PRODUKTÖVERSIKT

FÖLJANDE PRODUKTER OMFATTAS AV FÖLJANDE MILJÖPRODUKTDEKLARATION (EPD):

PRODUKT	VIKT	SKALNINGSFAKTOR
GIFAfoor FHB 25mm	40,21	0,684
GIFAfloor FHB 28mm	45,03	0,766
GIFAfloor FHB 32mm	51,47	0,875
GIFAfloor FHB 38mm	61,12	1,039

VÄRDEN FÖR BERÄKNING AV VIKT OCH SKALNINGSFAKTOR	VÄRDE	ENHET
Deklarerad enhet	1	m^2
Konverteringsfaktor	0,017	-
Vikt	57,9	kg/m^2
Denistet	1500	kg/m3
Skivtjocklek	0,036	m

EXEMPEL FÖR BERÄKNING AV 25MM SKIVA:

Vikt = (57,9/36) x 25 = 40,21 kg/m^2

Skalningsfaktor = 40,21 x 0,017 = 0,684

ENVIRONMENTAL PRODUCT DECLARATION

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

Owner of the Declaration	Knauf Integral KG
Publisher	Institut Bauen und Umwelt e.V. (IBU)
Programme holder	Institut Bauen und Umwelt e.V. (IBU)
Declaration number	EPD-KNA-20220095-CAB3-EN
Issue date	26.06.2023
Valid to	25.06.2028

Knauf GIFAtec compressed/ Knauf GIFAboard 1500/ Knauf GIFAfloor 1500

Knauf Integral KG

Institut Bauen und Umwelt e.V.

ECO PLATFORM EPD VERIFIED

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

General Information

Knauf Integral KG

Programme holder

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

Declaration number

EPD-KNA-20220095-CAB3-EN

This declaration is based on the product category rules:

Plasterboard, 01.08.2021
(PCR checked and approved by the SVR)

Issue date

26.06.2023

Valid to

25.06.2028

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

Florian Pronold
(Managing Director Institut Bauen und Umwelt e.V.)

Knauf GIFAtec compressed/ Knauf GIFAboard 1500/ Knauf GIFAfloor 1500

Owner of the declaration

Knauf Integral KG
Am Bahnhof 16
74589 Satteldorf
Germany

Declared product / declared unit

1 m² of gypsum fibre panel Knauf GIFAboard 1500, 57.9 kg/m²

Scope:

This EPD declares the environmental impacts of the gypsum fibre panels Knauf GIFAboard 1500, produced by Knauf Integral KG, plant Satteldorf (Germany). This EPD covers 100 % of the production of Knauf GIFAtec compressed/Knauf GIFAboard 1500/Knauf GIFAfloor 1500 in Satteldorf. The life cycle assessment is based on production data for 2020.
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 Naeem Adibi,
(Independent verifier)

Product

Product description/Product definition

The declared product Knauf GIFAboard 1500 is a gypsum fibre board made of gypsum with paper fibres suspended in the gypsum matrix for reinforcement of the boards. The material for Knauf GIFAboard 1500 is specified as Knauf GIFAtec 1500.

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 *EN 15283-2:2008 + A1:2009, Gypsum boards with fibrous reinforcement - Definitions, requirements and test methods - Part 2: Gypsum fibre boards* and the CE-marking.

National provisions apply for the application and use.

Application

Knauf GIFAboard 1500 panels can be structured freely and already finished in advance. Ceiling and wall panels as well as special forms can be realised exactly to the customer's requirements:

- Wall and column panellings
- Suspended ceilings and free-form island ceilings
- Impact protection
- Bullet-proof walls
- Flexible processing: Bending, forming, painting, varnishing, veneering, coating, etc.
- Humidity regulation and heat storage
- Complete heating and cooling surface
- Flooring

Technical Data

Technical datasheets can be downloaded from the website https://www.knauf-integral.de.

Constructional data of Knauf GIFAboard 1500

Name	Value	Unit
Gross density acc. to EN 15283-2	≥ 1500	kg/m^3
Thermal conductivity	0.25	W/(mK)
Calculation value for thermal conductivity	0.44	W/(mK)
Specific heat capacity	> 1	kJ/kgK
Water vapour diffusion resistance factor acc. to EN ISO 10456	10	-
Water vapour diffusion resistance factor acc. to EN ISO 10456	4	-
Moisture content at 20 °C, 65% humidity	0.5 - 0.9	M.-%
Elongation/Vibration when humidity changes by 30% (20°C) acc. to EN 318	≤ 0.6	mm/m

Performance data of the product in accordance with the declaration of performance with respect to its essential characteristics according to *EN 15283-2:2008 + A1:2009, Gypsum boards with fibrous reinforcement - Definitions, requirements, and test methods - Part 2: Gypsum fibre boards.*

Base materials/Ancillary materials

Knauf GIFAboard 1500 panels consist of approx. 92 % w/w set gypsum reinforced with > 7 % w/w paper fibres and < 0.5 % additives. Impregnation of Knauf GIFAboards is optional and depends on the intended application. The declared Knauf GIFAboard 1500 panels are impregnated with < 0.5 % w/w impregnating agent (surface impregnation).

The declared products contains substances listed in the candidate list (date: 17.01.2023) *ECHA* exceeding 0.1 percentage by mass: no.

This product contains other carcinogenic, mutagenic, reprotoxic (CMR) substances in categories 1A or 1B (*Regulation (EC) No. 1272/2008)* 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 (*EU) Ordinance on Biocide Products No. 528/2012*): no

Reference service life

No reference service life according to *ISO 15686* has been determined for the declared products. However, a service life of ≥ 50 years can be assumed for ceiling and wall coverings according to the *BBSR* table "Service lives of components for life cycle assessment according to BNB" (code no.s 353.111, 345.313).
There are no influences on ageing when the panels are applied in accordance with the rules of technology.

Extraordinary effects

Fire protection
Building material class A1
Burning droplets -
Smoke gas development -

Contact with water
Knauf GIFAboard 1500 panels are designed to tolerate relative humidities up to 75 %. Exceeding humidities or permanent exposure to wet conditions may lead to a decrease in strength and should be avoided. However, due to the ingredients no negative effect on human health is to be expected from leaching.

An instruction sheet about the restoration of flood damage is available under www.knauf.de /BSDH/. Information about the removal of flood damage can also be downloaded from www.gypsum.org.

Re-use

Knauf GIFAboard 1500 panels are used as wall or ceiling claddings and screwed to the sub-construction. Further, joint fillers are applied to cover screw holes and joints. Therefore, Kanuf GIFAboard 1500 usually are not removable without any damages to the panel itself and, thus, direct re-use may only be possible, if damages are small and can be mended by applying appropriate fillers.

Recycling

According to the German Commercial Waste Ordinance *GewAbfV* construction and demolition based on gypsum is preferably collected separately from other waste types and supplied to recycling facilities. In addition, Knauf GIFAboard 1500 panels are designed to be easily recyclable.

Disposal

Knauf GIFAboard 1500 panels need to be dismantled and collected separately from other construction waste. If disposed, Knauf GIFAboard 1500 panels need to be disposed of as

gypsum waste under the *European Waste Code* (EWC)

17 08 02 - gypsum-based construction materials other than those mentioned in 17 08 01

LCA: Calculation rules

Declared Unit

The declared unit is 1 m² of Knauf GIFAboard 1500 panels at plant gate. The conversion factors and densities are given in the table below:

Declared unit for Knauf GIFAboard 1500

Name	Value	Unit
Declared unit	1	m^2
conversion factor [Mass/Declared Unit]	0.017	-
Grammage	57.9	kg/m^2
Gross density	≥ 1500	kg/m^3
Layer thickness	0.036	m

The declared environmental impacts are average impacts for the production in plant Satteldorf. Water and energy consumption is measured on an annual basis and allocated to the various products by the annually produced surface area per panel thickness.

Knauf Integral plant Satteldorf is specifically designed to produce a fibre reinforced gypsum material called Knauf GIFAtec which is adapted in shape, density, surface treatment, and edge trimming to yield the desired products. Therefore, results of the life cycle indicators are considered to be very robust.

The LCA was modeled with software *GaBi* and its corresponding databases (database version 2022.1).

System boundary

Type of the EPD: cradle to gate - with options, modules C1–C4, and module D (A1–A3 + C+ D, additional modules: A4, A5)

This EPD includes the following life cycle stages:

- provision of raw materials and transport to plant Satteldorf, production of boards (A1-A3) including thermal energy for calcination and drying (from natural gas, geographic scope: DE), as well as electricity (residual mix DE)
- transport to building site (A4)
- installation at building site (A5) including the incineration of transport packaging
- disassembly (C1)
- transport to recycling facility or landfill site (C2)
- 2 scenarios for end of life:
- Scenario 1: landfilling (C4/1), corresponding to zero impacts in C3/1 and credits in D/1 from incineration of packaging material in A5
- Scenario 2: recycling (C3/2), zero impacts in C4/2 and credits for the recycled material beyond the system boundaries and from A5 (D/2). Recycling includes the electrical energy for the crushing and grinding of the disassembled panels prior to backfeeding into the next production cycle.

Fig. 1 illustrates the production process: Natural and Flue gas desulphurization (FGD) gypsum is calcined (removal of water of crystallization). The calcined stucco in mixed with additive and fibres from wastepaper and mixed with water. This slurry is fed to an infinite belt with vacuum pumps. After this, the density of the material is adjusted by a winding roller and a press. Mixing with water leads to the re-incorporation of water of crystallization into the crystal lattice of calcium sulphate. That way, gypsum becomes settled and hardened. Redundant surface water is finally removed in a dryer.

Cut-offs

Cut-off rules as required by *EN 15804+A2* are respected. The details are given in the background report. The environmental impacts imposed by these cut-offs are considered neglectable. In total, the cut off materials and processes are less than 5 % of the mass and energy flows in the modules (A1-A3).

Data quality

Datasets exclusively from *GaBi* databases (version 2022.1) are used for the LCA modelling. All datasets used have been updated in the last 5 years. For processes and materials, where no direct match is available, data from literature or expert judgements are applied. Only a few materials and processes needed to be cut off due to missing information. Since these cut-off materials and processes are only of small amounts (<< 1 % w/w), the total influence of these neglected inputs is expected to be lower than 5 % of energy usage and mass.

With respect to technological, geographic and time representativeness, the overall data quality is evaluated to be 'satisfactory'.

Foreground data are related to production data from plant Satteldorf for the reference year 2020. Water and energy consumption are monitored and reported on an annual basis and allocated to the specific products based on annually produced surface area per panel thickness. Since the composition of the material is quite constant throughout the product range, the LCA results are considered to be quite robust with respect to the foreground data.

Allocations

Allocations in the foreground data have only been applied for energy and water consumption data which is monitored on an annual basis for the whole production plant Satteldorf. Allocations in the background data are described and have not been adjusted. Paper fibres incorporated in the gypsum fibre panels are made from waste cardboard and enter the product system free of burdens.

Further allocations of production data have been avoided. However, there may be allocations in the background data which are are explained in the documentation of the respective datasets.

Geographic Representativeness

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

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.

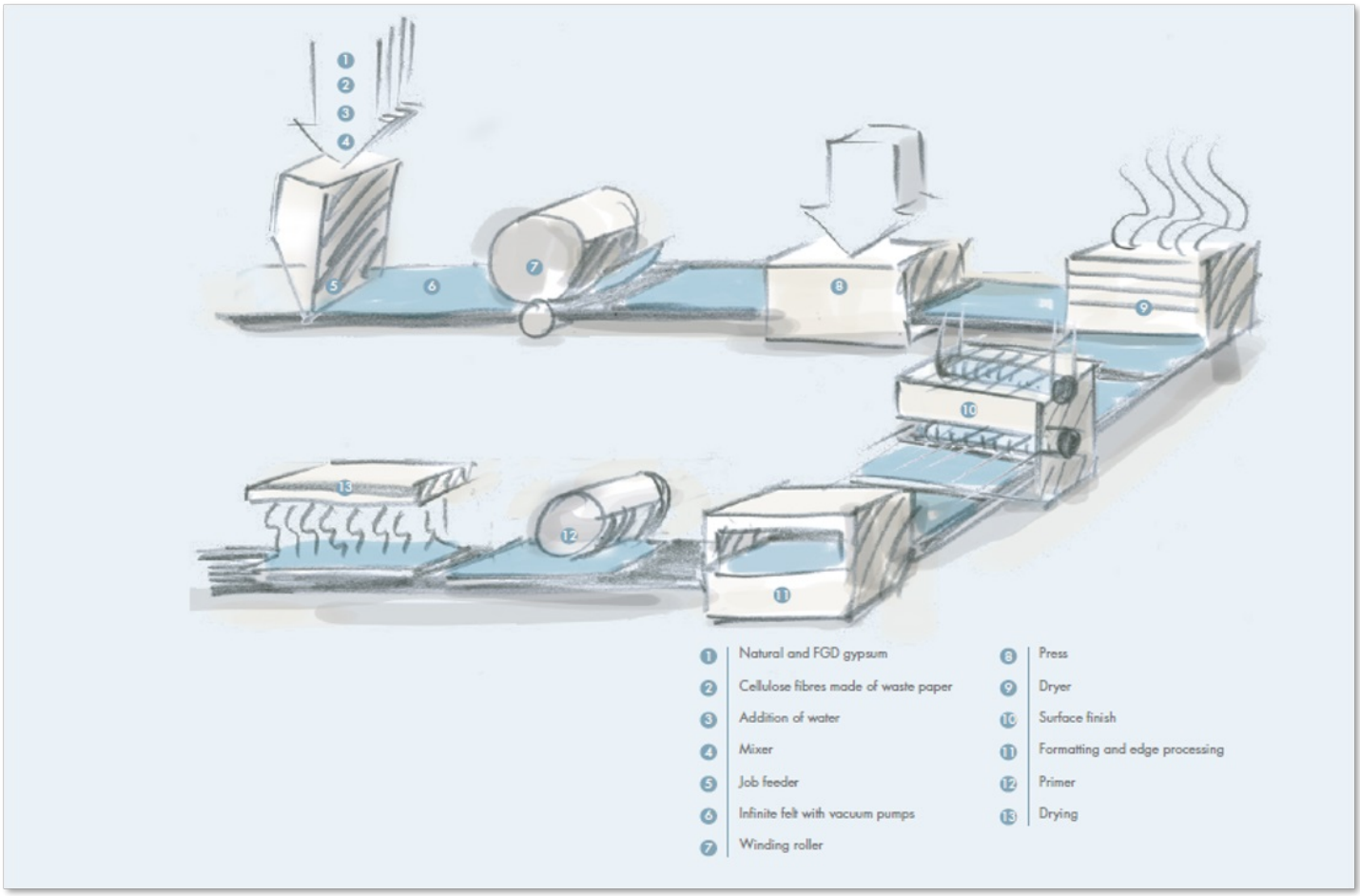

Fig. 1: Production process for gypsum fibre panels

LCA: Scenarios and additional technical information

Characteristic product properties of biogenic carbon

Information on describing the biogenic Carbon Content at factory gate

Name	Value	Unit
Biogenic carbon content in product	2.26	kg C
Biogenic carbon content in accompanying packaging	0.092	kg C

Product Stage (A1-A3)

Supply of raw materials
Gypsum fibre panels made of Knauf GIFAtec 1500 material consist of gypsum with cellulose fibre from recycled cardboard incorporated in the gypsum matrix. Currently, natural gypsum from open-cast mining in close vicinity to the production plant as well as gypsum from the **f**lue **g**as **d**esulphurization of different coal-fired power plants is used to produce the boards.

Small amounts of additives are used for easier processing and fine adjustment of properties.

Transport of raw materials
Natural gypsum is extracted from mines close to the manufacturing sites. Accordingly, transport distances are short (< 30 km) and trucks are used. FGD gypsum is transported by truck from coal-fired power plants in Germany and Europe, mainly. In few cases, a river freight ship and even an ocean freight ship are required for transportation. Due to these different transportation vehicles employed, the transport distances for FGD gypsum were calculated with weighted averages for a combined transportation by truck, river, and ocean.

Further raw materials are supplied by truck from manufacturers within Germany or from neighbouring countries.

Manufacturing
Gypsum (natural and FGD gypsum) is calcined to stucco before mixing with water. Stucco, cellulose fibres and small amounts of additives are then suspended in water to give a slurry. The resulting mixture passes a job feeder and is fed on an infinite felt with vacuum pumps to remove excess water. Afterwards, the pulp is driven through a winding roller and a subsequent press for panel forming and further removal of water before it finally enters a dryer. Drying of surface moisture is followed by surface finishing, formatting and edge processing as well as the application of the impregnating agent.

(Transport) Packaging
Knauf GIFAboard 1500 panels panels are not packaged individually, but stacked on a wooden pallet (reusable), covered with a cardboard sheet and secured with PET straps.

Transport to the building site (A4)
As the default value, transportation over 500 km by truck was assumed for the transportation of the products to the building site. This is no actual transport distances since transport distance can only be considered at the building level. Nevertheless, the provided numbers shall enable the calculation of the actual environmental burdens for the

transport of the declared products by inter-/extrapolating distances and mixing of transport means according to the conditions at hand for individual building assessments. However, since Knauf GIFAboard panels are shipped globally, further transportation scenarios were considered:
- Scenario (A4/1): Transport by truck 1000 km
- Scenario (A4/2): Transport by rail 1000 km
- Scenario (A4/3): Transport by ocean freight ship over 10 000 km
- Scenario (A4/4): Transport by river freight ship over 1000 km
The results of these further transportation scenarios are given in the Annexe to this EPD.

Default scenario (A4): Transport by truck 500 km

Name	Value	Unit
Litres of fuel	0.113	l/100km
Transport distance	500	km
Capacity utilisation (including empty runs)	50	%
Gross density of products transported	≥ 1500	kg/m^3

Installation into the building (A5)
Knauf GIFAboard 1500 panels can be cut, milled, drilled, sanded, stapled, nailed, screwed etc. with tools and machines used for derived timber products.

Name	Value	Unit
Electricity consumption	0.0018	kWh
Construction waste	5	%
Treatment of packaging waste	incineration	
Components not considered	Substructures, screws, jointing material	

Use phase (B1-B7): Excluded since no environmental impacts/benefits are expected.

A service life of ≥ 50 years can be assumed for ceiling and wall coverings according to the *BBSR* table "Service lives of components for life cycle assessment according to BNB".

Hygrothermal in-use conditions (stationary): -10 °C to +35 °C; 35 to 75 % rel. air humidity

End of life (C1-C4)
Knauf GIFAboard 1500 panels are disassembled manually and/or mechanically and collected separately from other deconstruction waste. Transportation in C2 is assumed to be 100 km by truck to either an appropriate landfill site (scenario 1) or to a recycling facility (scenario 2).

Adhering foreign material is removed from the panels prior to recycling (scenario 2) and disposed of in C4/2. The panels are milled to fine powder without any further material separation. The same energy consumption as for the milling of natural gypsum in plant Satteldorf is assumed for the recycling procedure. The recycled gypsum is assumed to replace virgin FGD and natural gypsum in the same ratio as it was initially introduced into production cycle declared in modules A1-A3. No additional processes are required for recycling.

Name	Value	Unit
Collected separately waste type gypsum-based construction materials	57.9	kg
Landfilling scenario 1	57.9	kg
Recycling scenario 2	57.9	kg

With the definition of 2 end-of-life scenarios, benefits and loads beyond system boundaries are declared as follows:
D/1: contains only credits for exported energy from incineration of packaging material (results only from A5)
D/2: contains credits for exported energy from incineration of packaging material in A5 and the benefits from the recycled material of Knauf GIFAboard 1500 panels replacing FGD and natural gypsum in the same ratio as both gypsum types were introduced in A1-A3; amount of paper fibres is discounted from weight of demolition waste to avoid double counting of secondary material and replacement of gypsum by paper fibres

LCA: Results

Note: Two scenarios for the end of life stage were considered as 100 % scenario, each.
Scenario 1: Landfilling (module C4/1), C3/1 with zero impacts, D/1 (only from A5)
Scenario 2: Recycling (module C3/2), C4/2 with zero impacts, D/2 (from A5 and C3/2)

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	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 Knauf GIFAboard 1500, 57.9 kg/m²

Parameter	Unit	A1-A3	A4	A5	C1	C2	C3/1	C3/2	C4/1	C4/2	D/1	D/2
GWP-total	kg CO_2 eq	1.22E+00	2.05E+00	1.36E+00	3.49E-01	4.12E-01	0	8.36E+00	9.42E+00	3.69E-01	-1.2E-01	-8.6E+00
GWP-fossil	kg CO_2 eq	9.84E+00	2.04E+00	6.8E-01	3.46E-01	4.09E-01	0	5.96E-02	1.12E+00	5.62E-02	-1.2E-01	-2.93E-01
GWP-biogenic	kg CO_2 eq	-8.62E+00	0	6.77E-01	3.11E-03	0	0	8.3E+00	8.3E+00	3.13E-01	-6.12E-04	-8.31E+00
GWP-luluc	kg CO_2 eq	1.9E-03	7.75E-03	7.01E-04	7.31E-05	2.75E-03	0	1.26E-05	1.63E-03	8.13E-05	-1.32E-05	-1.57E-04
ODP	kg CFC11 eq	2.31E-11	4.64E-13	1.34E-12	5.06E-12	5.03E-14	0	8.73E-13	2.32E-12	1.16E-13	-8.09E-13	-1.35E-12
AP	mol H^+ eq	3.22E-02	1.97E-03	2.15E-03	7.59E-04	4.61E-04	0	1.31E-04	7.23E-03	3.62E-04	-1.57E-04	-5.9E-04
EP-freshwater	kg P eq	2.56E-06	4.04E-06	2.24E-06	1.01E-06	1.46E-06	0	1.74E-07	3.65E-05	1.83E-06	-1.65E-07	-3.52E-07
EP-marine	kg N eq	9.36E-03	6.89E-04	6.47E-04	1.7E-04	1.53E-04	0	2.94E-05	2.38E-03	1.19E-04	-4.27E-05	-2.14E-04
EP-terrestrial	mol N eq	1.04E-01	7.88E-03	7.03E-03	1.79E-03	1.79E-03	0	3.08E-04	2.15E-02	1.08E-03	-4.57E-04	-2.42E-03
POCP	kg NMVOC eq	2.59E-02	1.77E-03	1.84E-03	4.6E-04	3.98E-04	0	7.94E-05	7.74E-03	3.87E-04	-1.2E-04	-5.7E-04
ADPE	kg Sb eq	2.32E-06	2.04E-07	1.34E-07	9.42E-08	4.14E-08	0	1.62E-08	1.04E-07	5.2E-09	-1.81E-08	-3.38E-08
ADPF	MJ	1.41E+02	2.7E+01	9.5E+00	6.27E+00	5.4E+00	0	1.08E+00	1.49E+01	7.45E-01	-2.03E+00	-3.96E+00
WDP	m^3 world eq deprived	6.15E-01	9.62E-03	7.57E-02	7.89E-02	4.75E-03	0	1.36E-02	1.1E-01	5.5E-03	-1.27E-02	-1.47E-02

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 Knauf GIFAboard 1500, 57.9 kg/m²

Parameter	Unit	A1-A3	A4	A5	C1	C2	C3/1	C3/2	C4/1	C4/2	D/1	D/2
PERE	MJ	3.9E+00	1.78E+00	7.63E+00	3.48E+00	3.76E-01	0	7.67E+01	1.94E+00	9.7E-02	-5.59E-01	-7.69E+01
PERM	MJ	7.93E+01	0	-3.24E+00	0	0	0	-7.61E+01	0	0	0	7.61E+01
PERT	MJ	8.32E+01	1.78E+00	4.39E+00	3.48E+00	3.76E-01	0	6.01E-01	1.94E+00	9.7E-02	-5.59E-01	-8.4E-01
PENRE	MJ	1.41E+02	2.7E+01	9.54E+00	6.28E+00	5.42E+00	0	1.08E+00	1.49E+01	7.45E-01	-2.03E+00	-3.96E+00
PENRM	MJ	3.29E-02	0	-3.29E-02	0	0	0	0	0	0	0	ND
PENRT	MJ	1.41E+02	2.7E+01	9.51E+00	6.28E+00	5.42E+00	0	1.08E+00	1.49E+01	7.45E-01	-2.03E+00	-3.96E+00
SM	kg	4.41E+00	0	0	0	0	0	0	0	0	0	-5.06E+01
RSF	MJ	0	0	0	0	0	0	0	0	0	0	0
NRSF	MJ	0	0	0	0	0	0	0	0	0	0	0
FW	m^3	2.66E-02	1.42E-03	2.5E-03	3.32E-03	4.39E-04	0	5.73E-04	3.31E-03	1.66E-04	-5.37E-04	-8.72E-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 Knauf GIFAboard 1500, 57.9 kg/m²

Parameter	Unit	A1-A3	A4	A5	C1	C2	C3/1	C3/2	C4/1	C4/2	D/1	D/2
HWD	kg	1.99E-08	1.72E-10	1.08E-09	5.43E-10	3.95E-11	0	9.36E-11	1.22E-09	6.11E-11	-2.75E-10	-3.2E-10
NHWD	kg	7.82E-02	4.45E-03	2.84E+00	4.73E-03	8.95E-04	0	8.15E-04	5.68E+01	2.84E+00	-1.03E-03	-1.8E-03
RWD	kg	5.93E-03	3.63E-05	3.14E-04	1E-03	1.05E-05	0	1.73E-04	1.69E-04	8.46E-06	-1.6E-04	-1.9E-04
CRU	kg	0	0	0	0	0	0	0	0	0	0	0

MFR	kg	0	0	0	0	0	0	5.5E+01	0	0	0	0
MER	kg	0	0	0	0	0	0	0	0	0	0	0
EEE	MJ	0	0	5.38E-01	0	0	0	0	0	0	0	0
EET	MJ	0	0	9.67E-01	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 Knauf GIFAboard 1500, 57.9 kg/m²

Parameter	Unit	A1-A3	A4	A5	C1	C2	C3/1	C3/2	C4/1	C4/2	D/1	D/2
PM	Disease incidence	9.58E-07	1.25E-08	5.32E-08	6.29E-09	3.16E-09	0	1.09E-09	8.46E-08	4.23E-09	-1.3E-09	-3.95E-07
IR	kBq U235 eq	4.67E-01	3.69E-03	2.57E-02	1.7E-01	1.56E-03	0	2.93E-02	2.05E-02	1.03E-03	-2.71E-02	-3.02E-02
ETP-fw	CTUe	5.55E+01	2.05E+01	4.53E+00	2.75E+00	3.81E+00	0	4.74E-01	1.01E+01	5.05E-01	-4.47E-01	-1.15E+00
HTP-c	CTUh	1.44E-09	4.11E-10	1.53E-10	7.9E-11	7.85E-11	0	1.36E-11	1.08E-09	5.42E-11	-2.05E-11	-3.75E-11
HTP-nc	CTUh	1.17E-07	2.08E-08	1.33E-08	2.89E-09	4.25E-09	0	4.98E-10	1.22E-07	6.12E-09	-7.88E-10	-1.83E-09
SQP	SQP	5.45E+01	8.02E+00	3.4E+00	2.26E+00	2.27E+00	0	3.9E-01	2.59E+00	1.3E-01	-3.63E-01	-9.73E-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 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.

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