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3<sup>rd</sup> PARTY VERIFIED

**EPD**

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VERIFIED ENVIRONMENTAL PRODUCT DECLARATION | ISO 14025 & EN 15804



## General Information

<p><b>Fermacell GmbH</b></p> <p><b>Programme holder</b> IBU - Institut Bauen und Umwelt e.V. Panoramastr. 1 10178 Berlin Germany</p> <p><b>Declaration number</b> EPD-FER-20160218-CAD1-EN</p> <p><b>This Declaration is based on the Product Category Rules:</b> Plasterboard, 07.2014 (PCR tested and approved by the SVR)</p> <p><b>Issue date</b> 12-12-2016</p> <p><b>Valid to</b> 11-12-2021</p>	<p><b>Gypsum Fibreboard</b></p> <p><b>Owner of the Declaration</b> Fermacell GmbH Düsseldorfer Landstraße 395 47259 Duisburg</p> <p><b>Declared product / Declared unit</b> 1 m<sup>2</sup> Fermacell gypsum fibreboard</p> <p><b>Scope:</b> This Environmental Product Declaration refers to coated gypsum fibreboard manufactured by Fermacell GmbH.  Specific data from 4 Fermacell plants (Germany: Münchhof, Sieglingen, Wijchen and Orejo/Spain) was averaged as a data basis. The LCA comprises the recovery of raw materials and energy, raw material transport and the actual manufacturing phase for coated gypsum fibreboard. Product reviewed: 1 m<sup>2</sup> of an average gypsum fibreboard (coated) with an average density of 1.18 t/m<sup>3</sup>.  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.</p> <p><b>Verification</b> The CEN Norm /EN 15804/ serves as the core PCR Independent verification of the declaration according to /ISO 14025/ <input type="checkbox"/> internally <input checked="" type="checkbox"/> externally</p>
<p></p> <p>Prof. Dr.-Ing. Horst J. Bossenmayer (President of Institut Bauen und Umwelt e.V.)</p> <p></p> <p>Dr. Burkhard Lehmann (Managing Director IBU)</p>	<p></p> <p>Dr.-Ing. Wolfram Trinius (Independent verifier appointed by SVR)</p>

## Product

### Product description / Product definition

FERMACELL gypsum fibreboards (coated) are special structural panels made of plaster and cellulose fibres. Directive (EU) No. 305/2011 (CPR) applies for placing the product on the market in the EU/EFTA (with the exception of Switzerland). The product requires a Declaration of Performance taking consideration of the European Technical Approval /ETA-03/0050/ and CE marking.

### Application

FERMACELL gypsum fibreboards are used for cladding and lining components. Use is governed by the respective national regulations.

### Technical Data

The product's performance values correspond with the Declaration of Performance in terms of its essential properties in accordance with /ETA 03/0050/, including:

### Constructional data

Name	Value	Unit
Gross density	1180	kg/m <sup>3</sup>
Thermal conductivity (dry)	0.32	W/(mK)
Water vapour diffusion resistance factor	13	-
Moisture content at 20 °C, 65% humidity	1.3	M.-%

### Base materials / Ancillary materials

Raw materials:

- Beta-hemihydrate: 80 – 85% (approx. 18% from returns)
- Cellulose fibres: 15 – 20%

Ancillary materials / Additives:

- Retarders: < 0.2%
- Accelerators: 2 – 4%

Coating agents: total approx. 90-110 g/m<sup>2</sup> (on both sides)

Packaging materials (PE shrink film, reusable wooden pallets) are used as ancillary materials. No other additives are used.

Material definitions:

**Beta-hemihydrate:** Beta-hemihydrate (CaSO<sub>4</sub> \* 1/2 H<sub>2</sub>O) arises when burning gypsum (CaSO<sub>4</sub> \* 2 H<sub>2</sub>O) under a normal atmosphere and at temperatures of 130 to 170 °C by removing the water of crystallisation. Gypsum or calcium sulphate is a mineral in the hydrated sulphates class. Gypsum occurs in nature and can also be manufactured industrially, e.g. via flue gas desulphurisation while burning coal.

Furthermore, production residue (grinding dust, trimmings or even customer returns) is used to produce beta-hemihydrate by calcining in the returns plant. Returns account for an average share of approx. 18%. Returns do not contain any other building materials, e.g. building rubble.

**Cellulose fibres:** Cellulose fibres are manufactured by recycling waste paper. The waste paper is pre-crushed

in a special crushing machine before defibring in a fibre mill.

**Retarders:** Beta-hemihydrate sets immediately after the press and is adjusted accordingly. Various fruit acids (e.g. citric acid C<sub>6</sub>H<sub>8</sub>O<sub>7</sub>) and modified protein hydrolysate (e.g. Retardan) can be used as retarders. Nowadays, citric acid is manufactured using a transgenic variant of "Aspergillus niger".

**Accelerators:** Grinding dust from production (i.e. calcium sulphate) is used as an accelerator.

**Coating agents:** The coating agent has the task of binding the dust while providing a slightly water-resistant impregnation of the surface. The coating agent involves an aqueous solution including a biological hydrocolloid made from renewable plant seeds.

#### Reference service life

Building product life cycles are dependent on the respective building design, use and maintenance.

## LCA: Calculation rules

#### Declared Unit

This core EPD refers to the manufacture of 1 m<sup>2</sup> FERMACELL gypsum fibreboard.

#### Declared unit

Name	Value	Unit
Declared unit	1	m <sup>2</sup>
Unit area	14,75	kg/m <sup>2</sup>
Conversion factor to 1 kg	0.068	-

#### System boundary

The selected system boundaries comprise manufacture of the product, including the extraction of raw materials through to the ready-packaged product at the plant gate (cradle-to-gate).

The review framework comprises the following details:

- Raw material supply
- Energy supply
- Transporting and packaging the raw materials and primary products
- Manufacture (energy, waste, emissions)

Use is not included in the calculation on account of the multiple application and construction possibilities. Disposal of the product under review is not sufficiently quantifiable on account of its long service life and is therefore not included in the analysis.

On the input side, all material flows integrated in the system and greater than 1% of its entire mass or contributing more than 1% to the primary energy consumption are taken into consideration. On the output side, all material flows are recorded which leave the system and whose environmental effects are greater than 1% of all effects in a category taken into consideration.

#### 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: Scenarios and additional technical information

Not of relevance for this cradle-to-gate EPD

## LCA: Results

The environmental impacts associated with 1 m<sup>2</sup> average gypsum fibreboard with a unit weight of 14.75 kg/m<sup>2</sup>, manufactured by FERMACELL GmbH, are outlined below. The following tables depict the results of the indicators of the estimated impact, use of resources, waste and other output flows. Modules marked "x" as per /EN 15804/ are addressed here.

### DESCRIPTION OF THE SYSTEM BOUNDARY (X = INCLUDED IN LCA; MND = MODULE NOT DECLARED)

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	MND	MND	MND	MND	MNR	MNR	MNR	MND	MND	MND	MND	MND	MND	MND

### RESULTS OF THE LCA - ENVIRONMENTAL IMPACT: 1 m<sup>2</sup> fermacell gypsum fibreboard

Parameter	Unit	A1-A3
Global warming potential	[kg CO <sub>2</sub> -Eq.]	1.14E+0
Depletion potential of the stratospheric ozone layer	[kg CFC11-Eq.]	2.95E-11
Acidification potential of land and water	[kg SO <sub>2</sub> -Eq.]	1.74E-3
Eutrophication potential	[kg (PO <sub>4</sub> ) <sup>3-</sup> -Eq.]	2.99E-4
Formation potential of tropospheric ozone photochemical oxidants	[kg ethene-Eq.]	6.75E-5
Abiotic depletion potential for non-fossil resources	[kg Sb-Eq.]	1.11E-4
Abiotic depletion potential for fossil resources	[MJ]	1.64E+1

### RESULTS OF THE LCA - RESOURCE USE: 1 m<sup>2</sup> fermacell gypsum fibreboard

Parameter	Unit	A1-A3
Renewable primary energy as energy carrier	[MJ]	3.57E+0
Renewable primary energy resources as material utilization	[MJ]	8.62E-3
Total use of renewable primary energy resources	[MJ]	3.58E+0
Non-renewable primary energy as energy carrier	[MJ]	1.74E+1
Non-renewable primary energy as material utilization	[MJ]	1.29E-3
Total use of non-renewable primary energy resources	[MJ]	1.74E+1
Use of secondary material	[kg]	3.64E+0
Use of renewable secondary fuels	[MJ]	0.00E+0
Use of non-renewable secondary fuels	[MJ]	0.00E+0
Use of net fresh water	[m <sup>3</sup> ]	6.97E-3

### RESULTS OF THE LCA – OUTPUT FLOWS AND WASTE CATEGORIES:

#### 1 m<sup>2</sup> fermacell gypsum fibreboard

Parameter	Unit	A1-A3
Hazardous waste disposed	[kg]	1.47E-7
Non-hazardous waste disposed	[kg]	2.35E-2
Radioactive waste disposed	[kg]	4.18E-4
Components for re-use	[kg]	0.00E+0
Materials for recycling	[kg]	0.00E+0
Materials for energy recovery	[kg]	0.00E+0
Exported electrical energy	[MJ]	0.00E+0
Exported thermal energy	[MJ]	0.00E+0

## References

**Institut Bauen und Umwelt**

Institut Bauen und Umwelt e.V., Berlin(pub.):  
Generation of Environmental Product Declarations  
(EPDs);  
[www.ibu-epd.de](http://www.ibu-epd.de)

**ISO 14025**

DIN EN ISO 14025:2011-10: Environmental labels and  
declarations — Type III environmental declarations —  
Principles and procedures

**EN 15804**

EN 15804:2012-04+A1 2013: Sustainability of  
construction works — Environmental Product  
Declarations — Core rules for the product category of  
construction products

**PCR 2014, Part B:**

Institut Bauen und Umwelt e.V., Product Category  
Rules for Building Products, Part B: Requirements on  
the EPD for plasterboard, 2014-07

**ETA 03/0050**

Deutsches Institut für Bautechnik (DIBt), European  
Technical Approval FERMACELL gypsum fibreboard,  
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**Publisher**

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