

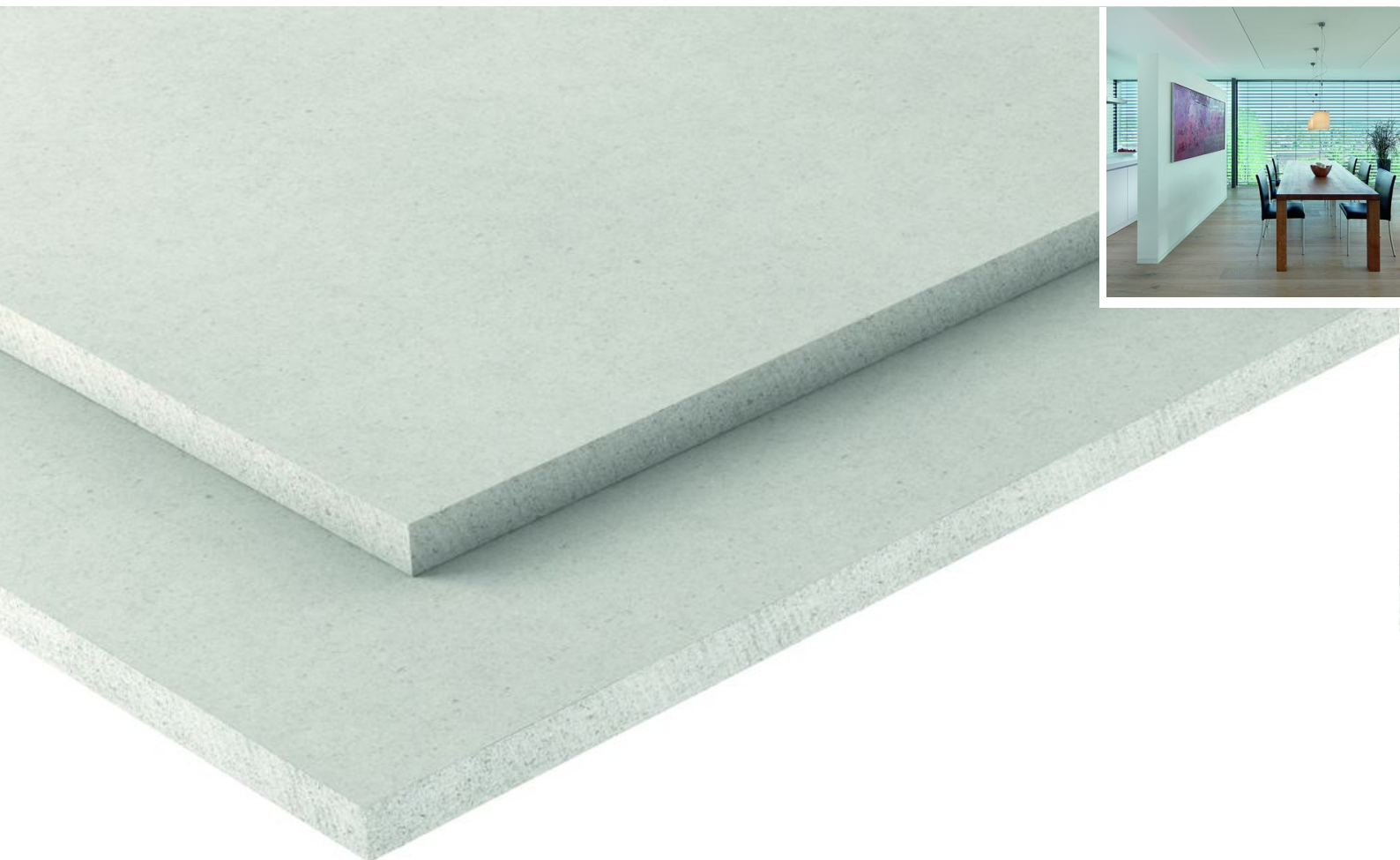
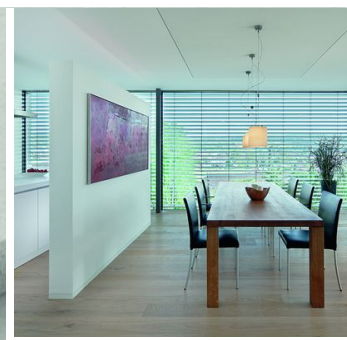
ENVIRONMENTAL PRODUCT DECLARATION

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

Owner of the Declaration	James Hardie Europe GmbH
Programme holder	Institut Bauen und Umwelt e.V. (IBU)
Publisher	Institut Bauen und Umwelt e.V. (IBU)
Declaration number	EPD-JAM-20220072-CBD1-EN
Issue date	17.10.2022
Valid to	16.10.2027

fermacell® flooring elements
James Hardie Europe GmbH

www.ibu-epd.com | <https://epd-online.com>



General Information

James Hardie Europe GmbH

Programme holder

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

Declaration number

EPD-JAM-20220072-CBD1-EN

This declaration is based on the product category rules:

Plasterboard, 11.2017
(PCR checked and approved by the SVR)

Issue date

17.10.2022

Valid to

16.10.2027



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



Dr. Alexander Röder
(Managing Director Institut Bauen und Umwelt e.V.)

flooring elements

Owner of the declaration

James Hardie Europe GmbH
Bennigsen-Platz 1
40474 Düsseldorf

Declared product / declared unit

1 m² fermacell® flooring element. In addition, the environmental impacts of 3 laminations based on 1 m² of surface area are presented in the appendix of this EPD.

Scope:

This Environmental Product Declaration refers to coated flooring elements consisting of 2 gypsum fibre boards glued together in an offset manner, manufactured by James Hardie Europe GmbH. Specific data from 4 plants (Münchehof, Siglingen, Wijchen/Netherlands and Orejo/Spain) were averaged as a data basis. The LCA includes raw material and energy extraction, raw material transports, the actual manufacturing phase of the coated gypsum fibre boards, and the after-use phase. 1 m² of an average flooring element with an average density of 1.18 t/m³ is considered.

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. Stefan Diederichs
(Independent verifier)

Product

Product description/Product definition

fermacell® flooring elements consist of fermacell® gypsum fibre boards bonded together; special building boards made of gypsum and cellulose fibres.

Regulation (EU) No. 305/2011 (CPR) applies to the placing of the product on the market in the EU/EFTA (with the exception of Switzerland). The product requires a declaration of performance taking into account the European Technical Approval ETA-18/0723 dated 22.3.2019 and the CE marking.

Application

fermacell® flooring elements are suitable for the efficient construction of floor structures in dry construction. The respective national regulations apply to their use.

Technical Data

Performance values of the product according to the declaration of performance in relation to its essential characteristics in accordance with ETA-18/0723 of 22.3.2019.

Technical data

Name	Value	Unit
Gross density	1180	kg/m ³
Bending strength	> 4	N/mm ²
Thermal conductivity	0.32	W/(mK)
Specific heat capacity	1.1	kJ/kgK
Water vapour diffusion resistance factor	13	-
Moisture content at 20 °C, 65%	1.3	M.-%

humidity		
Elongation/Vibration when humidity changes by 30% (20°C) nach EN 318	0.25	mm/m
Swelling (air-dry to water-saturated)	0 - 2	%
Brinell hardness	30	N/mm ²

Base materials/Ancillary materials

Raw materials:

- Beta hemihydrate: 80-85 % (approx. 18 % from returns).

- cellulose fibres: 15-20 %

Auxiliaries/additives:

- Retarders: < 0.2 %

- Accelerator: 2-4 %

- Coating agent: total approx. 90-110 g/m² (both sides)

Packaging materials (polyethylene shrink films, disposable and reusable wooden pallets) are used as auxiliary materials. No other additives are used.

Substance Explanations:

Beta hemihydrate: Beta hemihydrate ($\text{CaSO}_4 \cdot 1/2 \text{H}_2\text{O}$) is formed during the firing of gypsum ($\text{CaSO}_4 \cdot 2 \text{H}_2\text{O}$) under normal atmosphere and temperatures of 130 °C to 170 °C with splitting off of the water of crystallization. Gypsum or calcium sulfate dihydrate is a mineral from the class of hydrous sulfates. Gypsum occurs naturally and can also be produced industrially, e.g. by desulfurizing the flue gases from burning coal.

Furthermore, beta hemihydrate is produced from production residues (grinding dust, hemmings or also from returns from customers) by calcination in the returns plant. On average, the recycled material content is approx. 18%. No other building materials, e.g. construction waste, are contained in the returned material.

Cellulose fibres: Cellulose fibres are produced by processing waste paper. The waste paper is first pre-shredded in a special shredding machine and then defibered in a fibre mill.

Retarders: The setting of the beta hemihydrate takes place immediately after the press and is adjusted accordingly. Various fruit acids (e.g. citric acid $\text{C}_6\text{H}_8\text{O}_7$) and modified protein hydrolysates (e.g. Retardan) can be used as retarders. Citric acid is nowadays obtained by means of a transgenic variant of "Aspergillus niger".

Accelerator: Sanding dust from production (i.e. calcium sulfate) is used as an accelerator.

Coating agent: The coating agent is intended to bind the dust and at the same time provide a slightly water-repellent impregnation of the surface. The coating agent is an aqueous solution containing, among other things, a biological hydrocolloid made from renewable plant seeds.

1) The product/product/at least a part of the product contains substances on the candidate list of Substances of Very High Concern (SVHC) (date 17.01.2022) above 0.1 mass%: no

2) The product/product/at least one sub-product contains further CMR substances of category 1A or 1B, which are not on the candidate list, above 0.1 mass% in at least one sub-product: no

3) Biocidal products have been added to the present construction product or it has been treated with biocidal products (it is thus a treated product in the sense of the Biocidal Products Regulation (EU) No. 528/2012): no

Reference service life

The service life of building products depends on the respective construction, use and maintenance of the building.

LCA: Calculation rules

Declared Unit

The core EPD refers to the life cycle of 1 m² flooring element.

Multiplying the results for the declared unit of 29.5 kg/m² by a factor of 40, the results are representative for 1 m³ with an apparent density of 1180 kg/m³.

Declared unit

Name	Value	Unit
Declared unit	1	m ²
Gross density	29,5	kg/m ²
Thickness	0,025	m

In addition, the environmental profiles of 3 laminations based on the above specifications are presented in the appendix. The environmental profiles of the

laminations were calculated for single-sided application. Additionally required adhesive is included in the results of the laminations.

The determined LCA values are robust with respect to the variability of the production process, the geographical representativeness and the influence of background data and precursors compared to the environmental impacts caused by the actual production.

System boundary

Type of EPD: cradle to factory gate with options.

The selected system boundaries include the following modules:

Modules A1-A3 - Production Stage

Modules A1-A3 include in detail:

- Raw material supply, energy supply, transportation to manufacturing plant, packaging production, waste disposal at mill level.
- Waste paper fibers are considered to be free of encumbrances

Modules A4-A5 - Installation stage

Modules A4-A5 include in detail:

- transport to installation site, 100 km via truck (A4)
- thermal disposal of packaging (A5)

Modules C1-C4 - Post-use stage

Modules C1-C4 include:

- a manual dismantling (C1)
- transport to the after-use phase, 50 km via truck (C2)
- crushing and preparation for gypsum recycling (C3)
- landfilling of residual materials: Auxiliary materials, fibres, etc (C4).

There are potential credits as a result of the thermal disposal of the packaging and as a result of the gypsum recycling.

Credits are only awarded for the remaining "net

gypsum quantity", i.e. all secondary materials used for product manufacture are deducted beforehand, thus reducing the remaining quantity.

Likewise, auxiliary materials and fibers as separate material flows are already deducted here beforehand and considered in module C4.

The use of these materials is not included in the application possibilities and designs, is not included in the calculation.

On the input side, all material flows that enter the system and are greater than 1% of their total mass or contribute more than 1% to primary energy consumption are considered. On the output side, all material flows leaving the system and whose environmental impact is greater than 1% of the total impact of an impact category considered are included.

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 background database used is GaBi ts.

LCA: Scenarios and additional technical information

Characteristic product properties Information on biogenic carbon

Information describing the biogenic carbon content at the plant gate

Name	Value	Unit
Biogenic carbon content in product	1.82	kg C
Biogenic carbon content in accompanying packaging	0.016	kg C

The proportion of biogenic carbon in the product results from the cellulose fibres of the flooring element. A carbon content of approx. 0.43 kg per kg paper/cellulose fibres is assumed.

Transport to construction site (A4)

The EPD declares a transport distance of 100 km for A4. This allows easy conversion of specific transport distances on building level.

Name	Value	Unit
Litres of fuel	0.08	l/100km
Transport distance	100	km
Capacity utilisation (including empty runs)	60	%
Gross density of products transported	1180	kg/m ³

Installation in the building (A5)

The thermal recycling of the packaging is considered here. The following quantities are produced per m² of

flooring element:

Name	Value	Unit
Wooden pallet	0.037	kg/m ²
Polyethylene film	0.0002	kg/m ²

End of life path (C1-C4)

The modules C1-C4 include a manual deconstruction (C1), the transport to the after-use phase, 50 km via truck (C2) as well as the consideration of a gypsum recycling (C3) based on data of the Bundesverband der Gipsindustrie e.V. (Federal Association of the Gypsum Industry).

Name	Value	Unit
Collected separately Waste type	29.5	kg
Recycling (C3)	21.4	kg
Landfilling (C4)	8.08	kg
Secondary materials (unencumbered, sink)	5.35	kg

In Module D, potential credits result from thermal disposal of the packaging as well as from gypsum recycling.

The material credits are only awarded for the remaining "net gypsum quantity", i.e. all secondary materials used for product manufacture are deducted beforehand, thus reducing the remaining quantity.

LCA: Results

The following is a presentation of the life cycle assessment results for 1 m² of unlaminated flooring element with a weight per unit area of 29.50 kg/m².

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	ND	ND	MNR	MNR	MNR	ND	ND	X	X	X	X	X

RESULTS OF THE LCA - ENVIRONMENTAL IMPACT according to EN 15804+A2: 1 m² flooring element

Core Indicator	Unit	A1-A3	A4	A5	C1	C2	C3	C4	D
GWP-total	[kg CO ₂ -Eq.]	-7.37E-1	2.33E-1	7.21E-2	0.00E+0	1.16E-1	7.74E-1	6.74E+0	-2.11E-1
GWP-fossil	[kg CO ₂ -Eq.]	6.45E+0	2.22E-1	3.87E-3	0.00E+0	1.11E-1	3.36E-1	6.40E-2	-2.10E-1
GWP-biogenic	[kg CO ₂ -Eq.]	-7.19E+0	1.03E-2	6.83E-2	0.00E+0	5.12E-3	4.38E-1	6.68E+0	1.82E-4
GWP-luluc	[kg CO ₂ -Eq.]	2.51E-3	5.28E-6	1.31E-6	0.00E+0	2.64E-6	5.76E-5	1.88E-4	-9.43E-4
ODP	[kg CFC11-Eq.]	1.00E-13	2.34E-17	1.61E-17	0.00E+0	1.17E-17	3.78E-15	2.49E-16	-2.90E-16
AP	[mol H ⁺ -Eq.]	6.39E-3	2.07E-4	1.30E-5	0.00E+0	1.03E-4	5.43E-4	4.56E-4	-5.70E-4
EP-freshwater	[kg P-Eq.]	2.97E-6	4.75E-8	2.21E-9	0.00E+0	2.37E-8	1.35E-7	1.07E-7	-4.42E-7
EP-marine	[kg N-Eq.]	2.41E-3	6.31E-5	3.60E-6	0.00E+0	3.15E-5	1.44E-4	1.18E-4	-2.30E-4
EP-terrestrial	[mol N-Eq.]	2.65E-2	7.01E-4	6.24E-5	0.00E+0	3.50E-4	1.54E-3	1.30E-3	-2.60E-3
POCP	[kg NMVOC-Eq.]	6.88E-3	1.85E-4	9.45E-6	0.00E+0	9.25E-5	4.08E-4	3.59E-4	-5.93E-4
ADPE	[kg Sb-Eq.]	4.50E-7	6.65E-9	2.30E-10	0.00E+0	3.32E-9	4.16E-8	6.04E-9	-1.43E-8
ADPF	[MJ]	1.04E+2	3.14E+0	1.71E-2	0.00E+0	1.57E+0	6.97E+0	8.49E-1	-2.76E+0
WDP	[m ³ world-Eq deprived]	5.35E-1	4.35E-4	7.34E-3	0.00E+0	2.17E-4	2.69E-2	6.87E-3	-8.39E-3

Caption 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 flooring element

Indicator	Unit	A1-A3	A4	A5	C1	C2	C3	C4	D
PERE	[MJ]	8.39E+0	9.92E-3	5.62E-1	0.00E+0	4.95E-3	8.48E-1	2.18E-1	-9.32E-2
PERM	[MJ]	6.41E+1	0.00E+0	-5.58E-1	0.00E+0	0.00E+0	-6.35E+1	0.00E+0	0.00E+0
PERT	[MJ]	7.25E+1	9.92E-3	3.92E-3	0.00E+0	4.95E-3	-6.26E+1	2.18E-1	-9.32E-2
PENRE	[MJ]	3.76E+1	3.15E+0	2.52E-2	0.00E+0	1.57E+0	8.13E+0	1.62E+0	-1.81E+0
PENRM	[MJ]	8.00E-3	0.00E+0	-8.06E-3	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0
PENRT	[MJ]	3.76E+1	3.15E+0	1.71E-2	0.00E+0	1.57E+0	8.13E+0	1.62E+0	-1.81E+0
SM	[kg]	5.35E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	1.64E+1
RSF	[MJ]	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0
NRSF	[MJ]	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0
FW	[m ³]	2.16E-2	1.78E-5	1.73E-4	0.00E+0	8.88E-6	1.83E-3	3.99E-4	-2.40E-4

Caption 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 flooring element

Indicator	Unit	A1-A3	A4	A5	C1	C2	C3	C4	D
HWD	[kg]	8.22E-9	3.05E-10	3.81E-12	0.00E+0	1.52E-10	8.38E-10	9.02E-11	-8.90E-8
NHWD	[kg]	2.55E-2	3.22E-4	4.84E-4	0.00E+0	1.61E-4	1.31E-3	8.08E+0	-6.79E-4
RWD	[kg]	1.18E-3	3.38E-6	4.81E-7	0.00E+0	1.69E-6	1.13E-3	8.92E-6	-5.58E-5
CRU	[kg]	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0
MFR	[kg]	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	2.14E+1	0.00E+0	0.00E+0
MER	[kg]	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0
EEE	[MJ]	0.00E+0	0.00E+0	8.91E-2	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0
EET	[MJ]	0.00E+0	0.00E+0	2.09E-1	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0

Caption 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 flooring element

Indicator	Unit	A1-A3	A4	A5	C1	C2	C3	C4	D
PM	[Disease Incidence]	1.60E-7	1.12E-9	6.97E-11	0.00E+0	5.61E-10	5.78E-9	1.08E-8	-1.02E-7
IRP	[kBq U235-Eq.]	9.41E-2	4.83E-4	4.45E-5	0.00E+0	2.41E-4	1.92E-1	1.79E-3	-4.52E-3
ETP-fw	[CTUe]	1.25E+1	2.23E+0	6.79E-3	0.00E+0	1.11E+0	2.50E+0	9.23E-1	-7.54E-1
HTP-c	[CTUh]	7.45E-10	4.19E-11	4.84E-13	0.00E+0	2.09E-11	4.17E-11	1.36E-10	-1.80E-11
HTP-nc	[CTUh]	6.15E-8	1.78E-9	1.82E-11	0.00E+0	8.90E-10	2.30E-9	1.50E-8	-1.04E-9
SQP	[-]	8.06E+1	8.08E-3	5.04E-3	0.00E+0	4.04E-3	6.74E-1	3.27E-1	-2.71E-1
Caption	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								

Limitation note 1 - applies to the indicator "Potential effect from human exposure to U235". This impact category mainly addresses the potential effect of low dose ionizing radiation on human health in the nuclear fuel cycle. It does not consider effects due to possible nuclear accidents and occupational exposure, nor does it consider effects due to radioactive waste disposal in underground facilities. Potential ionizing radiation emitted from soil, radon, and some building materials is also not measured by this indicator.

Limitation Note 2 - applies to the indicators: "Potential for Abiotic Resource Depletion for Non-Fossil Resources," "Potential for Abiotic Resource Depletion for Fossil Resources," "Water Depletion Potential (User), Depletion-Weighted Water Use," "Potential Ecosystem Toxicity Comparison Unit," "Potential Human Toxicity Comparison Unit - Carcinogenic Effect," "Potential Human Toxicity Comparison Unit - Non-Carcinogenic Effect," "Potential Soil Quality Index."

The results of this environmental impact indicator must be used with caution, as the uncertainties in these results are high or because there is limited experience with the indicator.

References

Standards

EN 318

DIN EN 318:2002, Wood-based materials - Determination of dimensional changes in connection with changes in relative humidity.

EN 15804

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

ISO 14025

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

Software

GaBi ts

GaBi 10.5 dataset documentation for the softwaresystem and databases, Sphera Solutions GmbH, Leinfelden-Echterdingen, 2021 (<http://documentation.gabi-software.com/>)

PCR

PCR Teil A

Institut Bauen und Umwelt e.V., Berlin (pub.): Product Category Rules for Building-Related products and services. Part A: Calculation rules for life cycle assessment and requirements for the Project report according to EN 15804+A2:2019 (v1.2). 17.11.2021.

PCR Teil B

Institut Bauen und Umwelt e.V., Berlin (pub.): Product Category Rules for Building-Related products and services. Part B: Requirements for the EPD for gypsum boards, v1.7, 2019.

Further literature

IBU 2021

Institut Bauen und Umwelt e.V.: Allgemeine Anleitung für das EPD-Programm des Institut Bauen und Umwelt e.V., Version 2.0, Berlin: Institut Bauen und Umwelt e.V., 2021 www.ibu-epd.com.

REGULATION (EU) No. 305/2011

REGULATION (EU) No. 305/2011 OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL of 9 March 2011 laying down harmonized conditions for the marketing of construction products and repealing Council Directive 89/106/EEC; and Council; OJ EU L88/5, 4.4.2011.

ECHA 2021

European Chemicals Agency (ECHA)
Candidate List of Substances of Very High Concern for Authorisation (published in accordance with Article 59(10) of the REACH Regulation)
<http://echa.europa.eu/de/candidate-list-table>, Stand: 16. April 2021.

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