in suspended ceilings, and balconies. The Outdoor environment is not a problem as long as the product does not freeze when soaking wet.

Technical Data

The following technical data are to be mentioned:

Constructional data

Name	Value	Unit
Thermal conductivity	0.23	W/mK
Water vapour diffusion resistance factor acc. to DIN V 4108-4, EN ISO 12572	30.5	-
Swelling (air-dry to water-saturated)	2.2	mm/m
Gross density (average)	1158	kg/m^3
Tensile strength	5	N/mm^2
Flexural strength	10	N/mm^2
Modulus of elasticity	4000	N/mm^2

Additional information can be found on Cembrit's website: *www.cembrit.com/downloads*

Product according to the CPR, based on a hEN]: Performance data of the product in accordance with the declaration of performance with respect to its essential characteristics according to *EN 12467:2012+A2:2018 'Fibre-cement flast sheets. Product specification and test methods'*.

Base materials/Ancillary materials

The main constituents of the Cembrit Multi Force are as follows:

- Portland Cement: 45-65% (Grey)
- Cellulose: 5-15%
- Inert filler: 10-25%
- Light weight filler: 10-20%
- Mica: 10-20%
- Pigments: 5%

There are no substances of very high concern (SVHC) present in the construction of the product.

Reference service life

Cembrit Multi Force is introduced quite recently on the market. There are no substantiated data on the reference service life (RSL). However, it is estimated that the RSL of Cembrit Multi Force is 50 years or higher. This is in accordance with the table published by the *Bundesinstitut für Bau-, Stadt- und Raumforschung (BBSR) (code 335.511)*.
Disclaimer: The *BBSR* estimation of the RSL of fibre cement products relates to facade and roofing products. Nevertheless, Cembrit Multi Force (indoor board) is expected to have an RSL of 50 years or higher, as it sustains lower impacts relating to natural weathering.

LCA: Calculation rules

Declared Unit

In this EPD the declared unit is defined as the production of $1m^2$ "Cembrit Multi Force" fibre cement sheet, with ANexpected lifetime of 50 years or higher, and its related impacts over the 'cradle to grave' life-cycle modules.

The LCA data is based on the production of Multiforce with a thickness of 9mm. Therefore, a conversion factor of 1,33 is needed to calculate results for a Multiforce of 12mm thickness and is valid for all the indicators. The reference year of the LCA data is 2019.

Declared unit and mass reference

Name	Value	Unit
Declared unit	1	m^2
Gross density	1158	kg/m^3
Area weight	10.42	kg/m^2

Data is gathered for the production process at Cembrit's factory site in Finland (Lohja), for the year 2019.

System boundary

The modules considered in this EPD follows a cradle to gate with options: A1-A5, C1-C4, D.
A1 - The system boundaries includes the provision and processing of raw materials. These include in particular cement, plastic fibres, pulp and packaging materials.

A2 - The transports to the manufacturer were specifically collected for all starting materials.

A3 - The production includes also all in-plant energy consumption (gas + electricity), as well as water used in the production process, and production waste.

A4 - The transport, part of the construction process, is an average of the total distance of all products delivered to the point of installation. This is calculated to be 2064 km.

A5 - All environmental impacts associated with the disposal of packaging handled at the construction site are accounted for. It is assumed incinerated at an incineration plant. Disposal of product waste is assumed to be landfilled. Furthermore, environmental impacts associated
with trucks and fuel for the construction installation are included.

C1 - Accounts for the environmental impacts associated with dismantling and demolition of the fibre cement boards. Fuel used for demolition equipment and transport on-site vehicles.

C2 - Transportation of the discarded products from the construction site to a landfilling site. The transport is estimated to be 100 km in an average truck.

C3 - The fibre cement boards are sent to landfill and therefore there are no environmental impacts associated with waste processing of materials flows intended for reuse, recycling or energy recovery.

C4 - Environmental impacts associated with the processes at the landfill.

D - The fibre cement boards are sent to landfill after use. The product has therefore no impact during this stage and no associated environmental impacts. The boards are expected to be reusable over time, but this is not included in this assessment. Recycling credit for the product along with incineration credit for the packaging material have been considered.

Geographic Representativeness

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

Comparability

Basically, a comparison or an evaluation of EPD data is only possible if all the data sets to be compared were created according to *EN 15804* and the building context, respectively the product-specific characteristics of performance, are taken into account. The database used is DB CUP 2021.1

LCA: Scenarios and additional technical information

Characteristic product properties of biogenic carbon

The biogenic carbon containing material (cellulose) in Cembrit Multi Force is >5% of its total mass of the product and is therefore required to be listed separately. The following table shows the biogenic carbon content in the product and accompanying packaging:

Information on describing the biogenic Carbon Content at factury gate

Name	Value	Unit
Biogenic carbon content in product	0.003	kg C
Biogenic carbon content in accompanying packaging	0.004	kg C

The following technical scenario information is required for the declared modules and optional for non-declared modules. Modules for which no information is declared can be deleted; additional information can also be listed if necessary.

The following technical information is a basis for the declared modules or can be used for developing specific scenarios in the context of a building assessment if modules are not declared (MND).

A5 is not declared including the disposal of the packaging material on the construction site, the amounts of packaging materials included in the LCA calculations must be declared as technical scenario information for Module A5.

Transport to the building site (A4)

Estimating the transport to each individual construction site is rather complex. However, an educated estimate is made for the distance to the installation point by averaging the total distance of all products delivered to Cembrit's warehouses and adding 100 km, representing the distance from warehouse to installation point. Cembrit's warehouses for which the distance has been calculated are located in Denmark, Sweden, Norway, Netherlands, Belgium, Ireland and the United Kingdom.

Name	Value	Unit
Transport distance	2064	km
Gross density of products transported	1158	kg/m^3

Installation into the building (A5)

Installation of the boards is carried out by use of an automatic screwdriver. It is estimated that 12 screws are used for the installation of the declared unit of Cembrit Multi Force.

Furthermore, packaging waste generated in the installation of the boards is depicted in this module.

Name	Value	Unit
Plastic waste	0.008	kg
Pallets	0.007	kg
Screws	12	pcs

In case a **reference service life** according to applicable ISO standards is declared then the assumptions and in-use conditions underlying the determined RSL shall be declared. In addition, it shall be stated that the RSL applies to the reference conditions only.

The same holds for a service life declared by the manufacturer. Corresponding information related to in-use conditions needs not be provided if a service life taken from the list of service life by *BNB* is declared.

Reference service life

Name	Value	Unit
Reference service life (according to ISO 15686-1, -2, -7 and -8)	-	a
Life Span (according to BBSR)	Equal or more than 50	a
Life Span according to the manufacturer	-	a

End of life (C1-C4) and D (reuse)

Currently, the fibre cement boards are sent to landfill and no environmental impacts are therefore associated with waste processing of material flows intended for reuse, recycling or energy recovery. Reuse and recycling of the boards is possible; however, such a system is not extensively considered yet.

Transportation

of the discarded products from the construction site to a landfilling site is assumed to be ~100 km in an average truck.

Name	Value	Unit
Energy recovery (packaging)	0.0154	kg
Landfilling	10.42	kg

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LCA: Results

The following tables show the results of life-cycle assessment indicators, resource use and waste related to 1m^2 of Cembrit Multi Force fibre cement boards.The data is representative of the products of Cembrit Holding A/S.

DESCRIPTION OF THE SYSTEM BOUNDARY (X = INCLUDED IN LCA; ND = 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	MND	MND	MNR	MNR	MNR	MND	MND	X	X	X	X	X

RESULTS OF THE LCA - ENVIRONMENTAL IMPACT according to EN 15804+A2: 1 m2 Cembrit Multi Force

Parameter	Unit	A1	A2	A3	A4	A5	C1	C2	C3	C4	D
GWP-total	kg CO_2 eq	4.94E+00	4.12E-01	2.48E+00	1.32E+00	7.62E-01	4.77E-04	1.32E+00	-6.57E-01	1.06E+00	-4E-03
GWP-fossil	kg CO_2 eq	4.94E+00	3.95E-01	2.48E+00	1.27E+00	7.48E-01	4.72E-04	1.27E+00	2.46E-01	1.61E-01	-4E-03
GWP-biogenic	kg CO_2 eq	5E-03	1.7E-02	-5E-03	5.8E-02	1.4E-02	4.02E-06	5.8E-02	-9.03E-01	8.99E-01	-1.97E-05
GWP-luluc	kg CO_2 eq	1E-03	9.34E-06	1.53E-04	3E-05	5.27E-04	6.69E-07	3E-05	6.28E-04	4.72E-04	-2.67E-06
ODP	kg CFC11 eq	8.55E-15	4.52E-17	4.53E-15	1.45E-16	5.18E-15	1.13E-17	1.45E-16	6.03E-12	6.25E-16	-4.4E-17
AP	mol H^+ eq	1.5E-02	9.15E-04	2E-03	1E-03	2E-03	9.83E-07	1E-03	1E-03	1E-03	-5.16E-06
EP-freshwater	kg P eq	1.61E-06	8.37E-08	1.37E-06	2.69E-07	1.38E-06	1.27E-09	2.69E-07	1.04E-05	2.7E-07	-5.05E-09
EP-marine	kg N eq	4E-03	4.05E-04	8.25E-04	3.29E-04	4E-04	2.34E-07	3.29E-04	5.9E-04	2.97E-04	-1.49E-06
EP-terrestrial	mol N eq	4.6E-02	4E-03	9E-03	4E-03	4E-03	2.45E-06	4E-03	6E-03	3E-03	-1.6E-05
POCP	kg NMVOC eq	1.2E-02	1E-03	2E-03	9.95E-04	1E-03	6.34E-07	9.95E-04	2E-03	9.01E-04	-4.18E-06
ADPE	kg Sb eq	1.75E-07	1.38E-08	1.4E-07	4.42E-08	3.78E-05	1.39E-10	4.42E-08	9.48E-08	1.52E-08	-6.51E-10
ADPF	MJ	2.91E+01	5.58E+00	3.65E+01	1.79E+01	7.58E+00	8E-03	1.79E+01	3.42E+00	2.13E+00	-7.1E-02
WDP	m^3 world eq deprived	1.47E-01	6.53E-04	1.58E-01	2E-03	1.7E-02	7.58E-05	2E-03	4.8E-02	1.7E-02	-2.95E-04

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 Cembrit Multi Force

Parameter	Unit	A1	A2	A3	A4	A5	C1	C2	C3	C4	D
PERE	MJ	-4.43E+00	1.8E-02	1.12E+00	5.9E-02	1.7E+00	4E-03	5.9E-02	1.81E+01	7.78E+00	-1.5E-02
PERM	MJ	7.49E+00	0	1.4E-01	0	-1.4E-01	0	0	0	-7.49E+00	0
PERT	MJ	3.06E+00	1.8E-02	1.26E+00	5.9E-02	1.56E+00	4E-03	5.9E-02	1.81E+01	2.87E-01	-1.5E-02
PENRE	MJ	2.91E+01	5.58E+00	3.62E+01	1.8E+01	7.96E+00	8E-03	1.8E+01	3.42E+00	2.13E+00	-7.1E-02
PENRM	MJ	0	0	3.4E-01	0	-3.4E-01	0	0	0	0	0
PENRT	MJ	2.91E+01	5.58E+00	3.65E+01	1.8E+01	7.62E+00	8E-03	1.8E+01	3.42E+00	2.13E+00	-7.1E-02
SM	kg	7E-01	0	0	0	0	0	0	0	0	0
RSF	MJ	0	0	0	0	0	0	0	0	0	0
NRSF	MJ	0	0	0	0	0	0	0	0	0	0
FW	m^3	5E-03	2.95E-05	8E-03	9.5E-05	2E-03	3.77E-06	9.5E-05	2E-03	5.26E-04	-1.48E-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 Cembrit Multi Force

Parameter	Unit	A1	A2	A3	A4	A5	C1	C2	C3	C4	D
HWD	kg	1.97E-09	3.84E-11	7.09E-09	1.23E-10	9.76E-10	2.22E-12	1.23E-10	1.35E-07	2.27E-10	-1.57E-11
NHWD	kg	1.9E-02	5.59E-04	3.14E-01	2E-03	1.2E-02	5.96E-06	2E-03	2E-02	1.06E+01	-3.18E-05
RWD	kg	9.86E-04	5.98E-06	5E-03	1.92E-05	2.97E-04	1.25E-06	1.92E-05	1.72E-04	2.24E-05	-4.87E-06
CRU	kg	0	0	0	0	0	0	0	0	0	0
MFR	kg	0	0	0	0	0	0	0	0	0	0
MER	kg	0	0	0	0	0	0	0	0	0	0

EEE	MJ	0	0	0	0	7.33E-06	0	0	0	0	0
EET	MJ	0	0	0	0	7.33E-06	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 Cembrit Multi Force

Parameter	Unit	A1	A2	A3	A4	A5	C1	C2	C3	C4	D
PM	Disease incidence	2.11E-07	1.22E-08	2.08E-08	5.79E-09	2.13E-08	8.29E-12	5.79E-09	1.86E-08	1.42E-08	-4.45E-11
IR	kBq U235 eq	1.52E-01	8.47E-04	4.84E-01	3E-03	3.7E-02	2.05E-04	3E-03	2.8E-02	2E-03	-7.98E-04
ETP-fw	CTUe	1.58E+01	4.04E+00	8.58E+00	1.3E+01	2.08E+00	4E-03	1.3E+01	1.58E+00	1.22E+00	-1.4E-02
HTP-c	CTUh	6.52E-10	7.52E-11	2.09E-10	2.42E-10	7.51E-10	1E-13	2.42E-10	7.51E-11	1.79E-10	-6.63E-13
HTP-nc	CTUh	6.21E-08	3.16E-09	1.8E-08	1.01E-08	8.75E-09	3.78E-12	1.01E-08	4.05E-09	1.98E-08	-2.63E-11
SQP	SQP	2.33E+00	1.4E-02	3.04E+00	4.6E-02	1.27E+00	3E-03	4.6E-02	1.17E+02	4.31E-01	-1E-02

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 nor due to radioactive waste disposal in underground facilities. Potential ionizing radiation from the soil, from 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 or as there is limited experienced with the indicator.

References

Standards
EN 15804
EN 15804:2012+A1:2013, Sustainability of construction works — Environmental Product Declarations — Core rules for the product category of construction products.

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.

EN12467
EN12467:2012+A2:2018, Fibre-cement flat sheets — Product specifications and test methods"

Further References

BBSR
Bundesinstitut für Bau-, Stadt- und Raumforschung (BBSR): Nutzungsdauer von Bauteilen für Lebenszyklusanalyse nach Bewertungssystem Nachhaltiges Bauen (BNB), 2011

GaBi software
Sphera Solutions GmbH
GaBi Software System and Database for Life Cycle Engineering
CUP Version: 2021.1
University of Stuttgart
Leinfelden Echterdingen

GaBi documentation
GaBi life cycle inventory data documentation
(https://www.gabisoftware.com/support/gabi/gabidatabase2020lcidocun

PCR Part A
Calculation Rules for the Life Cycle Assessment and Requirements on the
Project Report,Berlin: Institut Bauen und Umwelt e.V., www.ibu-epd.com,
Version 2.2, 2022

PCR Part B
Requirements of the EPD for Fibre Cement/Fibre Concrete, version 1.7,
Institut Bauen und Umwelt e.V., www.bau-umwelt.com, 2019

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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

Cembrit A/S
Cembrit A/S: Information on technical data and downloads. www.Cembrit.com/downloads
The literature referred to in the Environmental Product Declaration must be listed in full.Standards already fully quoted in the EPD do not need to be listed here again.
The current version of PCR Part A and PCR Part B of the PCR document on which they are based must be referenced.

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