ENVIRONMENTAL PRODUCT DECLARATION

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

Owner of the Declaration	Hamberger Flooring GmbH & Co. KG
Programme holder	Institut Bauen und Umwelt e.V. (IBU)
Publisher	Institut Bauen und Umwelt e.V. (IBU)
Declaration number	EPD-HAM-20220202-ICD1-EN
Issue date	10.10.2022
Valid to	09.10.2027

2-layer parquet

Hamberger Flooring GmbH & Co. KG

Institut Bauen und Umwelt e.V.

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ECO PLATFORM EPD VERIFIED

1. General Information

Name of the manufacturer	Name of the product
Programme holder IBU – Institut Bauen und Umwelt e.V. Hegelplatz 1 10117 Berlin Germany	**Owner of the declaration** Hamberger Flooring GmbH & Co. KG Rohrdorfer Straße 133 83071 Stephanskirchen Germany
Declaration number EPD-HAM-20220202-ICD1-EN	**Declared product / declared unit** 1 m² 2-layer parquet
This declaration is based on the product category rules: Solid wood products, 12.2018 (PCR checked and approved by the SVR)	**Scope:** This product declaration refers to an average square metre of Hamberger 2-layer parquet produced in the plants in Germany and Bulgaria.
Issue date 10.10.2022 **Valid to** 09.10.2027	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*.
Dipl. Ing. Hans Peters (chairman of Institut Bauen und Umwelt e.V.)	**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. Alexander Röder (Managing Director Institut Bauen und Umwelt e.V.))	Prof. Dr. Birgit Grahl (Independent verifier)

2. Product

2.1 Product description/Product definition

2-layer parquet from Hamberger is a wooden floor with a wear layer of solid wood at least 2.5 mm thick. The wear layer consists of precious woods and is carefully selected from mostly native hardwoods. Spruce wood and a small amount of HDF (high density fibreboard) or birch plywood are used for the support layer. The wear layer and support layer are glued together.

The 2-layer parquet is available in the following product series:

- Series 6000 with a top layer thickness of 5.4 mm, a total thickness of 12 mm and a support layer of spruce sticks
- Series 4000 with a top layer thickness of 3.5 mm, a total thickness of 11 mm and a support layer of spruce sticks
- Series 3000 with a top layer thickness of 2.5 mm, a total thickness of 9 mm and a support layer of HDF
- Manufactured parquet with a top layer thickness of at least 3.5 mm, a total thickness of at least 10 mm and a support layer of spruce sticks or plywood
- Sports parquet with a top layer thickness of at least 3.5 mm, a total thickness of at least 10 mm and a carrier layer made of spruce sticks or plywood.

The surface is treated with varnish or oil.

The planks are equipped with a milled tongue-and-groove or click connection profile all around the sides.

The declared product represents an area-weighted average of the 2-layer parquet produced within one year.

*Regulation (EU) No 305/2011 (*CPR) applies to the placing of the product on the market in the EU/EFTA (with the exception of Switzerland). The product has a declaration of performance according to harmonised standard *DIN EN 14342:2013-09, Wood flooring and parquet - Characteristics, evaluation of conformity and marking* and a CE marking. The respective national regulations apply to the use.

2.2 Application

Hamberger 2-layer parquet is a wood flooring manufactured in accordance with *EN 13489 for* commercial and private use in dry interior areas, which

can be laid as a floating floor or glued to the subfloor over the entire surface.
The installation must be carried out in accordance with the installation instructions, the rules of the trade and the state of the art.

2.3 Technical Data

According to EU Regulation No. 305/2011, the following technical data of the products that are within the scope of the EPD shall be provided:

Construction data

Name	Value	Unit
Wood moisture according to EN 13183-1	7 - 9	%
Length (min. - max.)	0.49 - 2.2	m
Width (min. - max.)	0.07 - 0.221	m
Thickness (min. - max.)	9 - 18	mm
Gross density nach DIN 68364	> 500	kg/m^3
Reaction to fire according to EN 14342	min. Dfl - s1	-
Thermal conductivity according to EN 12664	0.121 - 0.186	W/(mK)
Durability class according to EN 350	Class 5	-
Formaldehyde emissions according to EN 717-1	< 100	$µg/m^3$
PCP content	≤ 5 x 10-6n	-
Emission of other dangerous substances	No performance declared	
Slip resistance	No performance declared	

The performance values of the product correspond to the declaration of performance in relation to its essential characteristics according to *EN 14342*. Verification and assessment of constancy of performance are carried out according to system 3 by notified bodies.

2.4 Delivery status

The 2-layer range includes parquet planks of various formats:

- Lengths from 490 mm to 2200 mm
- Widths from 70 mm to 221 mm

One packaging unit corresponds to approx. 2.5 to 3.5 m², depending on the format. The weight per unit area is between 5 and 10 kg/m².

The wood moisture content on delivery is 7-9 %.

2.5 Base materials/Ancillary materials

A square metre of 2-layer parquet, averaged over the series produced in one year, is composed of the following material components (in mass %)

- Solid wood 75 %
- HDF board 2 %
- Plywood 12 %
- Water content 6.5 %
- Adhesive 4 %
- Surface treatment 0.5 %

The product/at least one sub-product contains substances on the *ECHA Candidate List* (date 08.07.2021) above 0.1% by mass: no.

The product/at least one sub-product contains other CMR substances of category 1A or 1B not on the candidate list above 0.1% by mass in at least one sub-product: no.

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

2.6 Manufacture

For the wear layer, friezes and sawn timber as well as already finished top layers are purchased. Mostly the native hardwoods oak, beech, maple, ash and robinia are used, as well as merbau and walnut. Some types of wood are refined by a colouring process, such as steaming beech wood. The friezes and the sawn timber are cut into lamellas and undergo a technical drying process. After the lamellas have been formatted, they are visually graded.

Spruce and fir sawn timber as well as HDF and plywood boards are purchased for the support layer. The sawn timber is technically dried after delivery. The assortments for the carrier layer are cut to size.

The top layer and backing layer are glued and pressed together. Some top layer grades require puttying or filling of growth characteristics of the wood.

The surface treatment is done by multiple sanding and application processes. Solvent-free UV varnishes or oxidative drying oils are used.

In the final production stage, the boards are formatted to their finished dimensions and profiled. A tongue-and-groove or click geometry is milled according to the respective connection system.

The parquet is packed in cardboard and foil, which protect it from climatic fluctuations and mechanical damage. If the parquet was manufactured at the production site in Bulgaria, it is transported to the Hamberger logistics centre in Rosenheim.

The company Hamberger Flooring carries the following certifications:

- Quality management *ISO 9001* since 1995
- Environmental management according to *ISO 14001* since 1998
- Energy management according to *ISO 50001* since 2012

2.7 Environment and health during manufacturing

Environmental protection measures in the manufacturing process:

- Use of wood or wood-based materials from suppliers with *PEFC certification*

- Generating electricity and heat from wood residues from the production
- Electricity generation from hydropower

Health protection measures in the manufacturing process:

- Provision of hearing protection
- Provision of safety shoes
- Provision of protective clothing, goggles and gloves where required
- Use of solvent-free paint and adhesive systems
- Instruction on occupational safety and behaviour in an emergency
- First aider training for employees

2.8 Product processing/Installation

2-layer parquet can be processed with tools suitable for solid wood processing. The work safety instructions applicable to wood processing (e.g. ear protection, protective goggles) must be observed. If wood dust is generated, care should be taken to use an extraction system or to wear respiratory protection.

Required tools may only be used for their intended purpose and in accordance with the manufacturer's operating instructions. In case of commercial processing, the regulations of the employers' liability insurance associations must be observed.

The installation instructions can be downloaded from the "Service" section at www.haro.com.
2-layer products must be glued to the subfloor over the entire surface. A low-emission adhesive approved for parquet floors, e.g. HARO Flexible Glue, is recommended.

Certain products from the Maxim, Duna and Prestige designs with naturalin plus surface are also approved for installation in bathrooms, provided the special installation instructions are observed.

2.9 Packaging

The packaging is composed of cardboard and polyethylene (PE) film.

The various packaging materials are to be collected separately and recycled in accordance with local legal requirements.

2.10 Condition of use

As a hygroscopic material, wood can absorb and release water (vapour). A room climate with a temperature of approx. 20 °C and a relative humidity between 30 and 65 % protects the parquet from unwanted dimensional changes.

Cleaning and refreshing the parquet according to the care instructions is recommended. For 2-layer parquet with an oiled surface, it is advisable to re-oil the floor after installation and regularly as required.

If used as intended, no damage is to be expected.

2.11 Environment and health during use

There is no risk to water and soil when used as directed.

The indoor air quality is not impaired by Hamberger 2-layer parquet according to emission test reports. The product fulfils at least the criteria of the following specifications:

- *AgBB Scheme 2018*
- A+ émissions dans l'air intérieur according to *French VOC regulation FR*
- DE-UZ 176 *Blue Angel*

2.12 Reference service life

According to the BBSR table "Service live of building components for life cycle analysis according to BNB" (*BNB*, 2017), the service life of multilayer parquet is 40 years.

Multi-layer parquet with a wear layer at least 2.5 mm thick can be sanded and resealed at least twice.

Lack of care, especially neglected after-treatment of oil surfaces, can cause increased wear of the parquet. Non-intended use, e.g. moving heavy furniture, can have negative effects on the visual appearance. Excessive moisture (cleaning, building moisture, water damage) can damage the parquet.

2.13 Extraordinary effects

Fire

According to the fire test in accordance with *EN 13501-1* or Table 1 of *EN 14342,* Hamberger 2-layer parquet has been rated at least with classification Dfl -s1.

Water

No ingredients that could be hazardous to water can be washed out. The parquet is not resistant to permanent exposure to water.

Mechanical destruction

Mechanical damage can be repaired locally. There is no danger to the environment. There is a risk of injury at broken edges.

2.14 Re-use phase

A material cascade use of the wood, e.g. in wood-based panels, is in the spirit of the circular economy.

2.15 Disposal

According to the German *AltholzV,* removed parquet (unpolluted) and residual material produced during installation belong to waste wood category II. They can be assigned to *EWC class* 17 02 01. Material or thermal recycling is possible.

The packaging materials cardboard and PE film can be assigned separately to *EWC classes* 20 01 01 (paper and cardboard) and 15 01 02 (plastic packaging). Soiled parquet should be disposed of as construction site waste.

2.16 Further information

Further product information and documents on installation, maintenance and explained services are available at www.haro.com.

3. LCA: Calculation rules

3.1 Declared Unit

The declared unit is 1 m² of average 2-layer parquet. The average was weighted according to the production volume of the products included. The total inputs, outputs and produced m² for the period under consideration were taken as a basis.

Indication of the declared unit

Name	Value	Unit
Declared unit	1	m³
Declared unit	1	m²
Grammage	7.7	kg/m²
Bulk density	> 500	kg/m3
Wood moisture on delivery	7 - 9	%
Thickness	9 - 18	mm

3.2 System boundary

Type of EPD: Cradle to factory gate with options.

Modules A1-A3 and A5

Modules A1-A3 take into account the production of the necessary raw materials and energies, including all corresponding upstream chains and procurement transport.
In addition, the entire manufacturing phase, including the treatment of production waste until the end-of-waste (EoW) status is reached, is considered.
Module A5 takes the recycling of packaging materials into account.

Modules B2 and B5

Module B2 looks at the cleaning and oiling of the parquet, including the auxiliary materials required for this, as well as the treatment of the waste and waste water produced in the process.
Module B5 declares the renovation of the parquet, including the treatment of the resulting waste.

Modules C1-C4 and D

Module C1 describes the deconstruction.
In module C2, the transports to the disposal processes are considered.
Module C3 contains the necessary processes for waste treatment at the end of the product life cycle. The loads for waste treatment are mapped here until the end of the waste characteristic is reached.
Potentials arising in the process and avoided loads outside the system boundary are assigned to module D.

No substances are landfilled, so no loads/benefits are balanced in Module C4.

3.3 Estimates and assumptions

For wood species for which no suitable data set is available, the data set for oak wood was used. The proportion of these wood species is so small that no significant influence on the results of the LCA is to be expected.

3.4 Cut-off criteria

It can be assumed that the sum of the neglected processes does not exceed 5 % of the considered impact categories

3.5 Background data

Basically, the *GaBi* background database in content version 2021.1 was used. If no suitable data sets were available in the *GaBi background database*, data sets from the *ecoinvent 3.6 database* were used.

3.6 Data quality

The foreground data was provided by Hamberger and checked for plausibility. The quality and representativeness of the foreground data can therefore be considered high.
The data quality of the background data was rated as good in terms of temporal, technical and geographical representativeness.

With regard to the robustness of the LCA values, it can be stated that the balanced potential environmental impacts largely result from the background data.

3.7 Period under review

The foreground data was collected for the year 2019.

3.8 Allocation

Module A1-A3

Wood residues that are thermally utilised internally were considered in the closed loop.

3.9 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 *GaBi* background database Content version 2021.1 was used.

4. LCA: Scenarios and additional technical information

Characteristic product properties
Information on biogenic carbon

Information describing the biogenic carbon content at the factory gate

Name	Value	Unit
Biogenic carbon content in product	3.25	kg C
Biogenic carbon content in accompanying packaging	0.05	kg C

The following technical information was used for the modelling. A useful life of 50 years was assumed.

Installation in the building (A5)

Name	Value	Unit
Output substances following waste treatment on site	0.145	kg

Maintenance (B2)

Name	Value	Unit

HARO

Information on maintenance (vacuum cleaning, damp cleaning, oiling)	-	-
Maintenance cycle (vacuum cleaning, 2x a week)	5200	Number/RSL
Electricity consumption (vacuum cleaning)	15.6	kWh
Maintenance cycle (damp cleaning, 2x monthly)	1200	Number/RSL
Water consumption (damp cleaning)	0.25	m3
Detergent (damp cleaning)	0.48	Litres
Maintenance cycle (oiling, every 5 years)	7	Number/RSL
Water consumption (oiling)	0.0007	m3
Cleaning agent (oiling)	0.0014	Litres
Pads (oiling)	0.12	Piece
Oil	0.11	kg

Initial replacement (B4)/Conversion/Renovation (B5)

Name	Value	Unit
Replacement cycle	2	Number/RSL
Electricity consumption	1.32	kWh
Removal per renovation processs	0.7	mm
Abrasives	0.2	Piece
Oil (50 % of the floors)	0.05	kg
Lacquer (50 % of the floors)	0.225	kg

Reference service life

Name	Value	Unit
Life Span (nach BBSR)	40	a
Life Span (according to manufacturer)	50	a

End of life journey (C1–C4)

Name	Value	Unit
Collected separately (waste wood)	6.957	kg
Recycling (scenario 2)	6.957	kg
Energy recovery (scenario 1)	6.957	kg
Landfilling	0	kg

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

Name	Value	Unit
Waste wood	6.957	kg

5. LCA: Results

The LCA results for the B modules (use phase) refer to a useful life of 50 years. The parameters used as a basis can be found in Chapter 4.

Two scenarios were considered for the end of life journey:

- Scenario 1: Thermal recycling
- Scenario 2: Material recycling

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

PRODUCT STAGE			CONSTRUCTION PROCESS STAGE		USE STAGE							END OF LIFE STAGE				BENEFITS AND LOADS BEYOND THE SYSTEM BOUNDARIES
Raw material supply	Transport	Manufacturing	Transport from the gate to the site	Assembly	Use	Maintenance	Repair	Replacement	Refurbishment	Operational energy use	Operational water use	De-construction demolition	Transport	Waste processing	Disposal	Reuse-Recovery-Recycling-potential
A1	A2	A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
X	X	X	ND	X	ND	X	MNR	MNR	X	ND	ND	X	X	X	X	X

RESULTS OF THE LCA - ENVIRONMENTAL IMPACT according to EN 15804+A2: 1 m2 2-layer parquet

Core Indicator	Unit	A1-A3	A5	B2	B5	C1	C2	C3/1	C3/2	C4	D/1	D/2
GWP-total	[kg CO_2-Eq.]	6.53E+0	2.58E-1	7.04E+0	1.46E+0	0.00E+0	8.15E-2	1.19E+1	1.18E+1	0.00E+0	-4.88E+0	-2.19E-1
GWP-fossil	[kg CO_2-Eq.]	1.86E+1	7.56E-2	7.03E+0	1.24E+0	0.00E+0	8.09E-2	1.86E-1	6.09E-2	0.00E+0	-4.87E+0	-2.18E-1
GWP-biogenic	[kg CO_2-Eq.]	-1.21E+1	1.82E-1	0.00E+0	2.24E-1	0.00E+0	0.00E+0	1.17E+1	1.17E+1	0.00E+0	0.00E+0	0.00E+0
GWP-luluc	[kg CO_2-Eq.]	2.42E-2	1.40E-5	9.02E-3	1.12E-3	0.00E+0	6.62E-4	1.19E-4	1.37E-4	0.00E+0	-3.38E-3	-1.21E-3
ODP	[kg CFC11-Eq.]	2.68E-8	5.86E-18	1.51E-13	1.56E-14	0.00E+0	1.60E-17	1.65E-15	5.09E-9	0.00E+0	-5.59E-14	-1.83E-8
AP	[mol H^+-Eq.]	8.34E-2	9.30E-6	1.43E-2	2.55E-3	0.00E+0	9.42E-5	1.79E-3	3.36E-4	0.00E+0	-6.38E-3	-1.21E-3
EP-freshwater	[kg P-Eq.]	1.18E-4	5.67E-9	1.70E-4	2.76E-6	0.00E+0	2.40E-7	2.26E-7	5.85E-5	0.00E+0	-6.39E-6	-9.12E-5
EP-marine	[kg N-Eq.]	1.68E-2	2.20E-6	3.98E-3	6.51E-4	0.00E+0	3.16E-5	5.88E-4	5.81E-5	0.00E+0	-1.81E-3	-3.10E-4
EP-terrestrial	[mol N-Eq.]	1.78E-1	4.22E-5	3.60E-2	7.25E-3	0.00E+0	3.73E-4	8.53E-3	5.51E-4	0.00E+0	-1.94E-2	-3.23E-3
POCP	[kg NMVOC-Eq.]	5.55E-2	6.31E-6	9.88E-3	2.03E-3	0.00E+0	8.29E-5	1.60E-3	1.44E-4	0.00E+0	-5.09E-3	-1.02E-3
ADPE	[kg Sb-Eq.]	1.30E-5	2.31E-10	1.90E-6	2.35E-7	0.00E+0	7.17E-9	2.52E-8	2.35E-7	0.00E+0	-8.13E-7	-2.16E-6
ADPF	[MJ]	2.93E+2	3.11E-2	1.28E+2	2.64E+1	0.00E+0	1.08E+0	2.74E+0	1.40E+0	0.00E+0	-8.46E+1	-3.35E+0
WDP	[m^3 world-Eq deprived]	4.50E+0	6.82E-3	1.13E+0	4.10E-1	0.00E+0	7.51E-4	1.30E+0	4.42E-2	0.00E+0	-3.75E-1	-5.55E-2

Caption	GWP = Global warming potential; ODP = Depletion potential of the stratospheric ozone layer; AP = Acidification potential of land and water; EP = Eutrophication potential; POCP = Formation potential of tropospheric ozone photochemical oxidants; ADPE = Abiotic depletion potential for non-fossil resources; ADPF = Abiotic depletion potential for fossil resources; WDP = Water (user) deprivation potential

RESULTS OF THE LCA - INDICATORS TO DESCRIBE RESOURCE USE according to EN 15804+A2: 1 m2 2-layer parquet

Indicator	Unit	A1-A3	A5	B2	B5	C1	C2	C3/1	C3/2	C4	D/1	D/2
PERE	[MJ]	1.98E+2	3.06E-3	5.18E+1	5.59E+0	0.00E+0	6.20E-2	1.19E+2	2.07E-1	0.00E+0	-1.92E+1	-3.12E+1
PERM	[MJ]	1.21E+2	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	-1.19E+2	0.00E+0	0.00E+0	0.00E+0	0.00E+0
PERT	[MJ]	3.19E+2	3.06E-3	5.18E+1	5.59E+0	0.00E+0	6.20E-2	5.31E-1	2.07E-1	0.00E+0	-1.92E+1	-3.12E+1
PENRE	[MJ]	2.77E+2	3.12E-2	1.28E+2	2.64E+1	0.00E+0	1.08E+0	1.78E+1	1.40E+0	0.00E+0	-8.46E+1	-3.35E+0
PENRM	[MJ]	1.61E+1	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	-1.50E+1	0.00E+0	0.00E+0	0.00E+0	0.00E+0
PENRT	[MJ]	2.93E+2	3.12E-2	1.28E+2	2.64E+1	0.00E+0	1.08E+0	2.74E+0	1.40E+0	0.00E+0	-8.46E+1	-3.35E+0
SM	[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
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	1.19E+2	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]	1.83E-1	1.61E-4	5.32E-2	1.28E-2	0.00E+0	7.10E-5	3.06E-2	1.03E-3	0.00E+0	-1.88E-2	-1.29E-3

Caption	PERE = Use of renewable primary energy excluding renewable primary energy resources used as raw materials; PERM = Use of renewable primary energy resources used as raw materials; PERT = Total use of renewable primary energy resources; PENRE = Use of non-renewable primary energy excluding non-renewable primary energy resources used as raw materials; PENRM = Use of non-renewable primary energy resources used as raw materials; PENRT = Total use of non-renewable primary energy resources; SM = Use of secondary material; RSF = Use of renewable secondary fuels; NRSF = Use of non-renewable secondary fuels; FW = Use of net fresh water

RESULTS OF THE LCA – WASTE CATEGORIES AND OUTPUT FLOWS according to EN 15804+A2: 1 m2 2-layer parquet

Indicator	Unit	A1-A3	A5	B2	B5	C1	C2	C3/1	C3/2	C4	D/1	D/2
HWD	[kg]	7.52E-7	2.78E-12	3.06E-8	5.30E-9	0.00E+0	5.70E-11	4.94E-10	0.00E+0	0.00E+0	-1.90E-8	0.00E+0
NHWD	[kg]	2.14E-1	2.96E-4	3.40E-1	3.74E-2	0.00E+0	1.70E-4	9.04E-2	0.00E+0	0.00E+0	-3.98E-2	0.00E+0
RWD	[kg]	3.28E-2	5.53E-7	1.67E-2	1.69E-3	0.00E+0	1.96E-6	1.52E-4	0.00E+0	0.00E+0	-6.18E-3	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	1.19E-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
MER	[kg]	7.09E+0	2.36E-2	1.23E-1	9.68E-1	0.00E+0	0.00E+0	6.96E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0
EEE	[MJ]	0.00E+0	1.58E-1	0.00E+0	2.71E+0	0.00E+0	0.00E+0	1.82E+1	0.00E+0	0.00E+0	0.00E+0	0.00E+0
EET	[MJ]	0.00E+0	2.80E-1	0.00E+0	4.87E+0	0.00E+0	0.00E+0	3.27E+1	0.00E+0	0.00E+0	0.00E+0	0.00E+0

Caption	HWD = Hazardous waste disposed; NHWD = Non-hazardous waste disposed; RWD = Radioactive waste disposed; CRU = Components for re-use; MFR = Materials for recycling; MER = Materials for energy recovery; EEE = Exported electrical energy; EET = Exported thermal energy

RESULTS OF THE LCA – additional impact categories according to EN 15804+A2-optional: 1 m2 2-layer parquet

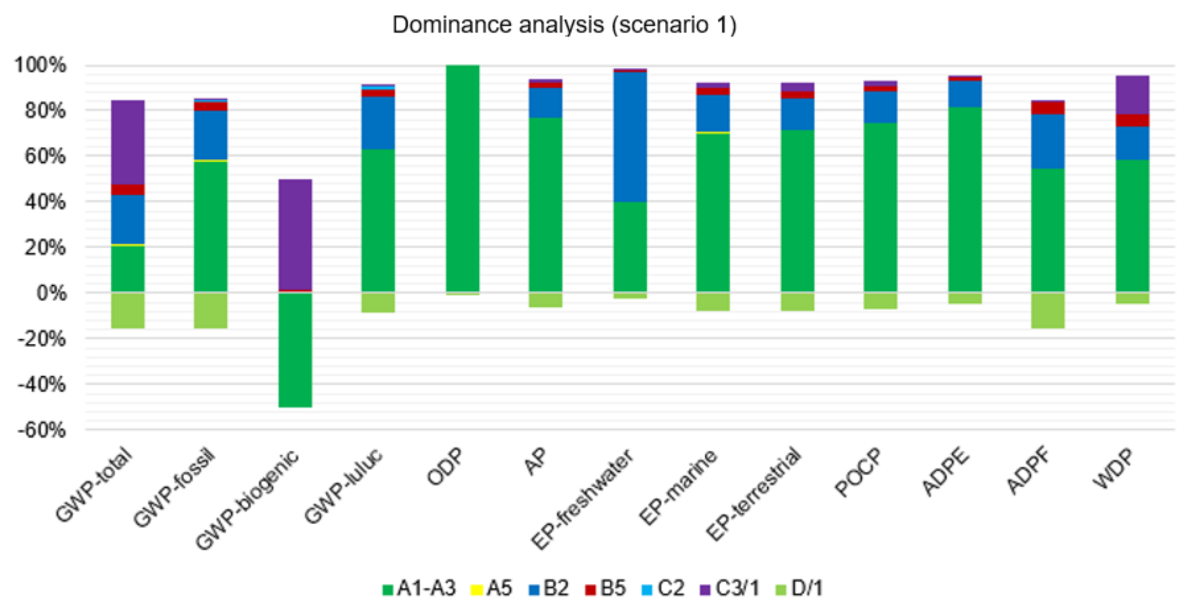
Indicator	Unit	A1-A3	A5	B2	B5	C1	C2	C3/1	C3/2	C4	D/1	D/2
PM	[Disease Incidence]	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
IRP	[kBq U235-Eq.]	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
ETP-fw	[CTUe]	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
HTP-c	[CTUh]	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
HTP-nc	[CTUh]	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
SQP	[-]	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND

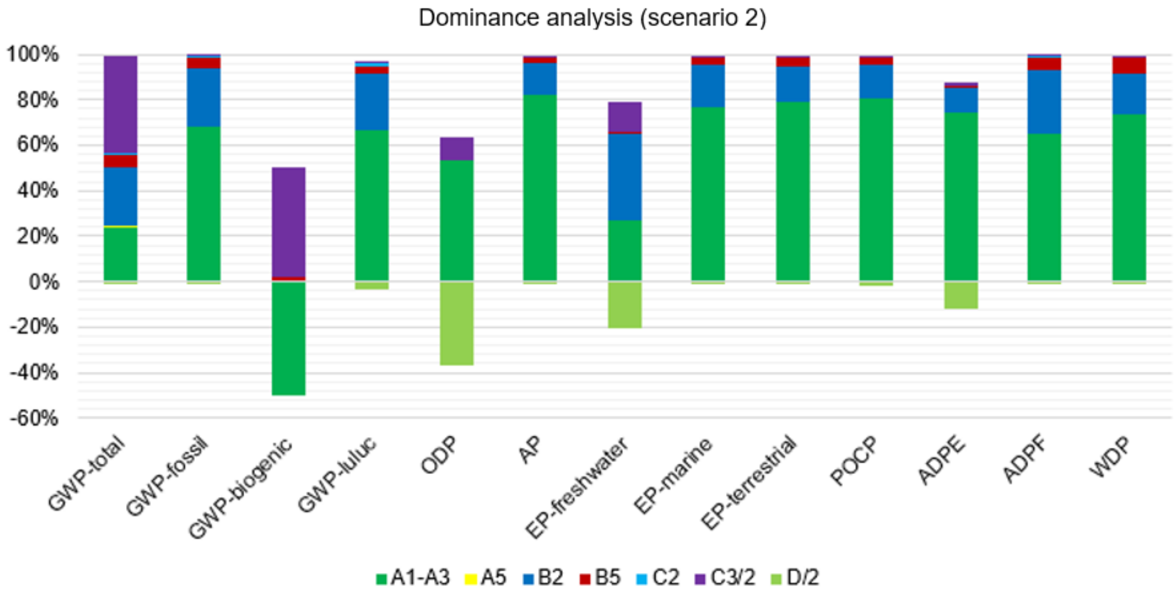
Caption	PM = Potential incidence of disease due to PM emissions; IR = Potential Human exposure efficiency relative to U235; ETP-fw = Potential comparative Toxic Unit for ecosystems; HTP-c = Potential comparative Toxic Unit for humans (cancerogenic); HTP-nc = Potential comparative Toxic Unit for humans (not cancerogenic); SQP = Potential soil quality index

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.

6. LCA: Interpretation





The dominance analysis shows that especially the manufacturing phase (modules A1-A3) and maintenance (module B2) contribute to the potential environmental impacts in the listed indicators. In module B2, the energy demand for vacuum cleaning in particular has an influence on the potential environmental impacts. The recycling of the parquet floor at the end of the life cycle (Module C3) contributes significantly to the indicators Global Warming Potential - total (GWP-total), Global Warming Potential - biogenic (GWP-biogenic) and Water Removal Potential (WDP). When parquet flooring is thermally recycled, the biogenic carbon stored in the product is emitted as biogenic CO2 emissions. During material recycling, the biogenic carbon leaves the system boundary. This is the reason why the sum of biogenic CO2 emissions is balanced over the life cycle of the product.

The demand for electrical energy dominates the indicators Global Warming Potential - Fossil (GWP-fossil), Acidification Potential of Soil and Water (AP) and Abiotic Fossil Fuel Depletion Potential (ADPF) by over 65 %.

Global warming potential luluc (GWP-luluc) is dominated by wood inputs.

Stratospheric ozone depletion potential (ODP) and eutrophication potential - freshwater (EP-freshwater) are dominated by the wood inputs to the surface layers.

Eutrophication potential saltwater (EP-marine), eutrophication potential land (EP-terrestrial) and formation potential for tropospheric ozone (POCP) is dominated by the demand for electrical energy as well as the material inputs for the mid-layer.

Potential for abiotic resource depletion - non-fossil resources (ADPE) are dominated by glue records.

Range of results

The floors considered vary in thickness, weight and material composition. Consequently, the LCA results in the manufacturing phase (modules A1-A3) are also dependent on these factors. For example, if the indicators GWP-fossil and PENRT are considered, floors with an HDF core board show higher indicator values than floors with a spruce/fir core layer.

The indicator results of the disposal phase (C modules) depend on the weight of the individual floors.

7. Requisite evidence

AgBB result overview (28 days [µg/m³])

Name	Value	Unit
TVOC (C6 - C16)	65 - 1000	µg/m³
Sum SVOC (C16 - C22)	< 5 - 100	µg/m³
R (dimensionless)	0,07 - 1	-
VOC without NIK	< 5 - 100	µg/m³
Carcinogenic Substances	< 1	µg/m³

AgBB result overview (3 days [µg/m³])

Name	Value	Unit
TVOC (C6 - C16)	110 - 310	µg/m³
Sum SVOC (C16 - C22)	< 5 - 30	µg/m³
R (dimensionless)	0,1 - 0,5	-
VOC without NIK	< 5 - 130	µg/m³
Carcinogenic Substances	< 1	µg/m³

The test centres and test reports are listed in the table below.

Collection	Test center	No. Test report	Date	Test standard	Classification
Multilayer parquet Different types of wood and surface treatments	eco Institut	56490-001-AgBB-L	09.08.2021	Emission measurement AgBB 2018	Without objection
	eco Institut	55365-001	09.07.2020	Emission measurement AgBB 2018	Without objection
	eco Institut	55160-001	04.06.2020	Emission measurement AgBB 2018	Without objection
	eco Institut	54366-001	29.07.2019	Emission measurement AgBB 2018	Without objection
	eco Institut	54119-001	06.05.2019	Emission measurement AgBB 2018	Without objection
Multilayer parquet with spruce middle layer	EPH Dresden	2522086/4	29.04.2022	Formaldehyde measurement EN 717-1	E1 / CE
Multilayer parquet with HDF middle layer	EPH Dresden	2522086/5	29.04.2022	Formaldehyde measurement EN 717-1	E1 / CE
Multilayer parquet with plywood middle layer	EPH Dresden	2522086/6	29.04.2022	Formaldehyde measurement EN 717-1	E1 / CE
2-layer parquet	RAL gGmbH	26421	30.04.2015	RAL UZ176	Blauer Engel
2-layer parquet oak 10 - 10,5 mm	EPH Dresden	Fire behaviour classification 2717425/1_A1	01.12.2017	DIN EN 13501-1:2010	C_{fl}-s1

8. References

Standards

DIN 68364
DIN 68364:2003-05, Characteristic values of wood species - Bulk density, modulus of elasticity and strengths

EN 350
DIN EN 350:2016-12, Durability of wood and wood products - Testing and classification of durability of wood and wood products against biological attack

EN 717-1
DIN EN 717-1:2005-01, Wood-based panels - Determination of formaldehyde emission - Part 1: Formaldehyde emission by the test chamber method.

EN 12664
DIN EN 12664:2001-05, Thermal performance of building materials and building products - Determination of thermal resistance by the plate device method and the heat flux plate device - Dry and wet products with medium and low thermal resistance.

EN 13489
DIN EN 13489:2017-12, Wood flooring and parquet - Multilayer parquet elements.

EN 13183-1
DIN EN 13183-1:2002-07, Moisture content of a piece of sawn timber - Part 1: Determination by kiln-drying method

EN 13501-1
DIN EN 13501-1:2019-05, Fire classification of construction products and types of construction - Part 1: Classification using results of reaction to fire tests of construction products.

EN 14342
DIN EN 14342:2013-09, Wood flooring and parquet - Characteristics, evaluation of conformity and marking.

EN 15804
DIN EN 15804:2012+A2:2019, Sustainability of construction works - Environmental product declarations - Basic rules for the product category construction products.

ISO 9001
DIN EN ISO 9001:2015-11, Quality management systems - Requirements (ISO 9001:2015)

ISO 14001
ISO 14001:2015-09, Environmental management systems - Requirements with guidance for use

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

ISO 14040
DIN EN ISO 14040:2021-02, Environmental management - Life cycle assessment - Principles and framework.

ISO 14044
DIN EN ISO 14044:2021-02, Environmental management - Life cycle assessment - Requirements and guidance.

ISO 50001
ISO 50001:2018-08, Energy management systems - Requirements with guidance for use

Further literature

AltholzV
Ordinance on Requirements for the Recovery and Disposal of Waste Wood of 15 August 2002 (BGBl. I p. 3302), last amended by Article 120 of the Ordinance of 19 June 2020 (BGBl. I p. 1328).

AVV
Ordinance on the List of Wastes (AVV) of 10 December 2001 (BGBl. I p. 3379), last amended by

Article 2 of the Ordinance of 30 June 2020 (BGBl. I p. 1533).

Blue Angel
RAL-UZ 176; Award regulations for eco-labels for low-emission floor coverings, panels and doors made of wood and wood-based materials for indoor use.

BNB
Useful lives of building components for life cycle analyses according to the Sustainable Building Assessment System, 2011.

ECHA Candidate List
List of Substances of Very High Concern (SVHC) Candidate for Authorisation (ECHA Candidate List), dated 19.01.2021, published in accordance with Article 59(10) of the REACH Regulation. Helsinki: European Chemicals Agency.

eco Institute Cologne
eco-INSTITUT Germany GmbH, Schanzenstraße 6-10, Carlswerk 1.19, 51063 Cologne, Germany

ecoinvent 3.6
ecoinvent 3.6 Database on Life Cycle Inventories (Life Cycle Inventory data), ecoinvent As-sociation, Zurich, 2020.

EPH Dresden
Entwicklungs- und Prüflabor Holztechnologie GmbH, Zellescher Weg 24, 01217 Dresden, NB No.: 0766

GaBi
GaBi 10.5: Software System and Database for Life Cycle Engineering, Sphera Solutions GmbH, Leinfelden-Echterdingen, 2021.

IBU 2021
Institut Bauen und Umwelt e.V.: General Guidance for the EPD Programme of the Institut Bauen und Umwelt e.V., Version 2.0, Berlin: Institut Bauen und Umwelt e.V., 2021
www.ibu-epd.com

PEFC
Programme for the Endorsement of Forest Certification Schemes.

PCR Part A
Product category rules for building-related products and services. Part A: LCA rules and project report requirements according to EN 15804+A2:2019, version 1.1. Berlin: Institut Bauen und Umwelt e.V. (ed.), 08.01.2021.

PCR: Solid wood products
Product category rules for building-related products and services. Part B: Requirements for the EPD for solid wood products, version 1.1. Berlin: Institut Bauen und Umwelt e.V. (ed.), 10.12.2018.

RALgGmbH
RAL gGmbH, Fränkische Straße 7, 53229 Bonn

Regulation (EU) No 305/2011
of the European Parliament and of the Council of 9 March 2011 laying down harmonised conditions for the marketing of construction products and repealing Council Directive 89/106/EEC Text with EEA relevance.
https://eur-lex.europa.eu/legal-content/DE/TXT/PDF/?uri=CELEX:02011R0305-20210716&from=EN

VOC Regulation FR
A+ émissions dans l'air intérieur according to the French VOC Regulation.

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