



Environmental Product Declaration

In accordance with the EN 15804 +A2 and the NMD Bepalingsmethode, v1.1

GUTEX wood fibre insulation

Scope of the declaration

Type of the EPD is Cradle to grave, including modules A-D

According to the EN 15804 +A2 and the NMD Bepalingsmethode, version 1.1

The LCA was carried out by Agrodome B.V. (NL)

Based on production data from GUTEX Holzfaserplattenwerk

Release Date: 8 December 2023

Validity for: 5 years

Functional unit: 1 m²

 **GUTEX**®
DÄMPLATTEN AUS SCHWARZWALDHOLZ

Goal and target group

Goal

The declaration covers the environmental effects throughout the lifetime of the product GUTEX wood fibre insulation for indoor and outdoor applications.

Target audience

The EPD can be used for building or building part level assessments by designers, architects, constructors, developers etc. The EPD is made business-to-business communication and can be used for business-to-consumer communication purposes. The background EPD report is third party verified.

Product description

GUTEX wood fibre insulating boards are board-shaped insulating materials manufactured from wood fibres in accordance with EN 13171.

By adding low quantities of polyurethane (PUR) resin, insulating boards are manufactured from wood fibres in a dry process. After production, they are cut and profiled and finished where necessary. Water-repellent and non-water-repellent single-layer insulation panels can be manufactured to a thickness of 240 mm.

In this study, two different product groups were assessed:

- GUTEX wood fibre insulation with wax, for outdoor application
(Ultratherm, Multiplex-top, Multitherm, Thermoflat, Thermowall (normal, +gf, +NF, +L))
- GUTEX wood fibre insulation indoors (without wax)
(Thermosafe (homogen + wd), Thermoinstal, Thermoroom)

Function of the product

GUTEX wood fibre insulating can be used in old and new buildings: as a thermal insulation composite system for the plaster facade, wall insulation for back-ventilated facades, on-roof and/or false ceilings, insulating ceilings between floors, interior insulation of external walls, insulation of installation levels and impact sound insulation for floors.

Composition of GUTEX wood fibre insulation

Material	Share	
	wax	indoor
Wood chips from coniferous wood: fir/spruce	95 %	96%
PUR resin	4 %	4 %
Paraffin wax	1 %	–

Table 1: Composition GUTEX wood fibre insulation

Technical data GUTEX wood fibre insulation

Name	Value	
	wax	indoor
Thickness element at R = 3,5 m ² k/W	140 mm	140 mm
Weight GUTEX wood fibre insulation	23,4 kg/m ²	23,2 kg/m ²
Density	110-250 kg/m ³	130-150 kg/m ³
Thermal conductivity λ	0,037-0,047 W/mK	0,037-0,047 W/mK
Vapour diffusion resistance factor μ	3	3
Specific heat capacity c	2100 J/kgK	2100 J/kgK
Fire resistance class according to EN 13501-1	E	E

Table 2: Technical data GUTEX wood fibre insulation

Environment and health during use phase

GUTEX wood fibre insulation does not contain concentrations of substances or materials listed in the "Candidate List of Substances of Very High Concern for authorisation".

Environmental certificates

GUTEX wood fibre insulation has the natureplus seal of approval, license number: **0104-0604-012-2**. natureplus has severe guidelines for the emissions from a product and the effects on health, environment and climate change (www.natureplus.org).

Biogenic carbon storage¹

Biogenic carbon storage during the lifetime of the products made from GUTEX wood fibre insulation:

Wax, 260,12 kg CO₂ eq./m³ this makes 70,94 kg C/m³

Indoor, 260,36 kg CO₂ eq./m³ this makes 71,01 kg C/m³.

Biogenic content GUTEX wood fibre insulation, m²

Biogenic carbon	Share biogenic carbon per m ²	
	wax	indoor
Biogenic carbon in product	70,94 kg C	71,01 kg C
Biogenic carbon in packaging	0,02 kg C	0,02 kg C

Table 3: Biogenic content GUTEX wood fibre insulation, m²

¹ Calculated according to the calculation method in the norm EN 16449 'Wood and wood based products - Calculation of sequestration of atmospheric carbon dioxide'.

LCA calculation rules

Functional unit

One square meter of wood fibre insulation, with a lifespan of 75 years, with an insulation value of 3,5 m²k/W and a thickness and density as in the table below.

Name	Product	Value	Unit
Thickness	wax	140	mm
	indoors	140	mm
Density	wax	167,12	kg/m ³
	indoors	165,53	kg/m ³
Weight	wax	23,4	kg/FU
	indoors	23,2	kg/FU

Reference Service Life

The lifespan of the product, as declared by the manufacturer, is 75 years (the life of the building) when correctly applied as an insulation material. No maintenance is needed.

Comparability

A comparison or evaluation of the environmental performance of construction products using the EPD information is only possible if based on the product's use in and its impacts on the building, and if all datasets are made in accordance with EN 15804 and the same product-related standard properties and modules are taken into account.

System boundaries

The LCA study was created for 'Cradle to Grave A1-D' according to the modules below. All declared values relate to the specified functional unit. The functional unit of the European standard EN 15804 +A2 and the NMD - Bepalingsmethode 'Milieuprestatie Bouwwerken' are identical.

The environmental performance of building materials is categorized in four modules corresponding to different lifecycle phases in the building material; Modules A (production of materials and construction), B (use phase), C (end-of-life phase of the building) and D (loads and benefits outside the system boundary); see Figure 1.

Product stage			Construction installation stage		Use stage							End of life stage				Beyond the system boundaries
Raw materials	Transport	Manufacturing	Transport	Construction installation stage	Use	Maintenance	Repair	Replacement	Returbishment	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
☒	☒	☒	☒	☒	☒	☒	☒	☒	☒	☐	☐	☒	☒	☒	☒	☒

Figure 1: Calculated modules GUTEX wood fibre insulation

For this LCA study, all modules A1-3, A4, A5, B, C and D have been examined, except B6 and B7.

Allocations

There are no allocations of co-products from the wood fibre insulation.

Assumptions, omissions and deviations

It is assumed that no maintenance is needed when installed in the building.

No other significant assumptions, omissions or deviations were included in this LCA study.

Production process GUTEX wood fibre insulation

The next page shows the flowchart of the production process of GUTEX wood fibre insulation. This flowchart lists the entire production process starting with the wood chips arriving at the factory.

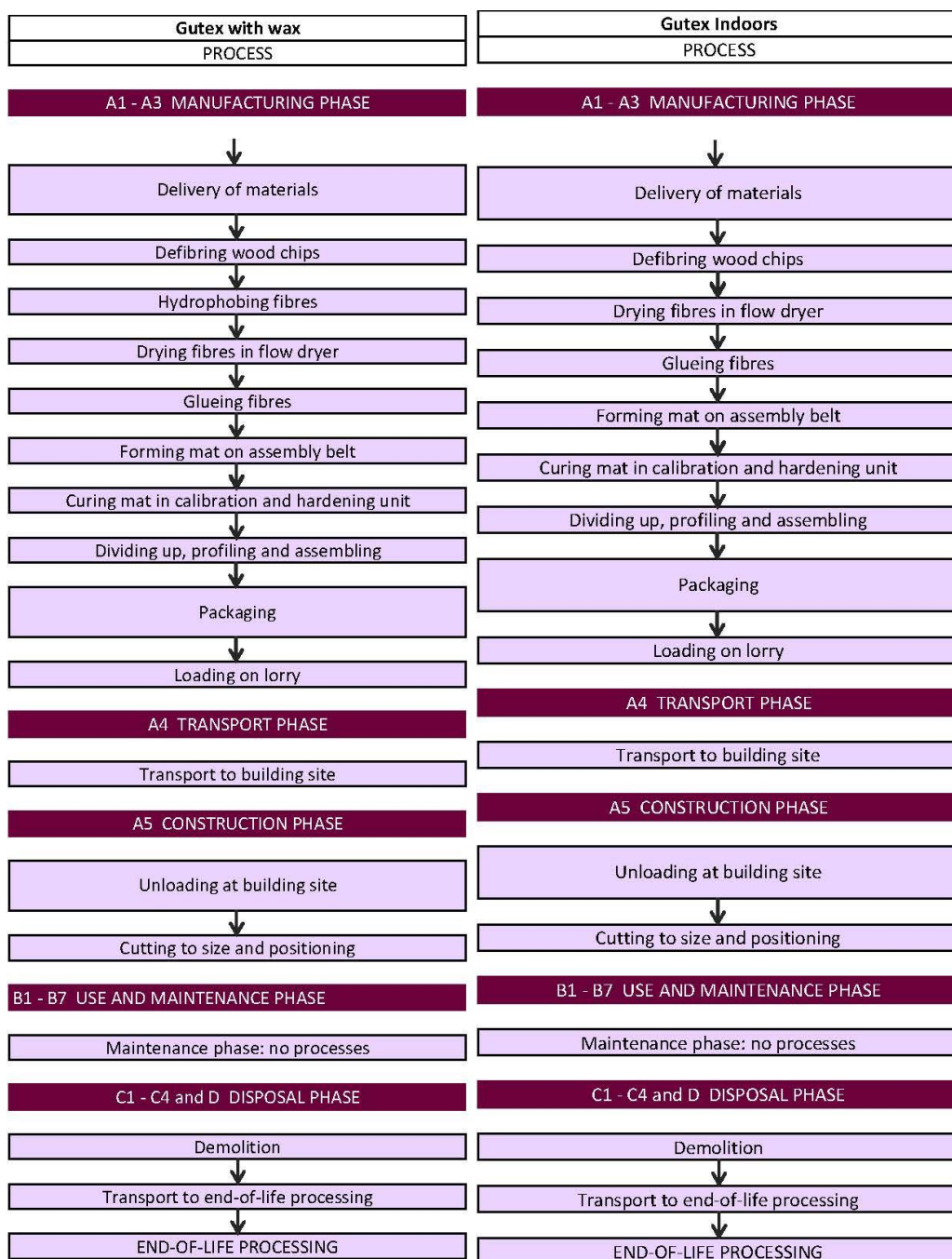


Figure 2: Flowcharts GUTEX wood fibre insulation with wax (left) and for indoors (right)

Explanation Flowcharts and Life Cycle per phase

Production phase (A1-3)

The products are made of wood chips, a residual stream from sawmills.

After the wood chips are delivered at the GUTEX factory, the chips are processed in a defibrator to create the fibres for the boards. Next, the fibres are made water repellent using paraffin. The fibres are dried in a flow dryer and then glued with a PUR resin. The sticky fibres are scattered on the forming belt to form a mat. The mat is cured in the calibration and hardening unit. The final step is dividing up the mat to boards and profiling them.

For transportation, a pile of boards is wrapped in cardboard and PE foil.

Construction process phase (A4-5)

Transport to the building site (A4)

The finished product is transported from the production site in Germany to the Netherlands. For the transport movement from Germany to the Netherlands, no empty return is applied. The default from the determination method version 1.1 is used for the transport to the building site, in this case Waldshut-Tiengen to Utrecht, the Netherlands.

Processing and construction on the construction site (A5)

At the construction site, the insulation is cut to size and fitted; for this only hand tools are used. The wood fibre cut-offs and packaging materials (cardboard and PE foil) are disposed of together with other building materials. For this, the following waste scenario's were taken into account:

- wood fibre board: 5% landfill, 95% incineration
- wooden pallets: 5% landfill, 80% incineration, 15% recycling
- card board: 15% landfill, 85% incineration
- PE foil: 10% landfill, 85% incineration, 5% recycling

Use phase (B1-7)

GUTEX wood fibre insulation has a lifespan of 75 years when correctly applied as insulation material in a building. This period is equal to the Dutch standard for residential buildings. During this period, no additional maintenance is needed.

End-of-life phase (C1-4)

Disassembly and demolition (C1)

Disassembly and demolition takes place together with the demolition of all the building elements. No separate process for the wood fibre is considered.

Transport (C2)

Transport phase assumptions: the default value according to the bepalingsmethode 1.1 is used. This is 50 km to sorting installation and 100 km from demolition or sorting location to processing location. Selection of the means of transport according to the bepalingsmethode version 1.1 (Chapter 2.6.3.7).

Waste treatment (C3-C4)

For waste processing, the distribution below and the scenarios chosen have been taken into account for the wood fibre insulation:

- 5% landfill, 95% incineration

Benefits and burdens outside the system boundary (D)

The benefits and burdens outside the system boundary relate to combustion in which energy use is avoided. The recycling and reuse of the attachment is also part of the benefits and burdens outside the system boundary. The efficiency of heat and electricity recovery from waste material is 31% for heat and 18% for electricity, according to the fixed values in the NMD bepalingsmethode.

LCA results

LCA results for GUTEX wood fibre insulation with wax, for outdoor application

Environmental indicators per FU (m²) EN 15804 +A1, GUTEX wood fibre insulation with wax

Potential Environmental Impacts	Production	Construction process stage		Use stage					End-of-life stage				D Reuse, recovery, recycling
	A1 Raw material A2 Transport A3 manufacturing	A4 Transport	A5 Installation	B1 Use	B2 Maintenance	B3 Repair	B4 Replacement	B5 Refurbishment	C1 Deconstruction / demolition	C2 Transport	C3 Waste processing	C4 Disposal	
ADPE (kg Sb-eq)	2,56E-04	6,94E-05	2,83E-07	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	1,24E-05	1,28E-06	1,33E-07	-2,02E-05
ADPF (kg SB-eq)	1,28E-01	2,00E-02	1,33E-04	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	3,57E-03	1,11E-03	1,42E-04	-8,81E-03
GWP (kg CO ₂ -eq)	1,48E+01	2,72E+00	1,52E-01	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	4,85E-01	2,01E-01	8,85E-02	-1,44E+00
ODP (kg CFC 11-eq)	1,60E-06	4,82E-07	5,53E-09	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	8,61E-08	2,38E-08	3,07E-09	-4,02E-07
POCP (kg C ₂ H ₄ -eq)	1,22E-02	1,64E-03	4,66E-05	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	2,93E-04	9,06E-04	2,76E-05	-4,41E-03
AP (kg SO ₂ -eq)	4,46E-02	1,19E-02	2,74E-04	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	2,13E-03	4,72E-03	8,16E-05	-2,82E-02
EP (kg (PO ₄) ₃ -eq)	9,11E-03	2,35E-03	6,75E-05	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	4,19E-04	1,23E-03	3,35E-05	-9,35E-03
HTP (kg 1,4-DB-eq)	5,02E+00	1,14E+00	3,63E-02	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	2,04E-01	5,67E-01	7,64E-03	-2,45E+00
FAETP (kg 1,4-DB-eq)	2,30E-01	3,34E-02	9,58E-04	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	5,97E-03	2,51E-02	1,50E-04	-5,12E-02
MAETP (kg 1,4-DB-eq)	5,17E+02	1,20E+02	2,46E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	2,15E+01	1,37E+01	5,42E-01	-6,91E+01
TETP (kg 1,4-DB-eq)	2,30E-02	4,04E-03	6,02E-05	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	7,22E-04	5,70E-04	2,48E-05	-1,56E-02

ADPE = Abiotic Depletion Potential – Elements; ADPF = Abiotic Depletion Potential – Fossil Fuels; GWP = Global warming Potential; ODP = Ozone Depletion Potential; POCP = Photochemical Ozone Creation; AP = Acidification Potential for Soil and Water; EP = Eutrophication Potential; HTP = Human Toxicity Potential ; FAETP = Fresh Aquatic Ecotoxicity Potential ; MAETP = Marine Aquatic Ecotoxicity Potential; TETP = Terrestrial Ecotoxicity Potential

Table 4: Environmental indicators per FU (m²) EN 15804 +A1, GUTEX wood fibre insulation with wax

Core Environmental Indicators per FU (m²) EN 15804 +A2, GUTEX wood fibre insulation with wax

Potential Environmental Impacts	Production	Construction process stage		Use stage					End-of-life stage				D Reuse, recovery, recycling
	A1 Raw material A2 Transport A3 manufacturing	A4 Transport	A5 Installation	B1 Use	B2 Maintenance	B3 Repair	B4 Replacement	B5 Refurbishment	C1 Deconstruction / demolition	C2 Transport	C3 Waste processing	C4 Disposal	
CC total (kg CO ₂ eq)	-2,88E+01	2,74E+00	1,59E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	4,90E-01	4,28E+01	1,30E-01	-1,52E+00
CC fossil (kg CO ₂ eq)	1,53E+01	2,74E+00	1,48E-01	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	4,89E-01	2,04E-01	1,39E-02	-1,46E+00
CC biogenic (kg CO ₂ eq)	-4,41E+01	1,26E-03	1,44E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	2,26E-04	4,25E+01	1,17E-01	-4,05E-02
CC luluc (kg CO ₂ eq)	2,55E-02	1,00E-03	1,77E-05	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	1,79E-04	5,58E-05	6,08E-06	-1,57E-02
ODP (kg CFC 11 eq)	1,80E-06	6,05E-07	5,68E-09	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	1,08E-07	2,62E-08	3,83E-09	-4,10E-07
AP (mol H ⁺ eq)	5,56E-02	1,59E-02	3,92E-04	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	2,84E-03	6,97E-03	1,08E-04	-4,44E-02
EP – freshwater (kg P eq)	5,22E-04	2,76E-05	7,52E-07	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	4,94E-06	4,17E-06	2,59E-07	-1,40E-04
EP – marine (kg N eq)	1,47E-02	5,60E-03	1,68E-04	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	1,00E-03	3,24E-03	6,94E-05	-1,30E-02
EP – terrestrial (mol N eq)	1,32E-01	6,17E-02	1,89E-03	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	1,10E-02	3,71E-02	3,98E-04	-2,13E-01
POCP (kg NMVOC eq)	5,08E-02	1,76E-02	4,98E-04	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	3,15E-03	9,71E-03	1,42E-04	-3,74E-02
ADP Elements (kg Sb eq)	2,56E-04	6,94E-05	2,83E-07	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	1,24E-05	1,28E-06	1,33E-07	-2,02E-05
ADP fossil fuels (MJ)	2,48E+02	4,13E+01	2,51E-01	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	7,38E+00	2,07E+00	2,93E-01	-1,81E+01
WDP (m ³ water eq deprived)	2,60E+01	1,48E-01	1,19E-02	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	2,64E-02	7,28E-02	1,26E-02	-1,57E-01

CC total = Climate Change total; CC fossil = Climate Change fossil; CC biogenic= Climate Change biogenic; CC-luluc = Climate Change land use and land use change; ODP = Ozone Depletion Potential; AP = Acidification Potential for Soil and Water; EP = Eutrophication Potential; POCP = Photochemical Ozone Creation; ADPE = Abiotic Depletion Potential – Elements; ADPF = Abiotic Depletion Potential – Fossil Fuels; WDP = water use (Water user) deprivation potential, deprivation-weighted water consumption)

Table 5: Core Environmental Indicators per FU (m²) EN 15804 +A2, GUTEX wood fibre insulation with wax

Additional Environmental Indicators per FU (m²) EN 15804 +A2, GUTEX wood fibre insulation with wax

Potential Environmental Impacts	A1 t/m A3	A4	A5	B1	B2	B3	B4	B5	C1	C2	C3	C4	D
<i>PM (disease incidence)</i>	7,04E-07	2,46E-07	3,25E-09	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	4,40E-08	5,62E-08	2,04E-09	-6,01E-07
<i>IRHH (kg U235 eq)</i>	2,93E-01	1,73E-01	8,97E-04	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	3,09E-02	5,39E-03	1,15E-03	-6,99E-02
<i>ETF (CTUe)</i>	5,16E+02	3,68E+01	2,07E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	6,58E+00	6,06E+00	2,94E-01	-4,30E+02
<i>HTCE (CTUh)</i>	5,95E-08	1,20E-09	7,92E-10	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	2,14E-10	8,63E-08	8,17E-12	-4,94E-09
<i>HTnCE (CTUh)</i>	6,12E-07	4,03E-08	1,73E-09	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	7,20E-09	2,12E-08	3,14E-10	-1,80E-07
<i>Land Use Related impacts (dimensionless)</i>	2,56E+03	3,58E+01	1,22E-01	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	6,40E+00	7,19E-01	6,94E-01	-1,70E+03
<i>PERE (MJ, net calorific value)</i>	5,17E+02	5,17E-01	-1,44E+01	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	9,24E-02	-3,11E+02	5,16E-03	-3,55E+02
<i>PERM (MJ, net calorific value)</i>	1,40E-01	0,00E+00	1,44E+01	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	3,11E+02	0,00E+00	0,00E+00
<i>PERT (MJ, net calorific value)</i>	5,17E+02	5,17E-01	1,87E-02	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	9,24E-02	9,59E-02	5,16E-03	-3,55E+02
<i>PENRE (MJ, net calorific value)</i>	2,69E+02	4,39E+01	-1,86E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	7,84E+00	2,23E+00	3,12E-01	-1,93E+01
<i>PENRM (MJ, net calorific value)</i>	9,36E-02	0,00E+00	2,13E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
<i>PENRT (MJ, net calorific value)</i>	2,69E+02	4,39E+01	2,68E-01	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	7,84E+00	2,23E+00	3,12E-01	-1,93E+01
<i>SM (kg)</i>	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
<i>RSF (MJ, net calorific value)</i>	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
<i>NRSF (MJ, net calorific value)</i>	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
<i>FW (m³ water eq)</i>	6,15E-01	5,03E-03	7,37E-04	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	8,99E-04	1,09E-02	3,06E-04	-4,55E-03

PM = Particulate Matter; IRHH = Ionizing Radiation – human health effects; ETF = Ecotoxicity – freshwater; HTCE = Human Toxicity – cancer effects; HTnCE = Human Toxicity – non cancer effects; 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 = Net use of fresh water

Table 6: Additional Environmental Indicators per FU (m²) EN 15804 +A2, GUTEX wood fibre insulation with wax

Environmental information describing output flows and waste categories per FU (m²) EN 15804 +A2, GUTEX wood fibre insulation with wax

Potential Environmental Impacts	A1 t/m A3	A4	A5	B1	B2	B3	B4	B5	C1	C2	C3	C4	D
<i>Hazardous waste disposed (kg/FU)</i>	2,74E-04	1,05E-04	5,54E-07	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	1,87E-05	1,33E-05	4,51E-07	-6,03E-05
<i>Non-hazardous waste disposed (kg)</i>	1,55E+00	2,62E+00	8,10E-02	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	4,68E-01	1,93E-01	1,17E+00	-6,37E-01
<i>Radioactive waste disposed (kg)</i>	3,55E-04	2,71E-04	8,98E-07	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	4,85E-05	6,39E-06	1,74E-06	-1,07E-04
<i>Components for reuse (kg)</i>	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
<i>Materials for recycling (kg)</i>	2,34E-04	0,00E+00	1,57E-01	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
<i>Materials for energy recovery (kg)</i>	1,17E-02	0,00E+00	9,39E-01	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	2,22E+01	0,00E+00	0,00E+00
<i>Exported energy Heat (MJ)</i>	4,21E-02	0,00E+00	2,98E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	5,60E+01	0,00E+00	0,00E+00
<i>Exported energy Energy (MJ)</i>	7,25E-02	0,00E+00	5,14E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	9,64E+01	0,00E+00	0,00E+00

Table 7: Environmental information describing output flows and waste categories per FU (m²) EN 15804 +A2, GUTEX wood fibre insulation with wax

LCA results for GUTEX wood fibre insulation without wax, for indoor application

Environmental indicators per FU (m²) EN 15804 +A1, GUTEX wood fibre insulation indoors

Potential Environmental Impacts	Production	Construction process stage		Use stage					End-of-life stage				D Reuse, recovery, recycling
	A1 Raw material A2 Transport A3 manufacturing	A4 Transport	A5 Installation	B1 Use	B2 Maintenance	B3 Repair	B4 Replacement	B5 Refurbishment	C1 Deconstruction / demolition	C2 Transport	C3 Waste processing	C4 Disposal	
ADPE (kg Sb-eq)	2,52E-04	6,88E-05	2,83E-07	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	1,23E-05	1,26E-06	1,31E-07	-2,00E-05
ADPF (kg SB-eq)	1,23E-01	1,98E-02	1,33E-04	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	3,54E-03	1,10E-03	1,41E-04	-8,74E-03
GWP (kg CO ₂ -eq)	1,46E+01	2,69E+00	1,52E-01	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	4,81E-01	1,99E-01	8,76E-02	-1,43E+00
ODP (kg CFC 11-eq)	1,59E-06	4,78E-07	5,53E-09	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	8,53E-08	2,36E-08	3,04E-09	-3,99E-07
POCP (kg C ₂ H ₄ -eq)	1,21E-02	1,62E-03	4,66E-05	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	2,90E-04	8,97E-04	2,74E-05	-4,37E-03
AP (kg SO ₂ -eq)	4,34E-02	1,18E-02	2,74E-04	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	2,11E-03	4,68E-03	8,09E-05	-2,80E-02
EP (kg (PO ₄) ₃ -eq)	9,01E-03	2,32E-03	6,75E-05	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	4,15E-04	1,21E-03	3,32E-05	-9,26E-03
HTP (kg 1,4-DB-eq)	4,95E+00	1,13E+00	3,63E-02	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	2,02E-01	5,61E-01	7,57E-03	-2,42E+00
FAETP (kg 1,4-DB-eq)	2,29E-01	3,31E-02	9,58E-04	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	5,91E-03	2,48E-02	1,49E-04	-5,07E-02
MAETP (kg 1,4-DB-eq)	5,13E+02	1,19E+02	2,45E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	2,13E+01	1,36E+01	5,37E-01	-6,85E+01
TETP (kg 1,4-DB-eq)	2,28E-02	4,01E-03	6,02E-05	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	7,16E-04	5,64E-04	2,46E-05	-1,55E-02

ADPE = Abiotic Depletion Potential – Elements; ADPF = Abiotic Depletion Potential – Fossil Fuels; GWP = Global warming Potential; ODP = Ozone Depletion Potential; POCP = Photochemical Ozone Creation; AP = Acidification Potential for Soil and Water; EP = Eutrophication Potential; HTP = Human Toxicity Potential ; FAETP = Fresh Aquatic Ecotoxicity Potential ; MAETP = Marine Aquatic Ecotoxicity Potential; TETP = Terrestrial Ecotoxicity Potential

Table 8: Environmental indicators per FU (m²) EN 15804 +A1, GUTEX wood fibre insulation indoors

Core Environmental Indicators per FU (m²) EN 15804 +A2, GUTEX wood fibre insulation indoors

Potential Environmental Impacts	Production	Construction process stage		Use stage					End-of-life stage				D Reuse, recovery, recycling
	A1 Raw material A2 Transport A3 manufacturing	A4 Transport	A5 Installation	B1 Use	B2 Maintenance	B3 Repair	B4 Replacement	B5 Refurbishment	C1 Deconstruction / demolition	C2 Transport	C3 Waste processing	C4 Disposal	
CC total (kg CO ₂ eq)	-2,89E+01	2,72E+00	1,59E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	4,85E-01	4,27E+01	1,29E-01	-1,50E+00
CC fossil (kg CO ₂ eq)	1,51E+01	2,71E+00	1,48E-01	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	4,85E-01	2,02E-01	1,38E-02	-1,45E+00
CC biogenic (kg CO ₂ eq)	-4,41E+01	1,25E-03	1,44E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	2,24E-04	4,25E+01	1,15E-01	-3,93E-02
CC luluc (kg CO ₂ eq)	2,55E-02	9,95E-04	1,77E-05	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	1,78E-04	5,52E-05	6,02E-06	-1,55E-02
ODP (kg CFC 11 eq)	1,80E-06	5,99E-07	5,68E-09	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	1,07E-07	2,59E-08	3,80E-09	-4,07E-07
AP (mol H ⁺ eq)	5,42E-02	1,57E-02	3,92E-04	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	2,81E-03	6,91E-03	1,07E-04	-4,40E-02
EP – freshwater (kg P eq)	5,18E-04	2,74E-05	7,52E-07	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	4,89E-06	4,13E-06	2,56E-07	-1,39E-04
EP – marine (kg N eq)	1,45E-02	5,55E-03	1,68E-04	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	9,91E-04	3,21E-03	6,87E-05	-1,29E-02
EP – terrestrial (mol N eq)	1,30E-01	6,12E-02	1,89E-03	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	1,09E-02	3,68E-02	3,94E-04	-2,11E-01
POCP (kg NMVOC eq)	4,99E-02	1,75E-02	4,97E-04	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	3,12E-03	9,61E-03	1,41E-04	-3,71E-02
ADP Elements (kg Sb eq)	2,52E-04	6,88E-05	2,83E-07	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	1,23E-05	1,26E-06	1,31E-07	-2,00E-05
ADP fossil fuels (MJ)	2,37E+02	4,09E+01	2,51E-01	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	7,31E+00	2,05E+00	2,90E-01	-1,80E+01
WDP (m ³ water eq deprived)	5,08E+00	1,46E-01	1,19E-02	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	2,62E-02	7,21E-02	1,25E-02	-1,56E-01

CC total = Climate Change total; CC fossil = Climate Change fossil; CC biogenic= Climate Change biogenic; CC-luluc = Climate Change land use and land use change; ODP = Ozone Depletion Potential; AP = Acidification Potential for Soil and Water; EP = Eutrophication Potential; POCP = Photochemical Ozone Creation; ADPE = Abiotic Depletion Potential – Elements; ADPF = Abiotic Depletion Potential – Fossil Fuels; WDP = water use (Water user) deprivation potential, deprivation-weighted water consumption)

Table 9: Core Environmental Indicators per FU (m²) EN 15804 +A2, GUTEX wood fibre insulation indoors

Additional Environmental Indicators per FU (m²) EN 15804 +A2, GUTEX wood fibre insulation indoors

Potential Environmental Impacts	A1 t/m A3	A4	A5	B1	B2	B3	B4	B5	C1	C2	C3	C4	D
<i>PM (disease incidence)</i>	6,91E-07	2,44E-07	3,25E-09	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	4,35E-08	5,56E-08	2,02E-09	-5,96E-07
<i>IRHH (kg U235 eq)</i>	2,91E-01	1,72E-01	8,97E-04	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	3,06E-02	5,34E-03	1,14E-03	-6,92E-02
<i>ETF (CTUe)</i>	5,12E+02	3,65E+01	2,07E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	6,52E+00	6,00E+00	2,91E-01	-4,26E+02
<i>HTCE (CTUh)</i>	5,94E-08	1,18E-09	7,92E-10	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	2,12E-10	8,54E-08	8,09E-12	-4,90E-09
<i>HTnCE (CTUh)</i>	6,10E-07	3,99E-08	1,73E-09	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	7,13E-09	2,10E-08	3,11E-10	-1,78E-07
<i>Land Use Related impacts (dimensionless)</i>	2,56E+03	3,55E+01	1,22E-01	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	6,34E+00	7,12E-01	6,87E-01	-1,68E+03
<i>PERE (MJ, net calorific value)</i>	5,17E+02	5,12E-01	-1,44E+01	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	9,16E-02	-3,08E+02	5,11E-03	-3,51E+02
<i>PERM (MJ, net calorific value)</i>	1,39E-01	0,00E+00	1,44E+01	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	3,08E+02	0,00E+00	0,00E+00
<i>PERT (MJ, net calorific value)</i>	5,17E+02	5,12E-01	1,87E-02	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	9,16E-02	9,50E-02	5,11E-03	-3,51E+02
<i>PENRE (MJ, net calorific value)</i>	2,57E+02	4,35E+01	-1,86E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	7,76E+00	2,21E+00	3,09E-01	-1,92E+01
<i>PENRM (MJ, net calorific value)</i>	9,27E-02	0,00E+00	2,13E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
<i>PENRT (MJ, net calorific value)</i>	2,57E+02	4,35E+01	2,68E-01	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	7,76E+00	2,21E+00	3,09E-01	-1,92E+01
<i>SM (kg)</i>	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
<i>RSF (MJ, net calorific value)</i>	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
<i>NRSF (MJ, net calorific value)</i>	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
<i>FW (m³ water eq)</i>	1,28E-01	4,99E-03	7,37E-04	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	8,91E-04	1,08E-02	3,03E-04	-4,51E-03

PM = Particulate Matter; IRHH = Ionizing Radiation – human health effects; ETF = Ecotoxicity – freshwater; HTCE = Human Toxicity – cancer effects; HTnCE = Human Toxicity – non cancer effects; 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 = Net use of fresh water

Table 10: Additional Environmental Indicators per FU (m²) EN 15804 +A2, GUTEX wood fibre insulation indoors

Environmental information describing output flows and waste categories per FU (m²) EN 15804 +A2, GUTEX wood fibre insulation indoors

Potential Environmental Impacts	A1 t/m A3	A4	A5	B1	B2	B3	B4	B5	C1	C2	C3	C4	D
<i>Hazardous waste disposed (kg/FU)</i>	2,72E-04	1,04E-04	5,54E-07	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	1,85E-05	1,31E-05	4,47E-07	-5,97E-05
<i>Non-hazardous waste disposed (kg)</i>	1,54E+00	2,60E+00	8,09E-02	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	4,64E-01	1,91E-01	1,16E+00	-6,31E-01
<i>Radioactive waste disposed (kg)</i>	3,52E-04	2,69E-04	8,98E-07	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	4,80E-05	6,32E-06	1,73E-06	-1,06E-04
<i>Components for reuse (kg)</i>	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
<i>Materials for recycling (kg)</i>	2,32E-04	0,00E+00	1,58E-01	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
<i>Materials for energy recovery (kg)</i>	1,16E-02	0,00E+00	9,39E-01	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	2,20E+01	0,00E+00	0,00E+00
<i>Exported energy Heat (MJ)</i>	4,17E-02	0,00E+00	2,98E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	5,54E+01	0,00E+00	0,00E+00
<i>Exported energy Energy (MJ)</i>	7,18E-02	0,00E+00	5,14E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	9,55E+01	0,00E+00	0,00E+00

Table 11: Environmental information describing output flows and waste categories per FU (m²) EN 15804 +A2, GUTEX wood fibre insulation indoors

Representativeness of the production process

Purchase of raw materials

The most important raw material, wood fibres, is coming from sawmills using wood from sustainable managed forests in Germany (Black Forest).

Data quality

For the collection of the process and product data, information is used provided by the manufacturer, GUTEX Holzfaserplattenwerk. These data were discussed and checked by Agrodome B.V.

Energy and water consumption of equipment required for the manufacture of the products under investigation is based on consumption figures for 2020. GUTEX is building a new factory which will operate climate-neutral. The consumption figures for 2020 can therefore be considered a worst case scenario for the coming years.

For the materials a choice was made from the available data in the Ecoinvent database, version 3.6, and the NMD database version 3.6, based on the main ingredients.

With the exception of the manufacturing phase, standard values have been used where appropriate in accordance with Ecoinvent 3.6. or NMD. This applies in particular to transport distances, processing in the waste phase and the choice of means of transport. Return transports loaded/unloaded are as per the manufacturer's instructions. In the final processing phase, the transports were calculated according to the Bepalingsmethode version 1.1.

Production processes can change over time. The information used in this LCA of the production process of the product is based on measurements and observations from 2022 (energy, waste percentages, quantities net, production volume).

Accountability

The LCA study was conducted by Agrodome B.V. in 2022/2023.

The data provided by GUTEX have been extensively discussed with Agrodome B.V.

The final version of the LCA study has been submitted to LBP|Sight for external peer review.

The LCA is carried out according to EN 15804 +A1 and +A2 in compliance with the standards from the ISO 14000 series: 14025, 14040 and 14044. The LCA report has been tested against the Bepalingsmethode 'Milieuprestatie Bouwwerken', version 1.1 March 2022.

When calculating the environmental impact categories, Simapro, version 9.4.0.2 and environmental data from the NMD-basic processes database, version 3.6 October 2022 and in some cases, namely where no NMD-data were available, the Ecoinvent database, version 3.6.

When making calculations in Simapro, the long-term effects (emissions that can occur after 100 years) are not taken into account, in accordance with the Bepalingsmethode version 1.1. The effects of capital goods and infrastructural processes are included.

References

ISO 14040

ISO 14040:2006-10, Environmental management - Life cycle assessment - Principles and framework; EN ISO 14040:2006

ISO 14044

ISO 14044:2006-10, Environmental management - Life cycle assessment - Requirements and guidelines; EN ISO 14040:2006

ISO 14025

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

EN 15804+A1

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

EN 15804+A2

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

Nationale Milieudatabase

Bepalingsmethode Milieuprestatie Bouwwerken, versie 1.1 March 2022.

Sphera Solutions GmbH

Hintergrundbericht zu der EPD für GUTEX Holzfaserdämmplatten im Trockenverfahren, 2020.

Caroline van der Laan, Sissy Verspeek and Fred van der Burgh

Background report EPD, Life cycle analysis, GUTEX wood fibre insulation, Agrodome B.V. Wageningen, the Netherlands. 2023.

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Declaration Agrodome B.V.

LBP|SIGHT has reviewed the LCA background report GUTEX wood fibre insulation, 2023, according to the Bepalingsmethode 'Milieuprestatie Bouwwerken' versie 1.1. as an external reviewer. This EPD is the summary of that LCA background report, to be used for external communication. The LCA background report is approved by René Kraaijenbrink, LBP|Sight, 12 October 2023.