

ENVIRONMENTAL PRODUCT DECLARATION

in accordance with *ISO 14025* and *EN 15804+A2*

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| Owner of the Declaration | Bundesverband der Gipsindustrie e.V. |
| Publisher | Institut Bauen und Umwelt e.V. (IBU) |
| Programme holder | Institut Bauen und Umwelt e.V. (IBU) |
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DRY SCREED GYPSUM FIBREBOARD Bundesverband der Gipsindustrie e.V.

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



1. General information

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| <p>Bundesverband der Gipsindustrie e.V.</p> <hr/> <p>Programme holder IBU – Institut Bauen und Umwelt e.V. Panoramastr. 1 10178 Berlin Germany</p> <hr/> <p>Declaration number EPD-BVG-20220091-IAG1-EN</p> <hr/> <p>This Declaration is based on the product category rules: Plasterboards, 01.2019 (PCR checked and approved by the independent Expert Council (SVR))</p> <hr/> <p>Issue date 04 April 2022</p> <hr/> <p>Valid until 03 April 2027</p> | <p>DRY SCREED GYPSUM FIBREBOARD</p> <hr/> <p>Holder of the Declaration Bundesverband der Gipsindustrie e.V. Kochstrasse 6-7 10969 Berlin</p> <hr/> <p>Declared product / Declared unit 1 m² dry screed gypsum fibreboard (24 kg)</p> <hr/> <p>Scope: The EPD applies for all member companies of the Bundesverband der Gipsindustrie e.V. in accordance with the current list of members on https://www.gips.de/fileadmin/user_upload/Herstellerlisten_Ansprechpartner_EPDS/Herstellerlisten_fuer_EPDS_-_Gipsfaserplattenhersteller.pdf for products manufactured in Germany. The LCA takes into account specific information from the manufacturers and suppliers of components for the entire life cycle.</p> <p>The owner of the Declaration shall be liable for the underlying information and proof; IBU shall not be liable with respect to manufacturer information, life cycle assessment data, or proof.</p> <p>This EPD was drawn up in accordance with the specifications of the <i>EN 15804+A2</i>. This standard is referred to as <i>EN 15804</i> hereinafter.</p> <hr/> <p>Verification</p> <p>The <i>EN 15804</i> European standard serves as the core PCR.</p> <p>Independent verification of the Declaration and information provided in accordance with <i>ISO 14025:2011</i></p> <p><input type="checkbox"/> internally <input checked="" type="checkbox"/> externally</p> |
| <p></p> <hr/> <p>Dipl.-Ing. Hans Peters (Chairman of Institut Bauen und Umwelt e.V.)</p> | <p></p> <hr/> <p>Dr.-Ing. Wolfram Trinius (Independent verifier)</p> |
| <p></p> <hr/> <p>Dr Alexander Röder (Managing Director Institut Bauen und Umwelt e.V.)</p> | |

2. Product

2.1 Product description / Product definition

The Declaration comprises dry screed made from gypsum fibreboard, which can be manufactured in the plant as multi-layer elements offset-bonded (rabbit edge) gypsum fibreboards or as monolithic elements with profiled edges and a weight per unit area of 24 kg/m².

(EU) Directive 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 DIN EN 15283-2: 2009-12, Gypsum boards with fibrous reinforcement – Definitions, requirements and test methods - Part 2: Gypsum fibreboards; German version EN 15283-2:2008+A1:2009 /DIN EN 15283-2/

and CE marking. Application of the products is subject to the respective national guidelines.

2.2 Application

Dry screeds made from gypsum fibreboards are used for floors in new buildings and in the refurbishment of residential and office buildings as well as in public buildings.

Dry screeds are applied on a separation or insulation layer on even, load-bearing sub-surfaces. Uneven substrates are levelled prior to installation. The elements are bonded and screw-fastened, if necessary, in the joint area. Dry screeds can be installed for all standard floor coverings and are suitable for underfloor heating systems.

2.3 Technical data

Technical information is available in the information supplied by the manufacturers. Due to continuous updating of technical standards or approvals, such information is not listed within the framework of the Environmental Product Declaration. Details on essential requirements can be taken from the CE mark and/or Declaration of Performance /Construction Products Regulation/.

The latest technical information can be requested from the following manufacturers:
https://www.gips.de/fileadmin/user_upload/Herstellerlisten_Ansprechpartner_EPDS/Herstellerlisten_fuer_EPDS_-_Gipsfaserplattenhersteller.pdf

The product's performance values correspond with the Declaration of Performance in terms of its essential properties in accordance with DIN EN 15283-2: 2009-12, Gypsum boards with fibrous reinforcement – Definitions, requirements and test methods – Part 2: Gypsum fibreboards; German version EN 15283-2:2008+A1:2009 /DIN EN 15283-2/.

2.4 Delivery status

Dry screeds made from gypsum fibreboards can be supplied as single or several bonded boards of varying sizes. The surface density ranges between 21.5 and 30 kg/m². The selected reference unit is typical for element thicknesses of 20 mm. Installations cover 500 x 1,500 mm for multi-layer elements and 600 x 1,200 mm for monolithic elements.

2.5 Base materials / Ancillary materials

Gypsum fibreboards comprise gypsum and recycled paper fibres. These two raw materials are combined and, after adding water as the only binding agent, are formed as boards and dried. The water binds the gypsum as well as penetrating and enveloping the fibres. This contributes to the high degree of stability and non-combustibility offered by gypsum fibreboards. Gypsum fibreboards for dry screeds are either edge-profiled or offset bonded in the factory.

Details on SVHC, CMR substances cat. 1A or 1B, and biocides:

The product contains substances from the ECHA candidate list of Substances of Very High Concern (SVHC) (date: 16.04.2021) exceeding 0.1% by mass /ECHA2021/: no

The product contains other CMR substances in categories 1A or 1B which are not on the candidate list exceeding 0.1% by mass in at least one partial product: 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) Regulation on Biocide Products No 528/2012): no

2.6 Manufacture

The manufacturing process comprises the steps depicted in Figure 1.

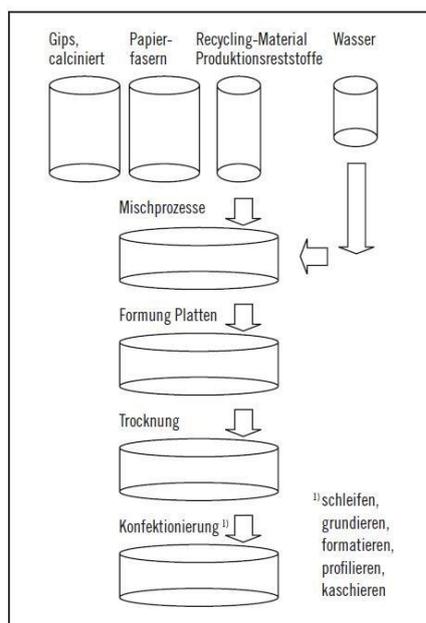


Fig. 1: Gypsum fibreboard manufacturing process in accordance with the /Gypsum Data Book/

| [Legende:] | [Legend:] |
|---|---|
| Gips, calciniert | Gypsum, calcined |
| Papierfasern | Paper fibres |
| Recycling-Material Produktionsreststoffe | Production residue recycling material |
| Wasser | Water |
| Mischprozesse | Mixing processes |
| Formung Platten | Forming boards |
| Trocknung | Drying |
| Konfektionierung ¹⁾ | Packing ¹⁾ |
| ¹⁾ schleifen, grundieren, formatieren, profilieren, kaschieren | ¹⁾ grinding, priming, formatting, profiling, coating |

The manufacturing companies have implemented a quality management system and are certified to /DIN EN ISO 9001/.

2.7 Environment and health during manufacturing

Dry screeds made from gypsum fibreboards are manufactured in plants permitted by emission laws in accordance with the specifications of the Federal Immission Control Act.

The plants have implemented an energy management system in accordance with /DIN EN ISO 50001/. As of an aggregated rated thermal input of > 20 MW, gypsum plants are subordinated to emissions trading.

2.8 Product processing / Installation

Products are processed in accordance with the relevant Codes of Practice of the Bundesverband der Gipsindustrie e.V. and the manufacturers.

During the cutting, sawing or grinding processes for gypsum products, the occupational exposure limit value of 6 mg/m² alveolar dust (A-dust) must be observed for calcium sulphate as a time-weighted average in accordance with /TRGS 900/

2.9 Packaging

Dry screeds made from gypsum fibreboards are stored on pallets and delivered without packaging. The

wooden pallets used are available as reusable or disposable pallets.

2.10 Condition of use

The useful life of the dry screeds made from gypsum fibreboards for construction reviewed here generally complies with the overall useful life of the building. The elements are not exposed to external stress if covered by floor coverings as standard and the manufacturer-specific information on (spot) useful loads is observed.

2.11 Environment and health during use

During the use phase, no hazardous substances are emitted which exceed the limit values of the /AgBB/ evaluation scheme. Gypsum fibreboards have been tested by the Institut für Bauphysik /Scherer IBP/. The test result indicates that the gypsum fibreboards are not associated with any adverse effects on the interior.

2.12 Reference service life

Reference service lives depend on the respective applications. In accordance with the BBSR "Nutzungsdauern von Bauteilen für Lebenszyklusanalysen nach dem Bewertungssystem Nachhaltiges Bauen (BNB)" (Useful lives of components for LCAs in accordance with the Sustainable Building evaluation system (BNB)) table, last revised 22 February 2017, amounts to > 50 years for code number 352.112 "Trockenestriche (Systeme): ... Gypsum fibreboards ..." /BBSR useful life/.

No influences on ageing are known if the rules of technology are applied.

2.13 Extraordinary effects

Fire

Dry screeds made from gypsum fibreboards are "non-combustible" and are classified as construction product class A1 or A2 on account of their reaction to fire in accordance with /DIN EN 13501-1/.

Water

All gypsum products must be protected from permanent moisture penetration unless expressly designated by the manufacturer for this purpose. A Code of Practice is available from the Bundesverband der Gipsindustrie e.V. on restoration of components made of gypsum after flood damage /Code of Practice Flooding/.

Mechanical destruction

As a general rule, mechanical damage can be compensated for using jointing compound thanks to the ease of repair associated with screeds made from gypsum fibreboards without impairing their functional use. Screeds made from gypsum fibreboards can be easily replaced with new elements in the event of major damage.

2.14 Reuse phase

Recycling

According to the Commercial Waste Ordinance, gypsum waste must be recycled. After treatment of the boards in special recycling plants for gypsum waste, recycled gypsum can be added to the manufacturing process for new boards following shredding and separation of the paper fibres. Alternatively, the reclaimed gypsum can be used in other areas suitable for gypsum (setting regulators for cement, agriculture, fertiliser production). The recycling plants for gypsum waste also ensure that any screws or nails are removed by a magnetic separator.

2.15 Disposal

Disposal in accordance with the /Waste code/:

17 08 02 Gypsum-based building materials other than those mentioned in 17 08 01

Gypsum-based building materials adhere to the disposal conditions from landfill class 1 of the /Landfill Ordinance/ in the case of landfilling.

2.16 Further information

www.gips.de

3. LCA: Calculation rules

3.1 Declared unit

Declared unit

| Designation | Value | Unit |
|---------------|-------|----------------|
| Declared unit | 1 | m ² |

The results relate to a representative formulation valid for the members of the Bundesverband Gipsindustrie e.V. with production in Germany, comprising several thicknesses and weights per unit area, which were converted to the average board weight of a dry screed gypsum fibreboard.

3.2 System threshold

EPD type in accordance with /EN 15804/: Cradle to gate, with

- options (A4–A5),
- Modules C1–C4 and
- Module D

(A1–A3 + C + D and additional modules: A4 and A5)

Modules A1–A3 (Product stage) include the production of raw materials taking consideration of framework conditions inherent in Germany and transport thereof, the provision of energy (German electricity mix), and the manufacturing processes required for the production of all components for the dry screed gypsum fibreboard product.

As the screed elements are generally transported to the construction site on reusable pallets with load-securing straps no packaging is taken into account

Module A4 comprises transport to the construction site.

Module A5 includes installation on the construction site. Disposal of any packaging is not required here (unpackaged product on reusable pallets).

Module C1 declares the manual deconstruction process.

Module C2 concerns transport to the disposal site.

Module C3 comprises the shredding and preparation of the dry screed gypsum fibreboards.

Module C4 is generally not considered, as the Commercial Waste Ordinance provides for gypsum waste to be sent for recycling. In this LCA, a landfill scenario is also calculated in order to cover legal exceptions to the Commercial Waste Ordinance.

Module D contains potential credits from gypsum recycling.

3.3 Estimates and assumptions

Approximations and estimates for the processes and materials were made in the corresponding modules for modelling the scenarios in the life cycle.

For Module C1, loss-free (100%) manual removal with hand-held tools is assumed. No losses (e.g. collection losses) during deconstruction are taken into account in the calculation of the end-of-life phase. The entire quantity produced is processed within the recycling process (scenario 1). In a further scenario, a landfill scenario is declared (scenario 2).

3.4 Cut-off criteria

In accordance with the target definition, all relevant input and output flows that occur in connection with the product under consideration were identified and quantified.

All available data from the production process is therefore taken into account in the LCA, i.e. all of the raw materials used, the thermal energy used, and the electricity consumption.

This also takes into account material and energy flows that contribute less than 1% of the mass or energy. The requirement that a maximum of 5% of the energy and mass input may be neglected is therefore complied with.

3.5 Underlying data

The data sets used are taken from the /GaBi/ databases.

The underlying database is based on the /GaBi/ 2021, Service Pack 40/CUP 2020.1 version. The /GaBi

database provides the life cycle inventory data for raw and process materials, transport and energy.

3.6 Data quality

The data quality of the life cycle inventories is assessed based on their precision (measured, calculated, literature values or estimated), completeness (e.g. unreported emissions), consistency (degree of uniformity of the methods used), and representativeness (geographical, temporal, technological).

In order to comply with these aspects and thus ensure reliable results, first-hand industry data was used together with consistent underlying data from the /GaBi/ 2021 databases.

3.7 Period under review

The primary data recorded refers to 2020.

3.8 Allocation

The allocation methods used in underlying data (materials and energy) originating from the /GaBi/ databases are documented online at <http://www.gabi-software.com>.

All incineration processes are depicted by partial flow analyses of the respective materials.

An R1 factor of greater than 0.6 is assumed for all waste incineration plants.

Environmental loads from combustion processes in the construction, utilisation and disposal stages are allocated to the module in which they arise. Potential benefits from these processes are allocated to Module D.

The potential credits arising from energy substitution are awarded via average German data for electric energy and thermal energy from natural gas.

3.9 Comparability

As a general rule, EPD data can only be compared or evaluated when all of the data records to be compared have been drawn up in accordance with EN 15804 and the building context and/or product-specific characteristics are taken into consideration.

The /GaBi/ ts underlying database was used (SP40).

4. LCA: Scenarios and additional technical information

Characteristic product features

Biogenic carbon

The proportion of biogenic carbon results from the paper fibres of the gypsum fibreboard. A carbon content of approx. 0.43 kg per kg of paper fibre is assumed.

Information describing the biogenic carbon content at the plant gate

| Designation | Value | Unit |
|--------------------------------|-------|------|
| Biogenic carbon in the product | 0.845 | kg C |

Technical information on the application forms the basis for developing specific scenarios within the context of a building evaluation.

Transport to construction site (A4)

| Designation | Value | Unit |
|--------------------|-------|------|
| Transport distance | 100 | km |

| | | |
|---|----|---|
| Capacity utilisation (including empty runs) | 60 | % |
|---|----|---|

Construction installation process (A5)

Installation in the building includes the electricity consumption for installing the dry screed.

| Designation | Value | Unit |
|-------------------|--------|------|
| Power consumption | 0.0025 | kWh |

End of Life (C1-C4)

The dry screed gypsum fibreboards are removed manually and transported by truck to a recycling plant (scenario 1) or to landfill (scenario 2). Module C2 is calculated at 50 km in each case.

| Designation | Value | Unit |
|-----------------|-------|------|
| For recycling | 24 | kg |
| For landfilling | 24 | kg |

**Reuse, recovery and recycling potential (D),
relevant scenario information**

Module D contains potential credits for the substitution of natural gypsum from the recycling process (Module C3).

5. LCA: Results

Important:

EP freshwater: This indicator was calculated as “kg P equiv.” in accordance with the characterisation model (EUTREND model, Struijs et al., 2009b, as implemented in ReCiPe; <http://eplca.jrc.ec.europa.eu/LCDN/developerEF.xhtml>).

DESCRIPTION OF THE SYSTEM THRESHOLDS (X = INCLUDED IN LCA; MND = MODULE NOT DECLARED; MNR = MODULE NOT RELEVANT)

| Product stage | | | Construction process stage | | Use stage | | | | | | | End-of-life stage | | | | Benefits and loads beyond the system thresholds |
|---------------------|-----------|---------------|---|----------|-------------------|-------------|---------|-------------|---------|------------------------|-----------------------|-----------------------------|-----------|-----------------|-------------|---|
| Raw material supply | Transport | Manufacturing | Transport from the manufacturer to the site | Assembly | Use / Application | Maintenance | Repairs | Replacement | Renewal | Operational energy use | Operational water use | Deconstruction / Demolition | Transport | Waste treatment | Landfilling | Reuse, recovery or 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 |

LCA RESULTS – ENVIRONMENTAL IMPACTS according to EN 15804+A2: Dry screed gypsum fibreboards, 1 m² = 24 kg

| Core indicator | Unit | A1-A3 | A4 | A5 | C1 | C2 | C3/1 | C3/2 | C4/1 | C4/2 | D/1 | D/2 |
|----------------|--|----------|----------|----------|---------|----------|----------|---------|---------|----------|-----------|---------|
| GWP total | [kg CO2 equiv.] | 7.03E+0 | 2.19E-1 | 1.01E-3 | 0.00E+0 | 1.51E-1 | 3.92E+0 | 0.00E+0 | 0.00E+0 | 3.57E+0 | -1.37E-1 | 0.00E+0 |
| GWP fossil | [kg CO2 equiv.] | 1.02E+1 | 2.09E-1 | 1.01E-3 | 0.00E+0 | 1.44E-1 | 3.91E+0 | 0.00E+0 | 0.00E+0 | 3.57E+0 | -1.37E-1 | 0.00E+0 |
| GWP biogenic | [kg CO2 equiv.] | -3.16E+0 | 9.62E-3 | 3.35E-6 | 0.00E+0 | 6.64E-3 | 2.66E-1 | 0.00E+0 | 0.00E+0 | 2.63E-1 | 5.08E-4 | 0.00E+0 |
| GWP luluc | [kg CO2 equiv.] | 1.80E-2 | 4.96E-6 | 1.46E-6 | 0.00E+0 | 3.42E-6 | 1.03E-3 | 0.00E+0 | 0.00E+0 | 1.05E-3 | -9.96E-4 | 0.00E+0 |
| ODP | [kg CFC11 equiv.] | 2.72E-11 | 2.20E-17 | 2.21E-17 | 0.00E+0 | 1.52E-17 | 1.56E-14 | 0.00E+0 | 0.00E+0 | 1.35E-15 | -2.64E-16 | 0.00E+0 |
| AP | [mol H+ equiv.] | 1.22E-2 | 1.96E-4 | 2.22E-6 | 0.00E+0 | 1.35E-4 | 1.57E-3 | 0.00E+0 | 0.00E+0 | 2.61E-3 | -5.07E-4 | 0.00E+0 |
| EP freshwater | [kg P equiv.] | 6.92E-5 | 4.46E-8 | 2.69E-9 | 0.00E+0 | 3.07E-8 | 1.90E-6 | 0.00E+0 | 0.00E+0 | 6.25E-7 | -4.67E-7 | 0.00E+0 |
| EP marine | [kg N equiv.] | 4.52E-3 | 5.95E-5 | 4.93E-7 | 0.00E+0 | 4.10E-5 | 3.49E-4 | 0.00E+0 | 0.00E+0 | 6.72E-4 | -2.12E-4 | 0.00E+0 |
| EP terrestrial | [mol N equiv.] | 4.40E-2 | 6.67E-4 | 5.18E-6 | 0.00E+0 | 4.60E-4 | 3.66E-3 | 0.00E+0 | 0.00E+0 | 7.39E-3 | -2.41E-3 | 0.00E+0 |
| POCP | [kg NMVOC equiv.] | 1.04E-2 | 1.74E-4 | 1.35E-6 | 0.00E+0 | 1.20E-4 | 9.55E-4 | 0.00E+0 | 0.00E+0 | 2.04E-3 | -5.39E-4 | 0.00E+0 |
| ADPE | [kg Sb equiv.] | 2.35E-6 | 6.24E-9 | 2.91E-10 | 0.00E+0 | 4.31E-9 | 2.06E-7 | 0.00E+0 | 0.00E+0 | 3.27E-8 | -1.33E-8 | 0.00E+0 |
| ADPF | [MJ] | 1.43E+2 | 2.95E+0 | 1.77E-2 | 0.00E+0 | 2.04E+0 | 1.25E+1 | 0.00E+0 | 0.00E+0 | 4.78E+0 | -1.88E+0 | 0.00E+0 |
| WDP | [m ³ world equiv., extracted] | 6.08E-1 | 4.08E-4 | 2.19E-4 | 0.00E+0 | 2.81E-4 | 1.55E-1 | 0.00E+0 | 0.00E+0 | 3.82E-2 | -8.22E-3 | 0.00E+0 |

| | |
|--------|--|
| Legend | GWP = Global warming potential; ODP = Ozone depletion potential; AP = Acidification potential of soil and water; EP = Eutrophication potential; POCP = Photochemical ozone creation potential; ADPE = Abiotic depletion potential – non-fossil resources (ADP substances); ADPF = Abiotic depletion potential – fossil fuels (ADP fossil fuels); WDP = Water deprivation potential (users) |
|--------|--|

LCA RESULTS – INDICATORS TO DESCRIBE RESOURCE USE according to EN 15804+A2: Dry screed gypsum fibreboards, 1 m² = 24 kg

| Indicator | Unit | A1-A3 | A4 | A5 | C1 | C2 | C3/1 | C3/2 | C4/1 | C4/2 | D/1 | D/2 |
|-----------|-------------------|---------|---------|---------|---------|---------|----------|---------|---------|----------|----------|---------|
| PERE | [MJ] | 3.97E+1 | 9.31E-3 | 7.84E-3 | 0.00E+0 | 6.42E-3 | 3.30E+1 | 0.00E+0 | 0.00E+0 | 2.81E+1 | -1.95E-1 | 0.00E+0 |
| PERM | [MJ] | 2.75E+1 | 0.00E+0 | 0.00E+0 | 0.00E+0 | 0.00E+0 | -2.75E+1 | 0.00E+0 | 0.00E+0 | -2.75E+1 | 0.00E+0 | 0.00E+0 |
| PERT | [MJ] | 6.72E+1 | 9.31E-3 | 7.84E-3 | 0.00E+0 | 6.42E-3 | 5.54E+0 | 0.00E+0 | 0.00E+0 | 6.25E-1 | -1.95E-1 | 0.00E+0 |
| PENRE | [MJ] | 1.43E+2 | 2.96E+0 | 1.77E-2 | 0.00E+0 | 2.04E+0 | 1.25E+1 | 0.00E+0 | 0.00E+0 | 4.78E+0 | -1.89E+0 | 0.00E+0 |
| PENRM | [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 | 0.00E+0 | 0.00E+0 | 0.00E+0 |
| PENRT | [MJ] | 1.43E+2 | 2.96E+0 | 1.77E-2 | 0.00E+0 | 2.04E+0 | 1.25E+1 | 0.00E+0 | 0.00E+0 | 4.78E+0 | -1.89E+0 | 0.00E+0 |
| SM | [kg] | 1.44E+1 | 0.00E+0 | 0.00E+0 | 0.00E+0 | 0.00E+0 | 0.00E+0 | 0.00E+0 | 0.00E+0 | 0.00E+0 | 0.00E+0 | 0.00E+0 |
| 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 | 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 | 0.00E+0 | 0.00E+0 | 0.00E+0 |
| FW | [m ³] | 4.30E-2 | 1.67E-5 | 9.07E-6 | 0.00E+0 | 1.15E-5 | 6.41E-3 | 0.00E+0 | 0.00E+0 | 1.20E-3 | -2.69E-4 | 0.00E+0 |

| | |
|--------|--|
| Legend | PERE = Renewable primary energy as primary energy carrier; PERM = Renewable primary energy resources as material utilisation; PERT = Total use of renewable primary energy resources; PENRE = Non-renewable primary energy as energy carrier; PENRM = Non-renewable primary energy as material utilisation; PENRT = Total use of non-renewable primary energy resources; SM = Use of secondary materials; RSF = Use of renewable secondary fuels; NRSF = Use of non-renewable secondary fuels; FW = Use of net fresh water |
|--------|--|

LCA RESULTS – WASTE CATEGORIES AND OUTPUT FLOWS according to EN 15804+A2: Dry screed gypsum fibreboards, 1 m² = 24 kg

| Indicator | Unit | A1-A3 | A4 | A5 | C1 | C2 | C3/1 | C3/2 | C4/1 | C4/2 | D/1 | D/2 |
|-----------|------|---------|----------|----------|---------|----------|---------|---------|---------|---------|----------|---------|
| HWD | [kg] | 7.25E-7 | 2.87E-10 | 7.32E-12 | 0.00E+0 | 1.98E-10 | 5.18E-9 | 0.00E+0 | 0.00E+0 | 7.28E-8 | -9.56E-8 | 0.00E+0 |
| NHWD | [kg] | 1.08E-1 | 3.02E-4 | 1.26E-5 | 0.00E+0 | 2.08E-4 | 8.87E-3 | 0.00E+0 | 0.00E+0 | 2.40E+1 | -4.00E-4 | 0.00E+0 |
| RWD | [kg] | 4.60E-3 | 3.17E-6 | 2.69E-6 | 0.00E+0 | 2.19E-6 | 1.90E-3 | 0.00E+0 | 0.00E+0 | 5.43E-5 | -3.37E-5 | 0.00E+0 |
| 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 | 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 | 1.73E+1 | 0.00E+0 | 0.00E+0 | 0.00E+0 | 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 | 0.00E+0 | 0.00E+0 | 0.00E+0 |
| EEE | [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 | 0.00E+0 | 0.00E+0 | 0.00E+0 |
| EET | [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 | 0.00E+0 | 0.00E+0 | 0.00E+0 |

Legend HWD = Hazardous waste for disposal; NHWD = Non-hazardous waste for disposal; RWD = Radioactive waste for disposal; CRU = Components for reuse; MFR = Materials for recycling; MER = Materials for energy recovery; EEE = Exported electrical energy; EET = Exported thermal energy

LCA RESULTS – Additional impact categories acc. to EN 15804+A2 – optional: Dry screed gypsum fibreboards, 1 m² = 24 kg

| Indicator | Unit | A1-A3 | A4 | A5 | C1 | C2 | C3/1 | C3/2 | C4/1 | C4/2 | D/1 | D/2 |
|-----------|----------------------|---------|----------|----------|---------|----------|----------|---------|---------|----------|-----------|---------|
| PM | [Disease incidences] | 2.11E-7 | 1.06E-9 | 1.86E-11 | 0.00E+0 | 7.34E-10 | 1.32E-8 | 0.00E+0 | 0.00E+0 | 3.23E-8 | -2.30E-7 | 0.00E+0 |
| IRP | [kBq U235 equiv.] | 4.45E-1 | 4.53E-4 | 4.41E-4 | 0.00E+0 | 3.13E-4 | 3.11E-1 | 0.00E+0 | 0.00E+0 | 5.58E-3 | -6.16E-3 | 0.00E+0 |
| ETP-fw | [CTUe] | 3.04E+1 | 2.09E+0 | 7.57E-3 | 0.00E+0 | 1.44E+0 | 5.35E+0 | 0.00E+0 | 0.00E+0 | 2.73E+0 | -1.33E+0 | 0.00E+0 |
| HTP-c | [CTUh] | 1.51E-9 | 3.94E-11 | 2.09E-13 | 0.00E+0 | 2.71E-11 | 1.48E-10 | 0.00E+0 | 0.00E+0 | 4.04E-10 | -2.87E-11 | 0.00E+0 |
| HTP-nc | [CTUh] | 6.61E-8 | 1.68E-9 | 7.70E-12 | 0.00E+0 | 1.16E-9 | 5.44E-9 | 0.00E+0 | 0.00E+0 | 4.46E-8 | -1.61E-9 | 0.00E+0 |
| SQP | [-] | 5.74E+1 | 7.59E-3 | 5.63E-3 | 0.00E+0 | 5.23E-3 | 3.98E+0 | 0.00E+0 | 0.00E+0 | 9.96E-1 | -5.92E-1 | 0.00E+0 |

Legend PM = Potential incidence of disease due to particulate matter emissions; IR = Potential effect of human exposure to U235; ETP fw = Potential toxicity comparison unit for ecosystems; HTP c = Potential toxicity comparison unit for humans (carcinogenic effect); HTP nc = Potential toxicity comparison unit for humans (non-carcinogenic effect); SQP = Potential soil quality index

Limitation note 1 – applies to the indicator “Potential impact of exposure of people to U235”: This impact category mainly addresses the potential impact of low-dose ionising radiation on human health in the nuclear fuel cycle. This does not consider impacts attributable to possible nuclear accidents and occupational exposure, nor to the disposal of radioactive waste in underground facilities. Potential ionising radiation from soil, radon and some building materials is also not measured by this indicator.

Limitation note 2 – applies for the indicators: “Potential for Abiotic Resource Depletion – Non-Fossil Resources”, “Potential for Abiotic Resource Depletion – Fossil Fuels”, “Water Depletion Potential (User)”, “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 there is only limited experience with the indicator.

6. LCA: Interpretation

The juxtaposition of the declared modules shows that the manufacturing phase (A1-A3) dominates the Life Cycle Assessment.

Transport to the construction site (A4) and to recycling or landfill (C2) at the end of life are of minor importance.

Greenhouse gas emissions also play a role in Module C3.

Module D shows the potential credits from the recycling process.

7. Proof

7.1 Leaching (sulphate + heavy metals)

On analysis according to the Landfilling Ordinance, the product displays the sulphate concentration in the saturation range which is typical for gypsum (approx. 1500 mg/l), resulting in disposal options only from landfill class I upwards.

Gypsum is classified as a listed substance in water hazard class 1 (slightly hazardous for water). Heavy metal content is significantly below the corresponding criteria for landfill class I.

Proper disposal in accordance with the parameters which can depend on use, sorting depth during deconstruction, collection (separately or together with other construction waste) and treatment, and must be determined by the responsible waste producer

7.2 Radioactivity

The product can be used without restriction with overall dose contributions of significantly lower than 0.3 mSv/a, determined on the basis of the index calculation to RP 112 and the radon concentration (BFS report).

7.3 VOC emissions

The requirements of the AgBB evaluation scheme, version 2008, are complied with in terms of all existing test items /Scherer 2010/:

TVOC3 ≤ 10 mg/m³
Carcinogens 3 EU cat. 1 and 2 ≤ 0.01 mg/m³
TVOC28 < 1.0 mg/m³
SVOC28 ≤ 0.1 mg/m³
Carcinogens28 EU cat. 1 and 2 ≤ 0.001 mg/m³
Total VOC28 excl. LCI ≤ 0.1 mg/m³
Total VOC incl. LCI R = Σ Ci/LCii < 1

8. References

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