ENVIRONMENTAL PRODUCT DECLARATION
as per /ISO 14025/ and /EN 15804/

Owner of the Declaration | M. Kaindl KG
Programme holder | Institut Bauen und Umwelt e.V. (IBU)
Publisher | Institut Bauen und Umwelt e.V. (IBU)
Declaration number | EPD-KAI-20170089-IBD1-EN
Issue date | 22.05.2017
Valid to | 21.05.2022

Particle board, raw and coated

M. Kaindl KG

www.ibu-epd.com / https://epd-online.com
1. General Information

<table>
<thead>
<tr>
<th>M. Kaindl KG</th>
<th>Particle board, raw and coated</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Programme holder</strong></td>
<td><strong>Owner of the Declaration</strong></td>
</tr>
<tr>
<td>IBU - Institut Bauen und Umwelt e.V.</td>
<td>M. Kaindl KG</td>
</tr>
<tr>
<td>Panoramastr. 1 10178 Berlin Germany</td>
<td>Kaindlstraße 2 A-5071-Wals/Salzburg Österreich</td>
</tr>
<tr>
<td><strong>Declaration number</strong></td>
<td><strong>Declared product / Declared unit</strong></td>
</tr>
<tr>
<td>EPD-KAI-20170089-IBD1-EN</td>
<td>The declared unit involves the manufacture and disposal of one cubic metre Kaindl particle board uncoated with 3 different coatings (APPENDIX) of one square metre each (melamine, veneer, CPL laminate).</td>
</tr>
</tbody>
</table>

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

**Issue date**
22.05.2017

**Valid to**
21.05.2022

**Verification**
The CEN Norm /EN 15804/ serves as the core PCR
Independent verification of the declaration according to /ISO 14025/

Prof. Dr.-Ing. Horst J. Bossenmayer
(Chairperson of Institut Bauen und Umwelt e.V.)

Dr. Burkhard Lehmann
(Managing Director IBU)

Matthias Klingler
(Independent verifier appointed by SVR)

2. Product

2.1 Product description / Product definition

Raw and coated particle boards are board-shaped wood materials in accordance with /EN 13986/, /EN 312/, /EN 14322/ and /EN 438/. The coating is applied using wood veneer, laminate or paper soaked in melamine resin, and serves towards decorative refinement of the product. The corresponding haptics are achieved by pressing through various textured plates / structure reinforcers.


This document is translated from the German Environmental Product Declaration into English. It is based on the German original version EPD-KAI-20170089-IBD1-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 evidence.

The LCA for Kaindl particle board, coated and uncoated, was drawn up for the Lungötz/Austria and Salzburg/Austria plants which corresponds with 100% of the production volume of the declared products of M. Kaindl KG. The owner of the Declaration shall be liable for the underlying information and evidence; IBU shall not be liable with respect to manufacturer information, Life Cycle Assessment data, and evidence.

The LCA refers to raw and uncoated particle board produced in the following plants:
M. Kaindl KG, Kaindlstraße 2, 5071 Wals / Salzburg, Austria
M. Kaindl KG, Gappen 38, 5523 Lungötz, Austria

The owner of the Declaration shall be liable for the underlying information and evidence; IBU shall not be liable with respect to manufacturer information, Life Cycle Assessment data and evidences.
Performance and CE markings were drawn up in accordance with the specifications of the harmonised EN 13986:2004+A1:2015 standard: “Wood-based panels for use in construction – Characteristics, evaluation of conformity and marking”.

2.2 Application

Coated wood materials manufactured by Kaindl are largely used in the area of interior design, furniture construction and trade fair/store-fitting.

2.3 Technical Data

Technical data in accordance with Directive (EU) No. 305/2011 /CPR/. The declared product performance in line with the MKSPA100 and/or MKSPA200 Declaration of Performance was drawn up in accordance with /EN13986:2004+A1:2015/: “Wood-based panels for use in construction – Characteristics, evaluation of conformity and marking”.

Declared performance of particle board P2: Boards for interior design (including furniture) for use in dry areas (as per /EN312/)

Declared performance of particle board P3: Boards for non-supporting purposes for use in humid areas (as per /EN312/)

<table>
<thead>
<tr>
<th>Essential characteristics</th>
<th>Unit</th>
<th>Performance</th>
<th>Harmonised technical specification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age resistance (standing strength)</td>
<td>mm</td>
<td>10-10</td>
<td>EN 117006:2004+A1:2015</td>
</tr>
<tr>
<td>Bonding quality</td>
<td>NPO</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Transverse tensile strength</td>
<td>MPa</td>
<td>0.40</td>
<td>EN 117006:2004+A1:2015</td>
</tr>
<tr>
<td>Water vapour permeability</td>
<td>mm Hg cm/m² s</td>
<td>0.1</td>
<td>EN 117006:2004+A1:2015</td>
</tr>
<tr>
<td>Formaldehyde emission</td>
<td>mg/m³</td>
<td>10</td>
<td>EN 117006:2004+A1:2015</td>
</tr>
</tbody>
</table>

2.4 Delivery status

2.5 Base materials / Ancillary materials

Raw particle board with thickness of 8–38 mm and an average density of 654 kg/m³, comprising the following base materials (details as mass percentage per 1 m³ production):

- Wood chips, largely spruce, approx. 83-87%.
- Up to 35% of wood mass used is covered by the use of recycled wood.
- Water, approx. 5-13%.
- UF glue / MUF glue (urea-formaldehyde resin, melamine-urea formaldehyde resin) 8-10%.
- Water-repellent finish: Paraffin emulsion < 1%.

(APPENDIX) 2.5.1 In addition as coatings:

- Melamine coating with decorative paper with grammages of 60-140 g/m², wood veneer or...
CPL laminates with a thickness of 0.2–1.2 mm

2.6 Manufacture

Manufacture of the raw particle board:
- Chipping the wood mass
- Treating the wood mass
- Drying the chips
- Sorting the chips
- Glueing the chips
- Scattering the chips onto a transport belt
- Pressing the chip cake under pressure and temperature (ContiRoll®)
- Formatting the raw board
- Cooling the raw board
- Grinding the top and bottom side
- Stacking the boards

(APPENDIX) 2.6.1 Manufacturing directly-coated decorative particle boards:
- Manufacturing impregnated paper: Clamping the untreated paper rolls; impregnating the paper with a melamine urea resin; drying the impregnated film; formatting the paper
- Positioning impregnated films under or over a raw particle board
- Feeding a short cycle press with the bundle of impregnated base board
- Pressing under pressure and temperature
- Visual inspection of bonded boards
- Stacking

(APPENDIX) 2.6.2 Manufacturing composite boards:
- Bonding several layers of impregnated paper (see 2.6.1) to a laminate in a continuous process under pressure and temperature
- Rolling up the laminate
- Glueing the base board on both sides
- Feeding a continuous press with base board and laminate on top and bottom side
- Pressing the bundle under pressure and temperature
- Formatting the ensuing composite board
- Stacking

(APPENDIX) 2.6.3 Manufacturing wood-veneered boards:
- Sorting real wood veneer strips
- Glueing and joining the sorted strips as wood veneer sheets
- Glueing the base board on both sides
- Positioning wood veneer sheets on the top and bottom side of the base board
- Bonding the bundle in a multi-level press
- Clean-cutting the top and bottom sides
- Stacking

2.7 Environment and health during manufacturing

In the manufacture of particle board, the health protection measures (high-visibility vests, safety shoes, dust mask, ear protection etc.) specified by the authorities must be observed. No other, more extensive, measures are required.

The waste air incurred during production is cleaned according to regulations. In addition, the waste air from production is used to recover district heat. Emissions are below the statutory specifications.

Water and soil are not polluted by production.

2.8 Product processing/Installation

Kaindl particle boards can be treated and processed using standard wood processing machinery. Prior to processing, Kaindl decorative particle boards must be examined for visible damage. In order to obtain good cutting quality, various measures such as feed rate, tooth geometry and pitch, saw blade projection, saw blade chip space etc. are to be considered.

2.9 Packaging

Kaindl particle boards are protected from transport damage by way of a protection board on top and underneath. Strips are positioned on the top to facilitate stacking. Packs are secured in place using plastic straps. Both the protection boards and plastic straps can be utilised thermally or as material.

2.10 Condition of use

Composition of the finished products complies with the base materials listed in 2.5 (Base materials). When the boards are pressed, the binding agent hardens under pressure and heat in a polycondensation process and forms a duroplastic, three-dimensional interlinked plastic.

Certain applications may require information on other properties. This shall be subject to separate agreement and can be provided on request in accordance with the test procedures specified in the /EN 14322/ standard (see Table 2.3.).

2.11 Environment and health during use

Environment

When the products are used as designated, the current state of knowledge indicates that there are no risks involved for water, air or soil (see section 7. Evidence).

Health

When the products are used as designated, the current state of knowledge indicates that there are no risks involved for health. In low volumes, natural ingredients inherent to wood can be emitted. Emissions of all other substances fall below the statutory limit values (see section 7. Evidence). Contact with skin or food is harmless.

2.12 Reference service life

The reference service life is defined via the particle board’s application classes. The resistance of the
products is dependent on the intensity of use and environmental factors (UV rays; humidity).

2.13 Extraordinary effects

Fire

Raw and/or coated particle boards display the following fire performance in accordance with /EN 13501-1/:

Change in aggregate state: Burning dripping material is not possible as raw and coated wood materials from Kaindl do not liquify when heated.

<table>
<thead>
<tr>
<th>Fire protection</th>
<th>Name</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Building material class</td>
<td>D (normally flammable)</td>
<td></td>
</tr>
<tr>
<td>Burning droplets</td>
<td>d0 (non-dripping)</td>
<td></td>
</tr>
<tr>
<td>Smoke gas development</td>
<td>s2 (normally fuming)</td>
<td></td>
</tr>
</tbody>
</table>

Water

The product does not contain any substances which represent a hazard to water when washed out. Continuous exposure to moisture leads to destruction of the composite board. Accordingly, the products must be protected from permanent exposure to water.

Mechanical destruction

The product displays brittle breakage behaviour under mechanical loads. Splinters and sharp edges can arise. Resistance to mechanical effects comply with the respective board types P2 and P3.

2.14 Re-use phase

Re-use / Further use

When deconstructed by type, Kaindl wood materials can be re-used for the same purpose. This is only possible if the boards do not feature full-surface gluing.

Recycling

When sorted by type, the material can be crushed and redirected to the wood materials manufacturing process. Further use

Owing to their components, Kaindl wood materials display a high calorific value and can be utilised thermally. This is conditional to approval of the heating plant and official acceptance for this application. This should only, however, be striven towards if the products can not be re-used or further used.

2.15 Disposal

Leftovers after treating and processing raw and coated wood materials should be primarily directed to re-use or further use. These measures should be given preference over incineration. Waste codes in accordance with the “European Waste Catalogue (EWC) 170201/030103/.

2.16 Further information

More information is available on the website: http://www.kaindl.com

3. LCA: Calculation rules

3.1 Declared Unit

This Declaration refers to the manufacture of 1 m³ raw particle board with an average density of 654 kg/m³ and product humidity of approx. 5%.

Details on declared unit

<table>
<thead>
<tr>
<th>Name</th>
<th>Value</th>
<th>Unit</th>
</tr>
</thead>
<tbody>
<tr>
<td>Declared unit</td>
<td>1</td>
<td>m³</td>
</tr>
<tr>
<td>Conversion factor to 1 kg</td>
<td>0.00153</td>
<td></td>
</tr>
<tr>
<td>Mass reference</td>
<td>654</td>
<td>kg/m³</td>
</tr>
</tbody>
</table>

Additionally, coated particle boards with coatings made from veneer (13.3 kg/m²), melamine (11.8 kg/m²) und CPL laminate (11.8 kg/m²) per 1 m² are indicated in the EPD Appendix.

The average board thickness was weighted and calculated on the basis of the individual board strengths produced.

3.2 System boundary

This is a “cradle-to-gate, with options” EPD. This LCA addresses the life cycle stages A1 – A3, A5, C3 and D in accordance with /EN 15804/.

The product stage begins with consideration of the production of all requisite raw materials including all upstream chains as well as CO2 absorption by raw materials (wood growth in the forest). The next processes involve production of the Kaindl raw and coated particle board in the plant including the provision of energy taking consideration of the respective upstream chains. All necessary transport for raw materials and ancillaries are considered in the LCA.

The assessment also includes packaging as far as the product ready for delivery at the plan gate. The emission of biogenic CO2 bound in the product is listed in Module C3 in order to safeguard CO2 neutrality within the product system.

Once the product has achieved end-of-waste status after dismantling, it is assumed that the product is directed to biomass incineration which produces thermal energy and electricity. The ensuing effects and potential credits (energy substitution) are declared in Module D.

3.3 Estimates and assumptions

It is assumed that the product leaving the system displays the same characteristics as the waste wood entering the system. The bound CO2 and primary energy are considered for the waste wood.

The rejected boards incurred during production enter the process without any environmental impact. Some
of these rejected boards (B-goods) are used as packaging or for internal generation of thermal energy.

The end-of-life system boundary between Module C3 and Module D is set where outputs such as secondary material or combustion material reach their end-of-waste status.

End-of-waste status for particle boards is reached after dismantling from the building, sorting by type and preparation. Transport from waste wood treatment to the biomass power plant is ignored.

Energy produced in the form of electricity and thermal energy from biomass incineration replaces thermal energy from natural gas as well as electric energy (EU-27).

3.4 Cut-off criteria

All operating data, i.e. all of the starting materials used, transport thereof to the plant, thermal and electrical energy used, packaging materials, all direct production waste as well as all emission measurements available were taken into consideration in the analysis. Accordingly, material and energy flows with a share of less than one per cent were also considered. The limit of 5% of processes to be ignored as required in PCR Part A is therefore complied with.

Machinery, plants and infrastructure required in the manufacturing process were not considered. Transport expenses for packaging were ignored. Expenses associated with installation were not considered.

Rejected boards sent to customers as packaging material are excluded from the LCA (cut-off).

3.5 Background data

The background data originates from the GaBi data base by thinkstep. The respective data base is the /GaBi 2016, version 7.3/.

3.6 Data quality

The primary data collated at the manufacturer’s is based on annual volumes and/or extrapolations from measurements at specific plants.

4. LCA: Scenarios and additional technical information

The following technical information forms the basis for the declared modules or can be used for developing specific scenarios in the context of a building evaluation if modules are not declared (MND).

<table>
<thead>
<tr>
<th>Name</th>
<th>Value</th>
<th>Unit</th>
</tr>
</thead>
<tbody>
<tr>
<td>Plastic strap (PET)</td>
<td>0.11</td>
<td>kg</td>
</tr>
<tr>
<td>Pallets (protective pallets and separators)</td>
<td>3.53</td>
<td>kg</td>
</tr>
</tbody>
</table>

Rejected boards are usually used as packaging; this was taken into consideration in the model. As for the remaining packaging, it is assumed that it is supplied along with the product (except for raw particle board where no packaging is supplied).

Data sets are largely available in the GaBi data base /GaBi 7/ for the basic materials used in the corresponding formulae. The data base was last updated in early 2016. Other data sets on the upstream chain associated with the manufacture of basic materials are approximated with data sets of similar chemicals or estimated by merging existing data sets.

3.7 Period under review

The primary data was made available by Kaindl. The primary data for manufacturing represents an average over the year 2015.

3.8 Allocation

Allocation relates to the assignment of input and output flows for a Life Cycle Assessment module to the product system tested (ISO 14040). Energy credits for electricity and thermal energy produced in the biomass power plant at the end of life are allocated according to the calorific value of the input, whereby the efficiency of the plant is also considered. The credit for thermal energy is calculated on the basis of “EU-27: Thermal energy from natural gas ts”; the credit for electricity is calculated from the “EU-27: Power mix ts” data set.

The emissions dependent on input at the end of life are calculated in line with the content composition of the ranges used. Emissions dependent on technology (e.g. CO) are added in terms of waste gas volume. Waste is also allocated throughout production. The upstream chain associated with forestry is analysed in accordance with /Hasch 2002/. In the case of sawmill by-products, the forest process and associated transports are allocated to the wood according to the volume share (or dry mass); no loads are allocated to sawmill by-products from sawmill processes.

No loads are considered for waste wood from the upstream chains. But the expenses associated with crushing as wood chips and transport (30% wood moisture) from the crusher and/or waste wood dealer to the production site are considered.

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 used background database has to be mentioned.
In case a **reference service life** according to applicable ISO standards is declared then the assumptions and in-use conditions underlying the determined RSL shall be declared. The same holds for a service life declared by the manufacturer.

**End of Life (C1-C4)**

The total waste wood from external sources (secondary fuels) which is also burned in the biomass power plant is applied to calculate the net flows. To calculate the net flows, the mass which could theoretically be used as waste wood in A1-A3 for energy supply and as a raw material is deducted from the total product mass (654 kg/m³).

<table>
<thead>
<tr>
<th>Name</th>
<th>Value</th>
<th>Unit</th>
</tr>
</thead>
<tbody>
<tr>
<td>Energy recovery waste wood</td>
<td>344</td>
<td>kg</td>
</tr>
</tbody>
</table>

Incinerating the 344 kg waste wood in the biomass power plant produces 29.2 MJ electricity and 34.9 MJ thermal energy.

It is assumed that the **end-of-life** scenario is identical for each of the four products analysed. This is explained by the calorific value which is around 18.6 MJ per kg for each product.
5. LCA: Results

The following tables depict the results of the environmental impact analysis differentiated by CML environmental categories, use of resources, output flows and waste categories scaled to the functional unit of 1 m³ raw particle board. The emissions of biogenic CO2 and material primary energy contained in the boards are declared in Module C3. Loads from incineration (with the exception of biogenic CO2) and benefits are declared in Module D.

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

<table>
<thead>
<tr>
<th>PRODUCT STAGE</th>
<th>CONSTRUCTION STAGE</th>
<th>USE STAGE</th>
<th>END OF LIFE STAGE</th>
<th>BENEFITS AND LOADS BEYOND THE SYSTEM BOUNDARIES</th>
</tr>
</thead>
<tbody>
<tr>
<td>Raw material supply</td>
<td>Transport</td>
<td>Manufacturing</td>
<td>Assembly</td>
<td>Use</td>
</tr>
<tr>
<td>X</td>
<td>X</td>
<td>X</td>
<td>MND</td>
<td>X</td>
</tr>
</tbody>
</table>

#### RESULTS OF THE LCA - ENVIRONMENTAL IMPACT: 1 m³ particle board (654 kg)

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Unit</th>
<th>A1-A3</th>
<th>A5</th>
<th>C3</th>
<th>D</th>
</tr>
</thead>
<tbody>
<tr>
<td>Global warming potential</td>
<td>[kg CO2-Eq]</td>
<td>-7.87E+2</td>
<td>2.47E-1</td>
<td>1.04E+3</td>
<td>-8.21E+2</td>
</tr>
<tr>
<td>Depletion potential of the stratospheric ozone layer</td>
<td>[kg CFC11-Eq]</td>
<td>1.13E-5</td>
<td>8.23E-14</td>
<td>0.00E+0</td>
<td>-1.48E-7</td>
</tr>
<tr>
<td>Acidification potential of land and water</td>
<td>[kg SO2-Eq]</td>
<td>2.37E-1</td>
<td>1.51E-6</td>
<td>0.00E+0</td>
<td>2.57E-1</td>
</tr>
<tr>
<td>Eutrophication potential</td>
<td>[kg (PO43-)2-Eq]</td>
<td>1.25E-1</td>
<td>3.36E-6</td>
<td>0.00E+0</td>
<td>-1.43E-3</td>
</tr>
<tr>
<td>Formation potential of tropospheric ozone photochemical oxidants</td>
<td>[kg ethene-Eq]</td>
<td>2.14E-1</td>
<td>1.70E-6</td>
<td>0.00E+0</td>
<td>4.63E-2</td>
</tr>
<tr>
<td>Abiotic depletion potential for non-fossil resources</td>
<td>[kg Sb-Eq]</td>
<td>2.27E-4</td>
<td>2.07E-9</td>
<td>0.00E+0</td>
<td>-7.13E-5</td>
</tr>
<tr>
<td>Abiotic depletion potential for fossil resources</td>
<td>[MJ]</td>
<td>3.52E+3</td>
<td>3.57E-2</td>
<td>0.00E+0</td>
<td>-4.28E+3</td>
</tr>
</tbody>
</table>

#### RESULTS OF THE LCA - RESOURCE USE: 1 m³ particle board (654 kg)

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Unit</th>
<th>A1-A3</th>
<th>A5</th>
<th>C3</th>
<th>D</th>
</tr>
</thead>
<tbody>
<tr>
<td>Renewable primary energy as energy carrier</td>
<td>[MJ]</td>
<td>1.42E+3</td>
<td>6.89E-3</td>
<td>0.00E+0</td>
<td>-1.02E+3</td>
</tr>
<tr>
<td>Renewable primary energy resources as material utilization</td>
<td>[MJ]</td>
<td>4.15E+3</td>
<td>0.00E+0</td>
<td>-4.15E+3</td>
<td>0.00E+0</td>
</tr>
<tr>
<td>Total use of renewable primary energy resources</td>
<td>[MJ]</td>
<td>5.57E+3</td>
<td>6.84E-3</td>
<td>-4.15E+3</td>
<td>-1.02E+3</td>
</tr>
<tr>
<td>Non-renewable primary energy as energy carrier</td>
<td>[MJ]</td>
<td>2.50E+3</td>
<td>1.09E+0</td>
<td>0.00E+0</td>
<td>-5.67E+3</td>
</tr>
<tr>
<td>Non-renewable primary energy as material utilization</td>
<td>[MJ]</td>
<td>8.81E+2</td>
<td>-1.05E+0</td>
<td>0.00E+0</td>
<td>-5.67E+3</td>
</tr>
<tr>
<td>Total use of non-renewable primary energy resources</td>
<td>[MJ]</td>
<td>3.38E+3</td>
<td>3.99E-2</td>
<td>-8.05E+2</td>
<td>-5.67E+3</td>
</tr>
<tr>
<td>Use of secondary material</td>
<td>[kg]</td>
<td>2.79E+2</td>
<td>0.00E+0</td>
<td>0.00E+0</td>
<td>0.00E+0</td>
</tr>
<tr>
<td>Use of renewable secondary fuels</td>
<td>[MJ]</td>
<td>1.16E+3</td>
<td>0.00E+0</td>
<td>0.00E+0</td>
<td>4.15E+3</td>
</tr>
<tr>
<td>Use of non-renewable secondary fuels</td>
<td>[MJ]</td>
<td>0.00E+0</td>
<td>0.00E+0</td>
<td>0.00E+0</td>
<td>3.34E+2</td>
</tr>
<tr>
<td>Use of net fresh water</td>
<td>[m³]</td>
<td>8.34E-1</td>
<td>5.13E-4</td>
<td>0.00E+0</td>
<td>-1.13E-0</td>
</tr>
</tbody>
</table>

#### RESULTS OF THE LCA – OUTPUT FLOWS AND WASTE CATEGORIES: 1 m³ particle board (654 kg)

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Unit</th>
<th>A1-A3</th>
<th>A5</th>
<th>C3</th>
<th>D</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hazardous waste disposed</td>
<td>[kg]</td>
<td>1.86E-5</td>
<td>4.22E-11</td>
<td>0.00E+0</td>
<td>-2.25E-6</td>
</tr>
<tr>
<td>Non-hazardous waste disposed</td>
<td>[kg]</td>
<td>2.44E+2</td>
<td>6.41E-3</td>
<td>0.00E+0</td>
<td>-3.78E+2</td>
</tr>
<tr>
<td>Radioactive waste disposed</td>
<td>[kg]</td>
<td>8.12E-2</td>
<td>1.66E-6</td>
<td>0.00E+0</td>
<td>-5.47E-1</td>
</tr>
<tr>
<td>Components for re-use</td>
<td>[kg]</td>
<td>0.00E+0</td>
<td>0.00E+0</td>
<td>0.00E+0</td>
<td>IND</td>
</tr>
<tr>
<td>Materials for recycling</td>
<td>[kg]</td>
<td>0.00E+0</td>
<td>0.00E+0</td>
<td>0.00E+0</td>
<td>IND</td>
</tr>
<tr>
<td>Materials for energy recovery</td>
<td>[kg]</td>
<td>0.00E+0</td>
<td>0.00E+0</td>
<td>6.54E+2</td>
<td>IND</td>
</tr>
<tr>
<td>Exported electrical energy</td>
<td>[MJ]</td>
<td>0.00E+0</td>
<td>3.05E-1</td>
<td>0.00E+0</td>
<td>IND</td>
</tr>
<tr>
<td>Exported thermal energy</td>
<td>[MJ]</td>
<td>0.00E+0</td>
<td>7.50E-1</td>
<td>0.00E+0</td>
<td>IND</td>
</tr>
</tbody>
</table>

6. LCA: Interpretation

The interpretation is based on the assumptions and restrictions outlined in this background report, both in terms of methods and data. A dominance analysis is used for interpretation. The following graphic contains a dominance analysis of the results for the declared unit – 1 m³ particle board from Kaindl.
Fig. 1: Dominance analysis for Modules A1-A3
Interpretation of results in Fig. 1 [1]:
Analysis of the global warming potential (GWP) is most obvious - large volumes of CO2 are bound during wood growth. This CO2 is released again during thermal utilisation of the particle board at the end of life. In all impact categories, the provision of raw materials plays a significant role (60-100% of impact). It has the least impact in the following impact categories: abiotic depletion potential fossil fuels (ADP fossil), acidification potential (AP) and non-renewable primary energy (PENRE) where the provision of thermal energy has a relevant influence, and contributes 11-21% to the respective overall impact. A certain influence is also exerted by the provision of electricity accounting for 10% of ADP fossil, 11.4% in terms of acidification potential and 12% in relation to non-renewable primary energy. Waste processing has a minor influence, as does the provision of electricity and transport (only for acidification potential here) in some impact categories. This is unusual as transport generally has a certain influence on the formation potential for tropospheric ozone (POCP). However, as Kaindl has extensively transferred transport by truck to rail, this is also reflected in the results. Packaging (raw material supply), the ancillaries used and transport have a negligible influence.

There are no special products among the declared products (P2 and P3 boards) which do not correspond with the base material volumes indicated and their fluctuation margin. It can therefore be assumed that the fluctuation margin of the results can be ignored within the product group. Other products indicated on the website (e.g. P5 boards or flame-retardant boards) are bought in and are not produced in the plant. No data was recorded for these products, nor are they part of the EPD.

[1] Interpretation based on terminology in the /ISO 14040ff//EN ISO 14044//EN ISO 14040/: maximum importance, significant influence (contributing >50 %); very important, relevant influence (contributing 25-50%); moderately important, certain influence (contributing 10-25%); rather unimportant, low influence (contributing 2.5–10%); unimportant, negligible influence (contributing <2.5%)

7. Requisite evidence

7.1. Formaldehyde
Measuring agency: Holzforschung Austria – Forschungsinstitut und akkreditierte Prüf- und Überwachungsstelle der Österreichischen Gesellschaft für Holzforschung (ÖGH), Franz Grill-Strasse 7, 1030 Vienna
Test report:
Test result: The formaldehyde content /EN 120/ is below the maximum permissible values in accordance with the Formaldehyde Ordinance applicable in Austria as well as the /DIBt Guideline/ 100 (E1).

7.2 MDI
Issuing agency: RAL gemeinnützige GmbH, Siegburger Straße 39, 53757 Sankt Augustin
Test report:
Contract no. 10899; extension: 19242
Test result: Kaindl raw and coated particle boards do not emit any monomer MDI (analysis method determination limit: 0.1 μg/m³). Accordingly, Kaindl raw and coated particle boards meet the requirements of the corresponding award criteria for low-emission wood-based boards /RAL-UZ76/ (Blue Angel).

7.3 Eluate analysis
Measuring agency: Holzforschung Austria - Forschungsinstitut und akkreditierte Prüf- und Überwachungsstelle der Österreichischen Gesellschaft für Holzforschung (ÖGH), Franz Grill-Strasse 7, 1030 Vienna
Test report:
Test result: The contents of migrated elements (Al, Sb, As, Ba, B, Cd, Cr III, Cr VI, Co, Cu, Pb, Mn, Hg, Ni, Se, Sr, Sn, Organozinn, Zn) established fall below the values required in the /ÖNORM EN 71-3/.

7.4 Fire gas toxicity
Measuring agency: Entwicklungs- und Prüflabor Holztechnologie GmbH, Zellescher Weg 24, 01217 Dresden
Test report:
Test result: All of the samples examined comply with the limit values of the Waste Wood Ordinance with respect to all parameters.

Environmental Product Declaration M.Kaindl KG – Particle board, raw and coated
Measurement results for raw particle board:

<table>
<thead>
<tr>
<th>Material number B1089091</th>
<th>400 °C</th>
</tr>
</thead>
<tbody>
<tr>
<td>Measured values after</td>
<td>30 min.</td>
</tr>
<tr>
<td>Carbon monoxide [ppm]</td>
<td>10000</td>
</tr>
<tr>
<td>Carbon dioxide [ppm]</td>
<td>-</td>
</tr>
<tr>
<td>Hydrogen cyanide [ppm]</td>
<td>-</td>
</tr>
<tr>
<td>Hydrogen chloride [ppm]</td>
<td>-</td>
</tr>
<tr>
<td>Ammonium [ppm]</td>
<td>20</td>
</tr>
<tr>
<td>Sulphur dioxide [ppm]</td>
<td>-</td>
</tr>
<tr>
<td>CO₂ (% calculated from CO value)</td>
<td>-</td>
</tr>
</tbody>
</table>

Measurement results for decorative particle board:

<table>
<thead>
<tr>
<th>Material number B1089092</th>
<th>400 °C</th>
</tr>
</thead>
<tbody>
<tr>
<td>Measured values after</td>
<td>30 min.</td>
</tr>
<tr>
<td>Carbon monoxide [ppm]</td>
<td>10000</td>
</tr>
<tr>
<td>Carbon dioxide [ppm]</td>
<td>-</td>
</tr>
<tr>
<td>Hydrogen cyanide [ppm]</td>
<td>-</td>
</tr>
<tr>
<td>Hydrogen chloride [ppm]</td>
<td>-</td>
</tr>
<tr>
<td>Ammonium [ppm]</td>
<td>-</td>
</tr>
<tr>
<td>Aldehydes [ppm]</td>
<td>-</td>
</tr>
<tr>
<td>Sulphur dioxide [ppm]</td>
<td>-</td>
</tr>
<tr>
<td>CO₂ (% calculated from CO value)</td>
<td>-</td>
</tr>
</tbody>
</table>

As the formula was not altered, the test reports referred to above remain valid.

7.5 VOC emissions

Measuring agency: Entwicklungs- und Prüflabor Holztechnologie GmbH, Zellescher Weg 24, 01217 Dresden
Test report: Coated wood-based panels – Testing according to the /AgBB scheme/ Test report job number: 2514579/2016/1/1/A1
Test principle: Determining the VOC and formaldehyde emissions by a wood-based panel in accordance with /AgBB scheme/, /ISO 16000/ Parts 3, 6 and 9
Test result: The product tested complies with the requirements of the /AgBB scheme/.

AgBB overview of results (28 days)

<table>
<thead>
<tr>
<th>Name</th>
<th>Value</th>
<th>Unit</th>
</tr>
</thead>
<tbody>
<tr>
<td>TVOC (C6 - C16)</td>
<td>92</td>
<td>µg/m³</td>
</tr>
<tr>
<td>Sum SVOC (C16 - C22)</td>
<td>0</td>
<td>µg/m³</td>
</tr>
<tr>
<td>R (dimensionless)</td>
<td>0.762</td>
<td>-</td>
</tr>
<tr>
<td>VOC without NIK</td>
<td>10</td>
<td>µg/m³</td>
</tr>
<tr>
<td>Carcinogenic Substances</td>
<td>0</td>
<td>µg/m³</td>
</tr>
</tbody>
</table>

8. References

AgBB Scheme
Procedure for health-related evaluation of emissions of volatile organic compounds (VOC, VO and SVOC) from construction products; Committee for the Health Assessment of Construction Materials; last revised: February 2015

CPR

DIBt Guideline 100:1994-06; Title (German): Guideline on classification and monitoring of wood-based boards in terms of formaldehyde emissions (DIBt Guideline 100)

DIN 53436-1:2015-12
Generation of thermal decomposition products from materials for their analytic-toxicological testing – Part 1: Decomposition apparatus and determination of test temperature

EWC

Hasch 2002

RAL UZ 76
Low-emission board-shaped materials (construction and furniture boards) for interior design

EN 71-3: 2014 11 15
Toy safety – Part 3: Migration of certain elements

EN 120: 1993 02 01
Wood-based panels – Determining the formaldehyde content – Extraction process, referred to as the perforator method

EN 312:2010-12
Particle board – Requirements; German version DIN EN

EN 438-7:2005
High-pressure decorative laminates (HPL) – Sheets based on thermosetting resins (laminates) – Part 7: Compact laminate and HPL composite panels for internal and external wall and ceiling finishes

EN 438-1:2016-06
High-pressure decorative laminates (HPL) – Sheets based on thermosetting resins (laminates) – Part 1: Introduction and general information; German version EN 438-1:2016

EN 717-2:1994

EN 13501-1:2010
Fire classification of construction products and building elements – Part 1: Classification using data from reaction to fire tests; German version EN 13501-1:2007 + A1:2009
Wood-based panels for use in construction – Characteristics, evaluation of conformity and marking

EN 14322: 2004
Wood-based panels – Melamine-faced boards for interior use – Definition, requirements and classification

EN 14323:2004-06
Wood-based panels – Melamine-faced boards for interior use – Test methods; German version EN14323:2004

GaBi 2016
GaBi 7.3: Software and data base for comprehensive analysis; thinkstep AG, Leinfelden-Echterdingen, 2016

ISO 14040
EN ISO 14040:2009-11
Environmental management – Life cycle assessment – Principles and framework

IBU, PART A

IBU, PART B

Institut Bauen und Umwelt
Institut Bauen und Umwelt e.V., Berlin(pub.): Generation of Environmental Product Declarations (EPDs);
General Principles for the EPD range of Institut Bauen und Umwelt e.V. (IBU), 2013/04
www.ibu-epd.de

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

/EN 15804/
/EN 15804:2012-04+A1 2013/, Sustainability of construction works — Environmental Product Declarations — Core rules for the product category of construction products