ENVIRONMENTAL PRODUCT DECLARATION

as per /ISO 14025/ and /EN 15804/

Owner of the Declaration	Parador GmbH
Programme holder	Institut Bauen und Umwelt e.V. (IBU)
Publisher	Institut Bauen und Umwelt e.V. (IBU)
Declaration number	EPD-PAR-20170076-IBC1-EN
Issue date	19.12.2017
Valid to	18.12.2022

Multilayer parquet
Parador GmbH

Institut Bauen und Umwelt e.V.

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

PARADOR

1. General Information

Parador GmbH

Programme holder
IBU - Institut Bauen und Umwelt e.V.
Panoramastr. 1
10178 Berlin
Germany

Declaration number
EPD-PAR-20170076-IBC1-EN

This Declaration is based on the Product Category Rules:
Solid wood products, 07.2014
(PCR tested and approved by the SVR)

Issue date
19.12.2017

Valid to
18.12.2022

Prof. Dr.-Ing. Horst J. Bossenmayer
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Dr. Burkhart Lehmann
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Multilayer parquet

Owner of the Declaration
Parador GmbH
Millenkamp 7-8
48653 Coesfeld

Declared product / Declared unit
The declared unit is one square metre (1 m²) multilayer parquet.

Scope:
This EPD refers to the production, transport, installation and disposal of one average square metre of Parador multilayer parquet. The various technical characteristics are described in section 2.3. The product is produced at the manufacturing site in Güssing, Austria. Products are shipped from the Coesfeld site in Germany.
This document is translated from the German Environmental Product Declaration into English. It is based on the German original version EPD-PAR-20170076-IBC1-DE. The verifier has no influence on the quality of the translation.

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.

Verification

The CEN Norm /EN 15804/ serves as the core PCR
Independent verification of the declaration according to /ISO 14025/
☐ internally ☒ externally

Dipl. Natw. ETH Sascha Iqbal
(Independent verifier appointed by SVR)

2. Product

2.1 Product description / Product definition

Parador multilayer parquet flooring are wooden floors with a top layer made of high-grade wood. The materials required for manufacturing these floors, i.e. sawn timber, planed goods, friezes, veneer or finished surface layers, are manufactured separately. Mainly local wood types are used. Tropical wood is not used for ecological reasons. Depending on the product variant, the surface layer consists of one lamella (wide plank) or several lamellas (block). The individual materials are glued together. After an acclimatisation period, the blanks are surface treated and equipped with a longitudinal and transverse profile according to the product format requirements before being packed.

/Directive (EU) No. 995/2010/ (European Timber Regulation) applies for placing these products on the EU market for the first time. In addition, Directive (EU) No. 305/2011 (CPR) applies for placing the product on the market in the EU/EFTA (with the exception of Switzerland). The products have a Declaration of Performance and bear a CE marking taking consideration of the harmonised /EN 14342:2013/ standard on “Wood flooring - Characteristics, evaluation of conformity and marking”.

2.2 Application

Multilayer parquet flooring complies with the /EN 13489/ standard, is suitable for private and commercial indoor applications, laid on screed or other existing substrates such as wood or tiles in combination with suitable underlays (insulation bases), either installed floated or glued across the entire screed surface. Installation needs to be executed in accordance with the installation instructions, the rules of the trade, and the state of the art.
Use is governed by the respective national regulations.

2.3 Technical Data

Essential characteristics and performance in accordance with the Declaration of Performance and

the harmonised /EN 14342:2013/ product standard on which they are based.

Constructional data

Name	Value	Unit
Product thickness	10.5 - 15	mm
Wear layer thickness	≥ 2.5	mm
Mass per unit area	4500 - 9300	g/m²
Approx. length of top layer	570 - 2380	mm
Approx. width of top layer	95 - 233	mm
Thermal resistance	0.07 - 0.10	m²K/W
Formaldehyde	E1	
Pentachlorophenol (PCP)	≤ 5	ppm
Reaction to fire	≥ Dfl – s1	
Biological durability	Grade 1	
Slip resistance natural oil finish	46	SRT (wet)
Slip resistance natural oil finish (rough sawn)	57	SRT (wet)
Slip resistance lacquer finish	29	SRT (wet)
Slip resistance UV oil finish	29	SRT (wet)
Slip resistance natural oil finish	103	SRT (dry)
Slip resistance natural oil finish (rough sawn)	99	SRT (dry)
Slip resistance lacquer finish	51	SRT (dry)
Slip resistance UV oil finish	38	SRT (dry)
Breaking strength	NPD*	

*NPD = no performance determined

2.4 Delivery status

Multi-layer parquet flooring in the "Basic" collection consisting of			
Top layer:	≥ 2.5 mm		
Type of wood:	Canadian maple, European maple, beech, oak, European cherry, American walnut		
Middle layer:	7.1 mm made of spruce		
Backing layer:	1.8 mm made of spruce		
Total thickness:	11.5 mm		
Mass per unit area	4500 - 5600 g/m²		
Length (format 1):	2380 mm	Pack (format 1):	7 elements / 3.882 m² / 21.007 kg
Width (format 1):	233 mm	Pallet (format 1):	36 packs / 139.752 m² / 756.252 kg
Length (format 2):	2200 mm	Pack (format 2):	10 elements / 4.07 m² / 29.30 kg
Width (format 2):	185 mm	Pallet (format 2):	32 packs / 130.24 m² / 937.60 kg
All details ± 10% / Length: ± 0.05% / Width: ± 0.1 mm			

Multi-layer parquet flooring in the "Classic" collection consisting of			
Top layer:	≥ 3.5 mm		
Type of wood:	Canadian maple, European maple, beech, oak, European cherry, larch, American walnut		
Middle layer:	8.0 mm made of spruce		
Backing layer:	1.8 mm made of spruce		
Total thickness:	13.0 mm		
Mass per unit area	6100 - 7400 g/m²		
Length:	2200 mm	Pack:	9 elements / 3.663 m² / 29.304 kg
Width:	185 mm	Pallet:	32 packs / 117.216 m² / 937.728 kg
All details ± 10% / Length: ± 0.05% / Width: ± 0.1 mm			

Multi-layer parquet flooring in the "EcoBalance" collection consisting of			
Top layer:	≥ 2.5 mm		
Type of wood:	Beech, oak, European walnut		
Middle layer:	9.0 mm made of spruce		
Backing layer:	1.8 mm made of spruce		
Total thickness:	13.0 mm		
Mass per unit area	6400 - 7400 g/m²		
Length:	2200 mm	Pack:	9 elements / 3.663 m² / 26.163 kg
Width:	185 mm	Pallet:	32 packs / 117.216 m² / 837.216 kg
All details ± 10% / Length: ± 0.05% / Width: ± 0.1 mm			

Multi-layer parquet flooring in the "Edition Floor Fields" collection consisting of			
Top layer:	≥ 3.5 mm		
Type of wood:	European oak		
Middle layer:	8.0 mm made of spruce		
Backing layer:	1.8 mm made of spruce		
Total thickness:	13.0 mm		
Mass per unit area	7400 g/m²		
Length:	2010 mm	Pack:	9 elements / 2.894 m² / 19.395 kg
Width:	160 mm	Pallet:	32 packs / 92.621 m² / 620.640 kg
All details ± 10% / Length: ± 0.05% / Width: ± 0.1 mm			

Multi-layer parquet flooring in the "Edition New Classics" collection consisting of			
Top layer:	≥ 3.5 mm		
Type of wood:	Quercus		
Middle layer:	10.8 mm made of spruce		
Backing layer:	1.8 mm made of spruce		
Total thickness:	15.0 mm		
Mass per unit area	7950 g/m²		
Length:	1593 mm	Pack:	8 elements / 2.74 m² / 25.98 kg
Width:	215 mm	Pallet:	32 packs / 87.679 m² / 831.36 kg
All details ± 10% / Length: ± 0.05% / Width: ± 0.1 mm			

Multi-layer parquet flooring in the "Trendtime 1" collection consisting of			
Top layer:	≥ 3.5 mm		
Type of wood:	Oak		
Middle layer:	8.0 mm made of spruce		
Backing layer:	1.8 mm made of spruce		
Total thickness:	13.0 mm		
Mass per unit area	6100 - 7400 g/m²		
Length:	2010 mm	Pack:	9 elements / 2.352 m² / 17.1 kg
Width:	130 mm	Pallet:	40 packs / 94.07 m² / 684.00 kg
All details ± 10% / Length: ± 0.05% / Width: ± 0.1 mm			

Multi-layer parquet flooring in the "Trendtime 3" collection consisting of			
Top layer:	≥ 2.5 mm		
Type of wood:	Oak		
Middle layer:	6.5 mm made of spruce		
Backing layer:	1.5 mm made of spruce		
Total thickness:	10.5 mm		
Mass per unit area	4950 g/m²		
Length:	570 mm	Pack:	20 elements / 1.083 m² / 5.4 kg
Width:	95 mm	Pallet:	36 packs / 38.99 m² / 194.40 kg
All details ± 10% / Length: ± 0.05% / Width: ± 0.1 mm			

Multi-layer parquet flooring in the "Trendtime 4" collection consisting of			
Top layer:	≥ 3.5 mm		
Type of wood:	Oak, American cherry, walnut		
Middle layer:	8.0 mm made of spruce		
Backing layer:	1.8 mm made of spruce		
Total thickness:	13.0 mm		
Mass per unit area	6100 - 7400 g/m²		
Length:	2010 mm	Pack:	9 elements / 2.894 m² / 19.4 kg
Width:	160 mm	Pallet:	32 packs / 92.621 m² / 620.64 kg
All details ± 10% / Length: ± 0.05% / Width: ± 0.1 mm			

Multi-layer parquet flooring in the "Trendtime 6" collection consisting of			
Top layer:	≥ 3.5 mm		
Type of wood:	Oak		
Middle layer:	8.0 mm made of spruce		
Backing layer:	1.8 mm made of spruce		
Total thickness:	13.0 mm		
Mass per unit area	6100 - 7400 g/m²		
Length:	2200 mm	Pack:	9 elements / 3.663 m² / 29.304 kg
Width:	185 mm	Pallet:	32 packs / 117.22 m² / 937.73 kg
All details ± 10% / Length: ± 0.05% / Width: ± 0.1 mm			

Multi-layer parquet flooring in the "Trendtime 8" collection consisting of			
Top layer:	≥ 4.0 mm		
Type of wood:	Oak		
Central layer:	9.0 mm made of poplar		
Backing layer:	2.0 mm made of poplar		
Total thickness:	15.0 mm		
Mass per unit area	8500 - 9300 g/m²		
Length:	1882 mm*	Pack:	8 elements / 2.861 m² / 26.40 kg
Width:	190 mm	Pallet:	32 packs / 91.55 m² / 844.80 kg
All details ± 10% / Length: ± 0.05% / Width: ± 0.1 mm			
*Other formats and one short length per pack possible			

Multi-layer parquet flooring in the "Trendtime 9" collection consisting of			
Top layer:	≥ 3.5 mm		
Type of wood:	Oak		
Middle layer:	9.0 mm made of spruce		
Backing layer:	2.0 mm made of spruce		
Total thickness:	14.0 mm		
Mass per unit area	6400 - 8300 g/m²		
Length (format 1):	2087 mm	Pack (format 1):	8 elements / 3.089 m² / 23.56 kg
Width (format 1):	185 mm	Pallet (format 1):	32 packs / 98.842 m² / 753.92 kg
Length (format 2):	2200 mm	Pack (format 2):	8 elements / 3.256 m² / 24.832 kg
Width (format 2):	185 mm	Pallet (format 2):	32 packs / 104.192 m² / 794.624 kg
Length (format 3):	2176 mm	Pack (format 3):	8 elements / 3.22 m² / 24.60 kg
Width (format 3):	185 mm	Pallet (format 3):	32 packs / 103.055 m² / 787.20 kg
Length (format 4):	2200 mm	Pack (format 4):	8 elements / 3.784 m² / 28.864 kg
Width (format 4):	215 mm	Pallet (format 4):	32 packs / 121.088 m² / 923.684 kg
Length (format 5):	1910 mm	Pack (format 5):	8 elements / 2.827 m² / 24.60 kg
Width (format 5):	185 mm	Pallet (format 5):	32 packs / 90.458 m² / 787.20 kg
All details ± 10% / Length: ± 0.05% / Width: ± 0.1 mm			

2.5 Base materials / Ancillary materials

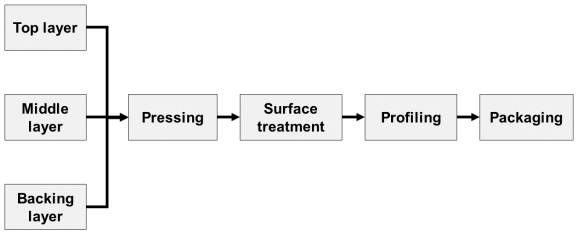
Average mass percentages of contents per m² for the EPD:

Name	Value	Unit
middle layer (spruce)	58	%
top layer (various high-grade woods, of which >95% oak)	30	%
backing layer (spruce veneer)	9	%
glue and surface finish (varnishes and oils)	3	%

None of the raw materials and auxiliaries used contain chemical compounds in the "Candidate List of Substances of Very High Concern for Authorisation" in accordance with the REACH Ordinance.
The urea formaldehyde resin glue used contains 0.1-1% formaldehyde. The hardener contains 0.0015-

0.06% of the biocide bronopol which releases formaldehyde.

2.6 Manufacture



The top layer, middle layer and backing layer are pressed together using glue. Pressing is followed by surface treatment of the individual blanks (with the exception of untreated end products) and application of a longitudinal and transverse profile. Quality control of the individual multilayer parquet elements is followed by packing into half-shell boxes and shrink-wrapping with PE foil. In accordance with their various sizes, these individual packing units are stacked on pallets and stored in the warehouse until shipment.
All processes are continuously monitored and documented within in-house *Factory Production Control* (FPC).

2.7 Environment and health during manufacturing

At the Güssing site, all waste wood is directed to a biomass heating power plant from where Parador procures the process heat it requires.

The Coesfeld and Güssing sites are certified in accordance with the European Environmental Management System /EMAS/ which examines both the environmental and energetic aspects of the sites and subjects them to continuous improvement.

2.8 Product processing/Installation

Parador recommends using the following tools when installing parquet flooring: tape measure, cutter, adhesive tape, pencil, hammer and jigsaw or circular/mitre saw (please ensure as fine toothing as possible and the tool's suitability for processing wood). Spacer wedges, a crowbar, impact protection and a multi-tool are also useful.
Standard safety measures (e.g. protective goggles and dust mask for sawing) should be applied. Wood shaving and sawdust should be vacuumed up. The guidelines provided by the professional liability associations apply for commercial processing.
Any residual material and packaging incurred must be disposed of separately according to their waste fraction. More information is available in the installation instructions and the "Parquet Guide" offered by Parador.

2.9 Packaging

The parquet elements are packed into half-shell boxes which are shrink-wrapped in PE foil to provide better protection against moisture. Exchangeable EURO pallets and PET straps are also used during transport. All packing components can be directed to the corresponding recycling fraction.

2.10 Condition of use

Wood is a hygroscopic material, i.e. it can absorb and release moisture. During usage, it is important to ensure a well-balanced room climate in order to avoid possible changes in size. The room climate should have an all-year temperature of approx. 20 °C and a relative humidity of 30-65%.

2.11 Environment and health during use

As the parquet flooring is made of wood, there are no interrelations between the product, the environment and health. No risks are known for water, air and soil if the products are used as designated. Pollutant emissions fall significantly below statutory limits. Products with smoked surface layers can contain harmless volumes of residual ammonia. In terms of emissions, the parquet variants with lacquered surface finishes comply with the allocation basis of /RAL-UZ176/ (Blue Angel) "Contract 27261" and the /eco-INSTITUT label "ID 1016-12656-002"/.

2.12 Reference service life

The reference service life for multilayer parquet is 40 years in accordance with code no. 352.812, service life for components for life cycle analyses in accordance with the /BNB/ assessment system for sustainable building, last revised 11/2011. Insufficient care or inappropriate cleaning can have negative effects on the anticipated service life of the products.

2.13 Extraordinary effects

Fire

Fire protection

Name	Value
Building material class	Dfl
Smoke gas development	s1

Water

Exposure to water can cause irreversible swelling which - in a worst-case scenario - can cause deformation necessitating replacement of the parquet. Permanent moisture can cause rot or mould. When dried appropriately, however, no negative consequences can be anticipated for the environment and health.

Mechanical destruction

No negative environmental impact is known in the event of mechanical destruction.

2.14 Re-use phase

The product can be easily re-used after the use phase in the case of selective de-construction. Leftovers and multilayer parquet waste need to be recycled in accordance with /AVV 17 02 01/ and /AVV 20 01 38/. If it is impossible to re-use the flooring, the wood can still be used, e.g. as a raw material for manufacturing wood-based panels which also involves the possibility of cascaded use. If the product can not be recycled, it is directed towards thermal recycling for generating process heat and electricity due to its high calorific value of approx. 16.1 MJ/kg.
Open burning or burning in a fireplace is not possible as burning treated wood (lacquer, glue etc.) causes

harmful emissions. The product should therefore only be burned in a plant featuring flue gas cleaning, e.g. a waste incineration plant.

2.15 Disposal

Landfilling waste wood is not permissible in accordance with the /Waste Wood Ordinance/, /AVV 17 02 01/ and /AVV 20 01 38/.

Waste wood category A II applies:

glued, painted, coated, lacquered or otherwise treated waste wood without halogen organic compounds in the coating and without wood preservatives.

2.16 Further information

More detailed information about the company and further products as well as information brochures, including the EMAS environmental declaration, are available for downloading at www.parador.de.

3. LCA: Calculation rules

3.1 Declared Unit

The declared unit is one square metre (1m²) multilayer parquet including packaging materials.

The product mix of average annual production comprising wide planks and 3-strip parquet was applied for this declaration. The average variants differ in terms of wood type and treatment of the wear layer as well as in the dimensions.
The average is based on the volumes effectively manufactured in m² and kg.

Declared unit

Name	Value	Unit
Declared unit	1	m^2
Mass per unit area	7.01	kg/m²
Packaging materials	0.181	kg/m²
Total	7.191	kg/m²
Conversion factor to 1 kg	0.139	-

3.2 System boundary

Type of EPD: cradle to factory gate with options

Modules A1-3, A4 and A5
The product stage (A1-3) commences with considering production of the necessary raw materials and energies including all relevant upstream chains and the effective procurement transport. Internal transports by truck and rail between the Austrian production site (Güssing) and German headquarters (Coesfeld) are also part of Modules A1-A3.
Furthermore, the entire manufacturing phase was considered, including processing of production waste until *end-of-waste* status. The distribution transports from Coesfeld / DE (A4) were also considered as well as the packaging waste incurred during installation (A5). Product losses as well as tools, ancillary materials and installation materials requiring electricity were not considered in A5.

Modules C2-3
The modules include the environmental impacts associated with processing the waste fractions until *end-of-waste* status, including transport at the end of the product life cycle.

Module D
Indication of product loads and credits outside the system boundary. These consist of energy credits from thermal utilisation (C3) in the form of the average Austrian electricity mix or thermal energy from natural gas.

3.3 Estimates and assumptions

A standardised energy demand per square meter surface for the different parquet variants was calculated as only the total electricity consumption by machines and plants is known. The same applies for the demand of materials.
Additionally, the data set for oak was applied for wood types for which no data set is available. The total percentage of these wood types related to the total mass is 1.1%. Due to its slow growth and more extensive water consumption as a result, oak represents a conservative assumption.

It was also assumed that thermal waste processing at the *End of Life* involves plants whose R1 factor (efficiency of energy conversion and energy efficiency of waste incineration plants in accordance with the European Waste Framework Directive) >0.6.

3.4 Cut-off criteria

Glues and lacquers for which no suitable data sets are available and whose mass percentages are below 0.1% were cut off in some cases. Components of potential relevance for the POCP such as UV lacquer and hardener were however considered. It can be assumed that the total of all neglected percentage shares does not exceed 5% in the impact categories.

3.5 Background data

The /GaBi/ software system for modelling the life cycle was applied for comprehensive analysis. The entire manufacturing process and the use of energy were modelled on the base of manufacturer-specific data while generic background data sets were used for the upstream and downstream processes. All background data sets used were taken from the current versions of various GaBi data bases. The data sets contained in the data bases are documented online.
Where possible, Austrian data sets were used for Modules A1-3 while European data sets were applied for the distribution transports (A4) and disposal scenarios (Module C). German data sets were used where no Austrian or European data sets were available.

3.6 Data quality

The background data sets used for the balance sheet originate from the /GaBi/ data bases which were applicable at the time of calculation.
The first data set involves a lacquer which represents the parquet UV lacquer due to its composition involving various acrylates. The lacquer has a share of 0.5% with regard to the input flows.
The second data set includes the incineration of solvent waste which only has a share of approximate 0.1% of the total waste and could therefore be ignored.

The data acquisition for the researched products was made by using analyses of internal production and environmental data, LCA-relevant data within the supplier chain, and analyses of relevant data for

the energy supply. The data surveyed has been checked for plausibility and consistency. Good data representativity can be assumed.

3.7 Period under review

The LCA data was recorded for the period 2015.

3.8 Allocation

Modules A1-3

Wood leftovers, which are utilised thermally by an external partner for covering thermal energy demand by production, were considered in a closed loop.
The remaining wood leftovers were considered as sold secondary fuel. Economic allocation was waived as the product value by far exceeds that of the wood leftovers and no noteworthy effect can be anticipated on the LCA result.
Incineration of the secondary fuel takes place outside the system boundary where it causes loads and credits, such as emissions and energy credits (see 3.2).

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 data base, version 7.3 was used as the background data base..

4. LCA: Scenarios and additional technical information

Internal transport (A3) from the factory gate (Güssing/AT) to the shipping centre (Coesfeld/DE)
Transport distance by truck: 555 km
Transport distance by rail: 534 km
Capacity utilisation (including empty runs) 85%

The entire product (7.01 kg) is thermally utilised in a waste-to-energy plant. Module D contains credits from energetic utilisation of multilayer parquet from Module C3 as well as packaging waste from Module A5 and secondary fuels from Module A3.

Transport to construction site (A4)

Name	Value	Unit
Transport distance by truck	741	km
Transport distance by ship	852	tkm
Capacity utilisation (including empty runs)	85	%

Installation process (A5)

Name	Value	Unit
Packaging waste	0.181	kg
Collection rate for packaging waste	100	%
Auxiliary material	0	kg
Other resources	0	kg
Power consumption	0	kWh
Other energy carriers	0	MJ
Material loss	0	kg
Water consumption	0	m^3
Dust emissions	-	kg
VOC in the air	-	kg

Reference service life

Name	Value	Unit
Reference service life	40	a

End of life (C2-C3)

Name	Value	Unit
Waste type collected separately	-	kg
Collected as mixed construction waste	-	kg
For energy recovery	7.01	kg
Collection rate	100	%
Transport distance by truck to waste incineration plant	75	km
Truck capacity utilisation (incl. empty runs)	50	%

Reuse, recovery and/or recycling potentials (D), relevant scenario information

Name	Value	Unit
Material for incineration	7.01	kg
R1 factor waste incineration plant	>60	%
Lower calorific value	16.1	MJ/kg

5. LCA: Results

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

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

RESULTS OF THE LCA - ENVIRONMENTAL IMPACT: One square metre (1 m²) multilayer parquet

Parameter	Unit	A1-A3	A4	A5	C2	C3	D
Global warming potential	[kg CO_2-Eq.]	-1.04E+1	3.39E-1	3.01E-1	4.80E-2	1.17E+1	-1.67E+0
Depletion potential of the stratospheric ozone layer	[kg CFC11-Eq.]	1.65E-8	1.51E-13	7.02E-11	1.61E-14	2.05E-8	6.66E-9
Acidification potential of land and water	[kg SO_2-Eq.]	1.73E-2	3.70E-3	5.41E-5	2.94E-4	4.38E-3	-5.76E-3
Eutrophication potential	[kg $(PO_4)^{3-}$-Eq.]	3.73E-3	5.30E-4	1.07E-5	7.47E-5	1.00E-3	-8.97E-4
Formation potential of tropospheric ozone photochemical oxidants	[kg ethene-Eq.]	6.24E-3	-2.80E-4	1.17E-7	-1.31E-4	2.73E-4	-8.37E-4
Abiotic depletion potential for non-fossil resources	[kg Sb-Eq.]	2.77E-6	1.77E-8	2.49E-9	3.86E-9	-3.51E-7	-1.56E-6
Abiotic depletion potential for fossil resources	[MJ]	6.44E+1	4.54E+0	8.13E-2	6.63E-1	3.71E+0	-8.09E+1

RESULTS OF THE LCA - RESOURCE USE: One square metre (1 m²) multilayer parquet

Parameter	Unit	A1-A3	A4	A5	C2	C3	D
Renewable primary energy as energy carrier	[MJ]	2.41E+2	1.67E-1	2.20E+0	3.34E-2	1.13E+2	-2.17E+1
Renewable primary energy resources as material utilization	[MJ]	1.90E+2	0.00E+0	-2.19E+0	0.00E+0	-1.13E+2	0.00E+0
Total use of renewable primary energy resources	[MJ]	4.31E+2	1.67E-1	1.06E-2	3.34E-2	1.13E-1	-2.17E+1
Non-renewable primary energy as energy carrier	[MJ]	6.99E+1	4.55E+0	1.27E+0	6.65E-1	4.61E+0	-8.50E+1
Non-renewable primary energy as material utilization	[MJ]	1.82E+0	0.00E+0	-1.17E+0	0.00E+0	0.00E+0	0.00E+0
Total use of non-renewable primary energy resources	[MJ]	7.17E+1	4.55E+0	9.39E-2	6.65E-1	4.61E+0	-8.50E+1
Use of secondary material	[kg]	9.58E-2	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0
Use of renewable secondary fuels	[MJ]	1.47E+1	0.00E+0	0.00E+0	0.00E+0	0.00E+0	4.51E+1
Use of non-renewable secondary fuels	[MJ]	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0
Use of net fresh water	[m³]	4.67E-2	3.28E-4	7.94E-4	6.18E-5	2.99E-2	-6.67E-3

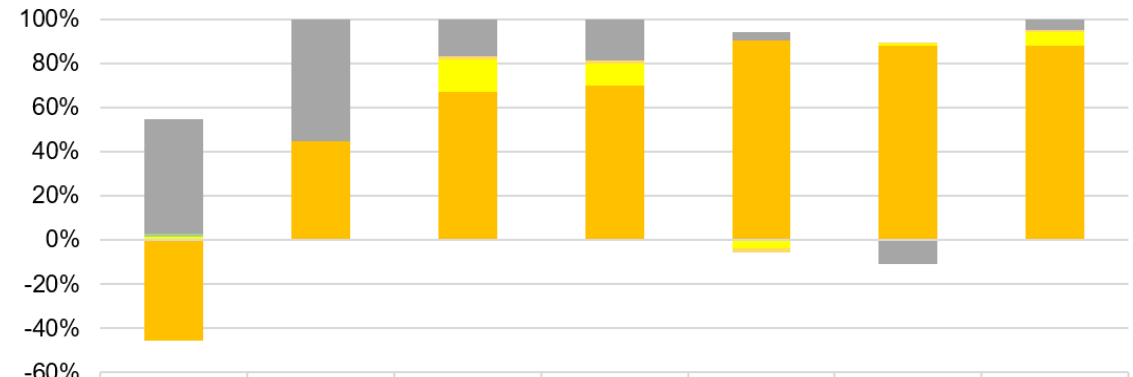
RESULTS OF THE LCA – OUTPUT FLOWS AND WASTE CATEGORIES: One square metre (1 m²) multilayer parquet

Parameter	Unit	A1-A3	A4	A5	C2	C3	D
Hazardous waste disposed	[kg]	3.22E-6	1.82E-7	9.53E-10	3.49E-8	IND	-3.33E-8
Non-hazardous waste disposed	[kg]	8.19E-2	2.70E-4	4.32E-3	5.08E-5	IND	-3.79E-2
Radioactive waste disposed	[kg]	2.65E-3	6.07E-6	4.73E-6	9.07E-7	2.56E-4	-1.66E-3
Components for re-use	[kg]	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0
Materials for recycling	[kg]	0.00E+0	0.00E+0	0.00E+0	0.00E+0	8.20E-1	0.00E+0
Materials for energy recovery	[kg]	2.64E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0
Exported electrical energy	[MJ]	5.32E+0	0.00E+0	4.32E-1	0.00E+0	1.36E+1	0.00E+0
Exported thermal energy	[MJ]	1.90E+0	0.00E+0	1.04E+0	0.00E+0	4.17E+1	0.00E+0

Additional technical scenario information:

10.3 kg CO2-equivalent are bound in one square metre multilayer parquet (including packaging) which accounts for a correspondingly negative contribution in Modules A1-A3.

6. LCA: Interpretation



	GWP 100	ODP	AP	EP	POCP	ADPE	ADPF
C3	1.17E+01	2.05E-08	4.38E-03	1.00E-03	2.73E-04	-3.51E-07	3.71E+00
C2	4.80E-02	1.61E-14	2.94E-04	7.47E-05	-1.31E-04	3.86E-09	6.63E-01
A5	3.01E-01	7.02E-11	5.41E-05	1.07E-05	1.17E-07	2.49E-09	8.13E-02
A4	3.39E-01	1.51E-13	3.70E-03	5.30E-04	-2.80E-04	1.77E-08	4.54E+00
A1 A3	-1.04E+01	1.65E-08	1.73E-02	3.73E-03	6.24E-03	2.77E-06	6.44E+01

The global warming potential (**GWP**) and ozone depletion potential (**ODP**) are primarily determined by Modules A1-A3 and C3. In Modules A1-A3, wood as a renewable raw material extensively ensures a negative contribution. Loads are incurred in A1-A3 primarily during the incineration of wood to cover heat requirements as well as in the upstream chains associated with substances such as glue and oil. Additionally, supplier transports and transport of products from Güssing (AT) to the Coesfeld (DE) site need to be considered.
In Module C3, the carbon bound in the product is released back into the atmosphere through thermal utilisation of the wood at the *End of Life* which in turn causes loads. The “negative loads” of wood in A1-A3 comply with the loads in C3 in terms of the GWP. The balance of biogenic carbon is thus offset.
In a downstream system (Module D; not included in the diagram), the energy gained from burning wood is considered as a credit as it substitutes energy generation from other sources (in this case the Austrian electricity mix and thermal energy from natural gas). If Module D were to be included in the overall analysis, the GWP emitted in this case would be a negative value.

The chipping processes have a relatively small effect due to the power mix which is based 100% on renewable energy.

The acidification potential (**AP**), eutrification potential (**EP**) and photochemical ozone creation potential (**POCP**) impact categories are determined particularly by wood as a raw material in A1-A3. In the case of AP and EP, the distribution transports (A4) also incur relatively high loads compared to the other impact categories. This also applies for incineration of parquet at the *End of Life* (C3) while
transports lead to a negative value for POCP. Despite the apparently paradoxical results that more transports would lead to a reduction in overall near-ground ozone, this model does not contain any errors. Thermal utilisation plays a relatively minor role.

Abiotic elementary depletion potential (**ADPE**) is primarily determined by Modules A1-A3 where electricity from photovoltaic, wind and hydro power are particularly responsible for loads. Furthermore, the production of urea glue needs to be considered. In C3, the waste incineration process creates a negative contribution owing to the recovery of metal from waste incineration plant slag.

Abiotic fossil depletion of resources (**ADPF**) can be attributed to wood production in A1-A3, distribution transport in A4, and incineration of parquet in C3 where fossil fuels are used to support the process.

7. Requisite evidence

Formaldehyde
Testing institute: eco-INSTITUT Germany GmbH, Schanzenstrasse 6-20, Carlswerk Kupferzug 5.2, D-51063 Cologne
Test report: 51265-A001, 23.08.2016
Result: 17 µg/m³ (0.014 ppm)
Test report: 51483-A002, 23.08.2016
Result: 2 µg/m³ (0.002 ppm)

VOC emissions
Testing institute: eco-INSTITUT Germany GmbH, Schanzenstrasse 6-20, Carlswerk Kupferzug 5.2, D-51063 Cologne

VOC emissions PB: 51265-A001, 23.08.2016

After 28 days	Result	Task	Unit
TVOC (C6 - C16)	78	≤ 300	µg/m³
TSVOC (C16 - C22)	25	≤ 100	µg/m³
R (dimensionless)	0.44	≤ 1	-
TVOC without LCI	55	≤ 100	µg/m³
Carcinogens	< 1	≤ 1	µg/m³

VOC emissions PB: 51483-A002, 23.08.2016

After 28 days	Result	Task	Unit
TVOC (C6 - C16)	130	≤ 300	µg/m³
TSVOC (C16 - C22)	< 1	≤ 100	µg/m³
R (dimensionless)	0.10	≤ 1	-
TVOC without LCI	64	≤ 100	µg/m³
Carcinogens	< 1	≤ 1	µg/m³

/RAL-UZ176/ Blue Angel certificate
Due to the Trade Mark Agreement no. 27261 of RAL gGmbH, Siegburger Straße 39, 53757 Sankt Augustin and the Federal Environment Agency, Parador multilayer parquet variants with a lacquered surface may bear the "Blue Angel" environmental symbol as they are low-emission products.

eco-INSTITUT label certificate
In accordance with the test criteria of the eco-INSITUT label (last revised: June 2016), eco-INSTITUT Germany GmbH, Schanzenstrasse 6-20, Carlswerk Kupferzug 5.2, D-51063 Cologne, Parador multilayer parquet variants with a lacquered surface may bear the eco-Institut label with the ID 1016-12656-002 ID.

PEFC certificate
Certificate no. BMT-PEFC-1289 dated 01.12.2013 confirms that the Parador GmbH parquet flooring production processes comply with the requirements of the PEFC Standard "PEFC ST 2002:2013" of Chain of Custody according to the percentage-based method.

EMAS certificate
Following registration in the EMAS Register under the number DE-156-00107 dated 10.11.2015, Parador GmbH is entitled to use the EMAS logo.

8. References

Institut Bauen und Umwelt
Institut Bauen und Umwelt e.V., Berlin (pub.): Generation of Environmental Product Declarations (EPDs);
General Principles
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/EN 15804:2012-04+A1 2013/, Sustainability of construction works — Environmental Product Declarations — Core rules for the product category of construction products

Product category rules for building products, part A:
Calculation rules for the life cycle assessment and requirements on the background report, version 1.5, 08/2016

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Requirements on the EPD for solid wood products, 04/2017

AgBB scheme 2015
Procedure for health-related evaluation of emissions of volatile organic compounds (VVOC, VOC and SVOC) from construction products

Waste wood act
Act governing the requirements on utilisation and disposal of waste wood

AVV 17 02 17 and AVV 03 01 05
Ordinance governing the European List of Waste, "Wood" and "Sawdust, chips, trimmings, wood, particle board and veneer, except those which are covered by 030104"

BNB
Service lives of components for life cycle analyses in accordance with the evaluation system for sustainable building, 2011

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European Chemicals Agency (ECHA) Candidate List of Substances of Very High Concern (SVHC) for Authorisation
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RAL-UZ 176
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(EU) Directive No. 995/2010
of the European Parliament and Council dated 20 October 2010 on the commitments by market participants distributing wood and wood-based products

(EU) Directive No. 305/2011
of the European Parliament and Council dated 9 March 2011 establishing harmonised conditions for marketing construction products and replacing Council Guideline 89/106/EEC of significance for the EWR

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