PLITEQ®

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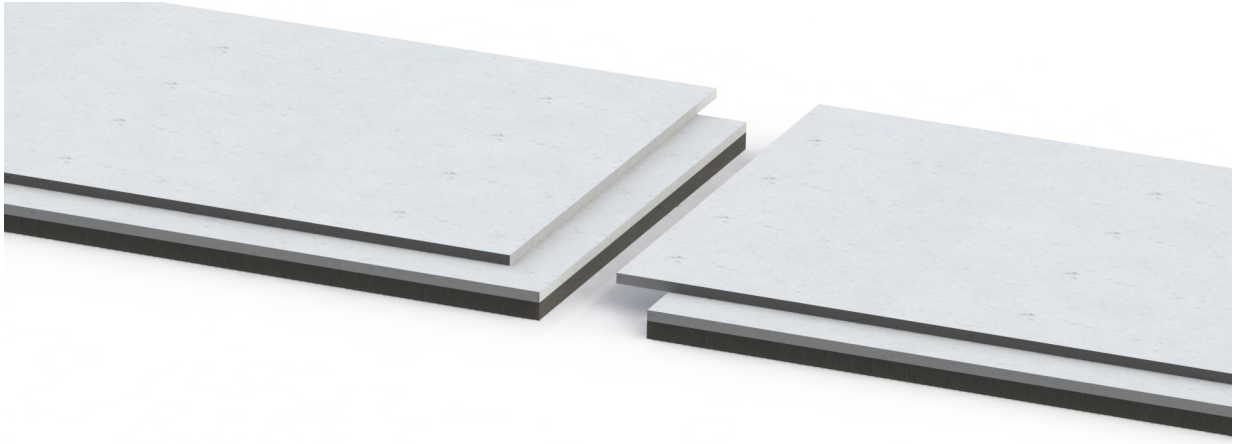
# GenieBoard™

## Recycled Subfloor Panels

# ENVIRONMENTAL PRODUCT DECLARATION

IN ACCORDANCE WITH EN 15804+A2 & ISO 14025 / ISO 21930



# GENERAL INFORMATION

## MANUFACTURER

| | |
|---|---|
| Manufacturer | Pliteq Inc. |
| Address | 131 Royal Group Cres, Vaughan, Ontario, Canada |
| Contact details | info@pliteq.com |
| Website | https://pliteq.com |

## EPD STANDARDS, SCOPE AND VERIFICATION

| | |
|---|---|
| Reference standard | EN 15804+A2:2019 and ISO 14025 |
| PCR | EPD Hub Core PCR version 1.0, 1 Feb 2022 |
| Sector | Construction product |
| Category of EPD | Self-declared EPD |
| Scope of the EPD | Cradle to gate with modules C1-C4, D |
| EPD author | Aedan Callaghan |
| EPD verification | Independent verification of this EPD and data, according to ISO 14025:<br>☑ Internal certification □ External verification |

The manufacturer has the sole ownership, liability, and responsibility for the EPD. EPDs within the same product category but from different programs may not be comparable. EPDs of construction products may not be comparable if they do not comply with EN 15804 and if they are not compared in a building context.

## PRODUCT

| | |
|---|---|
| Product name | GenieBoard |
| Additional labels | GenieBoard 301, GenieBoard 302, |
| Product reference | |
| Place of production | Vaughan, Ontario, Canada |
| Period for data | June 2021 - June 2022 |

## TECHNICAL DATA SUMMARY

| | |
|---|---|
| **Gross density** | 1180 kg/m3 |
| **Bending strength** | > 4 N/mm² |
| **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% humidity** | 1.3 M.-% |
| **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/mm² |

# PRODUCT AND MANUFACTURER

## ABOUT THE MANUFACTURER

Pliteq® is a leading innovator of acoustic products manufactured for the built environment from unusable materials diverted from landfill. Trusted by global architects, builders, engineers, contractors and acoustic consultants for products which are engineered for superior performance, backed by third party test data, and recognized for their sustainable credentials, Pliteq is one of the preeminent global engineering resources.

## PRODUCT DESCRIPTION

Pliteq's GenieBoard product line is engineered as a dry-laid and sustainable alternative to poured gypsum concrete, eliminating curing time, moisture/ water damage, and mold. GenieBoard paired with GenieMat products provides a high-performance system and slimmer floor assemblies backed by rigorous testing for proven results. https://genieboard.pliteq.com/

## 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 (CaSO4 *1/2 H2O) is formed during the firing of gypsum (CaSO4 * 2 H2O) 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 C6H8O7) and modified protein hydrolisates (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.

# PRODUCT AND MANUFACTURER

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 | 1 m2 |
| Gross density | 29.5 kg/m² |
| 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 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

| | |
|---|---|
| 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.

| | |
|---|---|
| Litres of fuel | 0.08 l/100km |
| Transport distance | 100 km |
| Capacity utilisation (including empty runs) | 60 % |
| Gross density of products transported | 1180 kg/m3 |

**Installation in the building (A5)**

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

| | |
|---|---|
| Wooden pallet | 0.037 kg/m² |
| Polyethylene film | 0.0002 kg/m² |

**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).

| | |
|---|---|
| Collected separately Waste type | 29.5 kg |
| Recycling (C3) | 21.4 kg |
| Landfilling (C4) | 8.08 kg |
| Secondary materials (unencumbered, sink) | 5.25 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.

# ENVIRONMENTAL IMPACT DATA

**DESCRIPTION OF THE SYSTEM BOUNDARY (X = INCLUDED IN LCA; ND = MODULE OR INDICATOR NOT DECLARED; MNR = MODULE NOT RELEVANT)**

| Product stage | | | Assembly stage | | Use stage | | | | | | | End of life stage | | | | Beyond the system boundaries | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 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 | | |
| Raw materials | Transport | Manufacturing | Transport | Assembly | Use | Maintenance | Repair | Replacement | Refurbishment | Operational energy use | Operational water use | Deconstr./demol. | Transport | Waste processing | Disposal | Reuse | Recovery | Recycling |

# ENVIRONMENTAL IMPACT DATA

## CORE ENVIRONMENTAL IMPACT INDICATORS – EN 15804+A2, PEF

| Impact category | Unit | A1-A3 | A4 | A5 | C1 | C2 | C3 | C4 | D |
|---|---|---|---|---|---|---|---|---|---|
| GWP – total | kg $CO_2$e | -7.37E-1 | 2.33E-1 | 7.21E-2 | 0E0 | 1.16E-1 | 7.74E-1 | 6.74E+0 | -2.11E-1 |
| GWP – fossil | kg $CO_2$e | 6.45E+0 | 2.22E-1 | 3.87E-3 | 0E0 | 1.11E-1 | 3.36E-1 | 6.40E-2 | -2.10E-1 |
| GWP – biogenic | kg $CO_2$e | -7.19E+0 | 1.03E-2 | 6.83E-2 | 0E0 | 5.12E-3 | 4.38E-1 | 6.68E+0 | 1.82E-4 |
| GWP – LULUC | kg $CO_2$e | 2.51E-3 | 5.28E-6 | 1.31E-6 | 0E0 | 2.64E-6 | 5.76E-5 | 1.88E-4 | -9.43E-4 |
| Ozone depletion pot. | kg $CFC_{-11}$e | 1.00E-13 | 2.34E-17 | 1.61E-17 | 0E0 | 1.17E-17 | 3.78E-15 | 2.49E-16 | -2.90E-16 |
| Acidification potential | mol $H^+$e | 6.39E-3 | 2.07E-4 | 1.30E-5 | 0E0 | 1.03E-4 | 5.43E-4 | 4.56E-4 | -5.70E-4 |
| EP-freshwater | kg Pe | 2.97E-6 | 4.75E-8 | 2.21E-9 | 0E0 | 2.37E-8 | 1.35E-7 | 1.07E-7 | -4.42E-7 |
| EP-marine | kg Ne | 2.41E-3 | 6.31E-5 | 3.60E-6 | 0E0 | 3.15E-5 | 1.44E-4 | 1.18E-4 | -2.30E-4 |
| EP-terrestrial | mol Ne | 2.65E-2 | 7.01E-4 | 6.24E-5 | 0E0 | 3.50E-4 | 1.54E-3 | 1.30E-3 | -2.60E-3 |
| POCP (“smog”) | kg NMVOCe | 6.88E-3 | 1.85E-4 | 9.45E-6 | 0E0 | 9.25E-5 | 4.08E-4 | 3.59E-4 | -5.93E-4 |
| ADP-minerals & metals | kg Sbe | 4.50E-7 | 6.65E-9 | 2.30E-10 | 0E0 | 3.32E-9 | 4.16E-8 | 6.04E-9 | -1.43E-8 |
| ADP-fossil resources | MJ | 1.04E+2 | 3.14E+0 | 1.71E-2 | 0E0 | 1.57E+0 | 6.97E+0 | 8.49E-1 | -2.76E+0 |
| Water use | $m^3$e depr. | 5.35E-1 | 4.35E-4 | 7.34E-3 | 0E0 | 2.17E-4 | 2.69E-2 | 6.87E-3 | -8.39E-3 |

# ENVIRONMENTAL IMPACT DATA

## INDICATORS TO DESCRIBE RESOURCE USE according to EN 15804+A2

| Impact category | Unit | A1-A3 | A4 | A5 | C1 | C2 | C3 | C4 | D |
|---|---|---|---|---|---|---|---|---|---|
| PERE | MJ | 8.39E+0 | 9.92E-3 | 5.62E-1 | 0E0 | 4.95E-3 | 8.48E-1 | 2.18E-1 | -9.32E-2 |
| PERM | MJ | 6.41E+1 | 0.00E+0 | -5.58E-1 | 0E0 | 0.00E+0 | -6.35E+1 | 0.00E+0 | 0.00E+0 |
| PERT | MJ | 7.25E+1 | 9.92E-3 | 3.92E-3 | 0E0 | 4.95E-3 | -6.26E+1 | 2.18E-1 | -9.32E-2 |
| PENRE | MJ | 3.76E+1 | 3.15E+0 | 2.52E-2 | 0E0 | 1.57E+0 | 8.13E+0 | 1.62E+0 | -1.81E+0 |
| PENRM | MJ | 8.00E-3 | 0.00E+0 | -8.06E-3 | 0E0 | 0.00E+0 | 0.00E+0 | 0.00E+0 | 0.00E+0 |
| PENRT | MJ | 3.76E+1 | 3.15E+0 | 1.71E-2 | 0E0 | 1.57E+0 | 8.13E+0 | 1.62E+0 | -1.81E+0 |
| SM | KG | 5.35E+0 | 0.00E+0 | 0.00E+0 | 0E0 | 0.00E+0 | 0.00E+0 | 0.00E+0 | 1.64E+1 |
| RSF | MJ | 0.00E+0 | 0.00E+0 | 0.00E+0 | 0E0 | 0.00E+0 | 0.00E+0 | 0.00E+0 | 0.00E+0 |
| NRSF | MJ | 0.00E+0 | 0.00E+0 | 0.00E+0 | 0E0 | 0.00E+0 | 0.00E+0 | 0.00E+0 | 0.00E+0 |
| FW | MJ | 2.16E-2 | 1.78E-5 | 1.73E-4 | 0E0 | 8.88E-6 | 1.83E-3 | 3.99E-4 | -2.40E-4 |

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 nonrenewable 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

# ENVIRONMENTAL IMPACT DATA

## WASTE CATEGORIES AND OUTPUT FLOWS according to EN 15804+A2

| Impact category | Unit | A1-A3 | A4 | A5 | C1 | C2 | C3 | C4 | D |
|---|---|---|---|---|---|---|---|---|---|
| HWD | KG | 8.22E-9 | 3.05E-10 | 3.81E-12 | 0E0 | 1.52E-10 | 8.38E-10 | 9.02E-11 | -8.90E-8 |
| NHWD | KG | 2.55E-2 | 3.22E-4 | 4.84E-4 | 0E0 | 1.61E-4 | 1.31E-3 | 8.08E+0 | -6.79E-4 |
| RWD | KG | 1.18E-3 | 3.38E-6 | 4.81E-7 | 0E0 | 1.69E-6 | 1.13E-3 | 8.92E-6 | -5.58E-5 |
| CRU | KG | 0.00E+0 | 0.00E+0 | 0.00E+0 | 0E0 | 0.00E+0 | 0.00E+0 | 0.00E+0 | 0.00E+0 |
| MFR | KG | 0.00E+0 | 0.00E+0 | 0.00E+0 | 0E0 | 0.00E+0 | 2.14E+1 | 0.00E+0 | 0.00E+0 |
| MER | KG | 0.00E+0 | 0.00E+0 | 0.00E+0 | 0E0 | 0.00E+0 | 0.00E+0 | 0.00E+0 | 0.00E+0 |
| EEE | MJ | 0.00E+0 | 0.00E+0 | 8.91E-2 | 0E0 | 0.00E+0 | 0.00E+0 | 0.00E+0 | 0.00E+0 |
| EET | MJ | 0.00E+0 | 0.00E+0 | 2.09E-1 | 0E0 | 0.00E+0 | 0.00E+0 | 0.00E+0 | 0.00E+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

# ENVIRONMENTAL IMPACT DATA

## ADDITIONAL IMPACT CATEGORIES ACCORDING TO EN 15804+A2-OPTIONAL

| Impact category | Unit | A1-A3 | A4 | A5 | C1 | C2 | C3 | C4 | D |
|---|---|---|---|---|---|---|---|---|---|
| PM | Disease Incidence | 1.60E-7 | 1.12E-9 | 6.97E-11 | 0E0 | 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 | 0E0 | 2.41E-4 | 1.92E-1 | 1.79E-3 | -4.52E-3 |
| ETP-fw | CTUe | 1.25E+1 | 2.23E+0 | 6.79E-3 | 0E0 | 1.11E+0 | 2.50E+0 | 9.23E-1 | -7.54E-1 |
| HTP-c | CTUh | 7.45E-10 | 4.19E-11 | 4.84E-13 | 0E0 | 2.09E-11 | 4.17E-11 | 1.36E-10 | -1.80E-11 |
| HTP-nc | CTUh | 6.15E-8 | 1.78E-9 | 1.82E-11 | 0E0 | 8.90E-10 | 2.30E-9 | 1.50E-8 | -1.04E-9 |
| SQP | - | 8.06E+1 | 8.08E-3 | 5.04E-3 | 0E0 | 4.04E-3 | 6.74E-1 | 3.27E-1 | -2.71E-1 |

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.*