

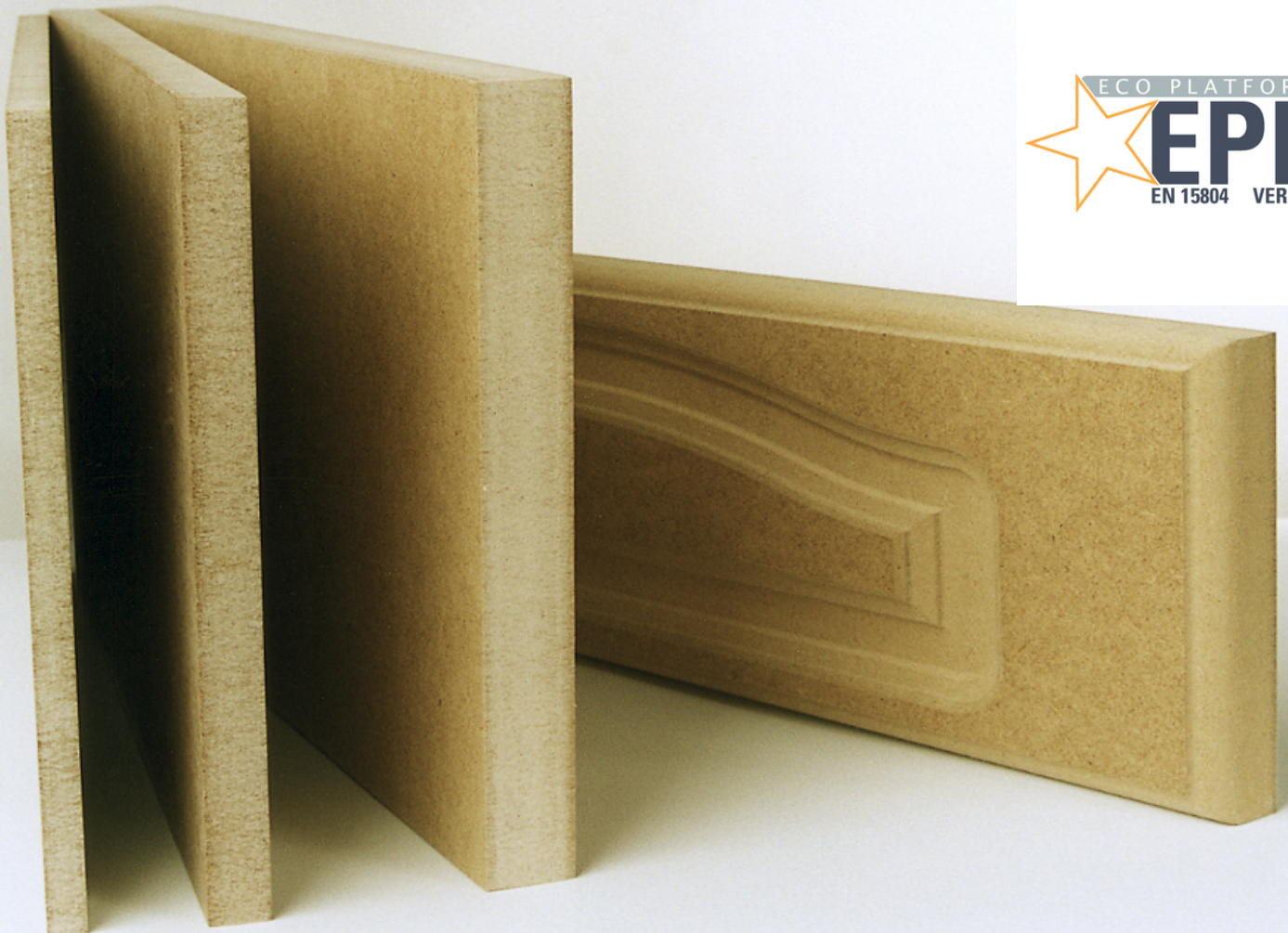
ENVIRONMENTAL PRODUCT DECLARATION

as per ISO 14025 and EN 15804+A1

| | |
|--------------------------|--------------------------------------|
| Owner of the Declaration | SWISS KRONO TEX GmbH & Co. KG |
| Programme holder | Institut Bauen und Umwelt e.V. (IBU) |
| Publisher | Institut Bauen und Umwelt e.V. (IBU) |
| Declaration number | EPD-20190043-IBD1-EN |
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Raw and coated MDF and HDF wooden fibreboard
SWISS KRONO Group

www.ibu-epd.com | <https://epd-online.com>



1. General Information

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| <p>SWISS KRONO Group</p> <hr/> <p>Programme holder IBU – Institut Bauen und Umwelt e.V. Panoramastr. 1 10178 Berlin Germany</p> <hr/> <p>Declaration number EPD-20190043-IBD1-EN</p> <hr/> <p>This declaration is based on the product category rules: Wood based panels, 11.2017 (PCR checked and approved by the SVR)</p> <hr/> <p>Issue date 11-06-2019</p> <hr/> <p>Valid to 10-06-2024</p> <hr/> <p> Dipl. Ing. Hans Peters (chairman of Institut Bauen und Umwelt e.V.)</p> <hr/> <p> Dr. Alexander Röder (Managing Director Institut Bauen und Umwelt e.V.)</p> | <p>SWISS KRONO Raw and coated MDF and HDF wooden fibreboard</p> <hr/> <p>Owner of the declaration SWISS KRONO TEX GmbH & Co. KG Wittstocker Chaussee 1 16909 Heiligengrabe Germany</p> <hr/> <p>Declared product / declared unit 1 cubic metre of uncoated and coated wooden fibreboard (APPENDIX) of one square meter each.</p> <hr/> <p>Scope: This document relates to all wooden fibreboards which are manufactured in the following SWISS KRONO GROUP factories: SWISS KRONO TEX GmbH & Co. KG, Heiligengrabe, Germany SWISS KRONO Sp. z o.o, Zary, Poland SWISS KRONO AG, Menznau, Switzerland</p> <p>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.</p> <p>The EPD was created according to the specifications of <i>EN 15804+A1</i>. In the following, the standard will be simplified as <i>EN 15804</i>.</p> <hr/> <p>Verification</p> <table border="1"> <tr> <td colspan="2">The standard <i>EN 15804</i> serves as the core PCR</td> </tr> <tr> <td colspan="2">Independent verification of the declaration and data according to <i>ISO 14025:2010</i></td> </tr> <tr> <td><input type="checkbox"/> internally</td> <td><input checked="" type="checkbox"/> externally</td> </tr> </table> <hr/> <p> Matthias Klingler (Independent verifier)</p> | The standard <i>EN 15804</i> serves as the core PCR | | Independent verification of the declaration and data according to <i>ISO 14025:2010</i> | | <input type="checkbox"/> internally | <input checked="" type="checkbox"/> externally |
| The standard <i>EN 15804</i> serves as the core PCR | | | | | | | |
| Independent verification of the declaration and data according to <i>ISO 14025:2010</i> | | | | | | | |
| <input type="checkbox"/> internally | <input checked="" type="checkbox"/> externally | | | | | | |

2. Product

2.1 Product description/Product definition

Wooden fibreboard made of medium-density fibreboard (MDF) and high-density fibreboard (HDF) are panel-shaped wood-based materials in accordance with /EN 622-5/ for furniture and decorative interior design. They can be coated with melamine-soaked papers.

EU regulation no. /305/2011/ (CPR) of 9th March 2011 applies for putting the product on the market in the EU/EFTA (with the exception of Switzerland). The products require a declaration of performance in compliance with /EN 13986:2004/ Wood-based materials for use in construction - Characteristics, evaluation of conformity and marking, and CE labelling.

The respective national regulations apply to use.

2.2 Application

Raw and coated MDF and HDF boards are used for decorative interior design, furniture, as floorboards, wall and ceiling panels, and decorative construction.

2.3 Technical Data

General requirements in accordance with /EN 622-1/ and /EN 622-2/.

Constructional data

| Name | Value | Unit |
|-------------------------------------------|-------------|-------------------|
| Gross density in accordance with /EN 323/ | 700 - 900 | kg/m ³ |
| Grammage e.g. 15 mm | 10.5 - 13.5 | kg/m ² |
| E-module (longitudinal) to /EN 310/ | 1900 - 4000 | N/mm ² |
| E-module (transverse) to /EN 310/ | 1900 - 4000 | N/mm ² |
| Bending strength (longitudinal) to | 17 - 55 | N/mm ² |

| | | |
|------------------------------------------------------------------------|------------|-------------------|
| /EN 310/ | | |
| Material dampness at delivery to /EN 323/ | 4 - 6 | % |
| Dimension change on plate level | k.A. | mm |
| Tensile strength rectangular to /EN 310/ | 0.5 - 2.5 | N/mm ² |
| Impact resistance classification | k.A. | - |
| Joint opening | k.A. | mm |
| Height difference between elements | k.A. | mm |
| Thermal conductivity in accordance with /EN 13986/ Table 11 | 0.1 - 0.14 | W/(mK) |
| Water vapour diffusion resistance factor in accordance with /EN 12524/ | 12 - 30 | - |
| Sound absorption coefficient in accordance with /EN 13986/ Table 10 | 0.1 - 0.2 | % |
| Room sound improvement | k.A. | Sone |

NA: No information as not relevant for the application.

The performance values according to the declaration of performance apply in relation to its main features in accordance with /EN 13986:2015-06/; Wood-based materials for use in construction - Characteristics, evaluation of conformity and marking and /DIN EN 622-5:2010-03/, Fibreboards - Specifications - Part 5: Requirements for dry process boards (MDF).

2.4 Delivery status

Uncoated and coated MDF and HDF boards from the factories are available in the following dimensions:
 Length: 2800 – 5600 mm
 Width: 2070 – 2800 mm
 Thickness: 6 – 38 mm
 Special formats are available on request.

2.5 Base materials/Ancillary materials

The composition of MDF wooden fibreboards is as follows:

- Wood content, approx. 80 % (mainly pine, approx. 37% FSC-certified)
- UF or MUF adhesive approx. 10 %
- Water in the form of wood humidity 4–6 %
- Wax emulsion < 1 %

2.6 Manufacture

The manufacture of MDF boards comprises the following production steps:

- 1) Partial debarking of the wood
- 2) Grinding down round timber to wood chips
- 3) Washing the chips
- 4) Plasticisation of the chips
- 5) Defibration of the chips
- 6) Gluing with resin and inclusion of additives
- 7) Drying the fibres
- 8) Scattering of the fibres on the forming line
- 7) Pressing of the fibres in a continuously running press
- 8) Trimming the boards along their longitudinal edges and division into board lengths
- 9) Sanding surfaces
- 10) Stacking the boards and packaging

All manufacturing plants have an /ISO 9001:2015/- compliant quality management system.

2.7 Environment and health during manufacturing

Due to manufacturing conditions, no health protection measures beyond those prescribed by statutory and other regulations are necessary. MAK (maximum workplace concentration) (for Germany) values are significantly undercut in all parts of the plant.

Air

The exhaust air produced by manufacturing is cleaned in accordance with statutory regulations. Emissions are significantly below the required threshold values.

Water / Soil

No direct contamination for water or soil is produced.

Noise

Noise control measurements have shown that all values emitted inside and outside of the production site are far below the requirements demanded.

Noiseemitting

plant parts such as the debarking drum are capsuled accordingly.

The manufacturing plants have an /ISO 14001/- compliant quality management system.

2.8 Product processing/Installation

SWISS KRONO MDF/HDF boards can be worked with normal woodworking machinery or tools. The usual safety precautions as for processing solid wood are to be taken during processing (work gloves, dust masks when sanding and sawing).

2.9 Packaging

Paper, cardboard, polyethylene foam transport packaging and strapping can be recycled if collected separately.

2.10 Condition of use

The material composition for the period of use corresponds to the base materials specified in 2.5.

2.11 Environment and health during use

No hazards or impairments to health are to be expected if SWISS KRONO MDF/HDF fibreboards are used normally and as intended.

According to the current state of knowledge, no hazards for water, the air/atmosphere and soil can arise if used as intended.

2.12 Reference service life

Durability during service life depends on the application classes (/EN 622/).

2.13 Extraordinary effects

Fire

Minimum fire class D in accordance with /EN 13501-1/, smoke class s2 – normally smoky, d0 – non-dripping. Change in physical condition (burning dripping/falling material):

Not possible as the products described do not liquefy when heated.

Fire protection

| Name | Value |
|-------------------------|-------|
| Building material class | B/D |
| Smoke gas development | s2 |
| Burning droplets | d0 |

Water

Application indoors only

Mechanical destruction

Fracture behaviour: The fracture pattern of SWISS KRONO MDF/HDF shows relatively brittle behaviour with no smooth fracture surfaces at the board breaking edges.

2.14 Re-use phase

SWISS KRONO MDF/ HDF fibreboards can easily be reused or used further for the same purpose in case of rebuilding or the termination of the use phase of a building in case of selective dismantling as long as they are untreated and not completely glued. Energetic recycling (in approved facilities): The energetic recycling of fibreboard offcuts which accrue on the construction site and boards from demolition measures to produce process energy and electricity

(combined heat and power generation (CHP)) is recommended due to their high heat value of approximately 18 MJ/kg.

2.15 Disposal

Disposal/Landfilling: SWISS KRONO MDF/HDF board offcuts and the like which accrue from demolition measures may not be disposed of in landfill if material recycling is not possible but must be energetically recycled (see above) or burnt in a waste incineration plant due to their purely organic components (wood, binding agent). /Waste code:/ 170201/030105 according to /EWC/.

Packaging: Paper/cardboard and steel strips as transport packaging can be recycled if collected separately.

2.16 Further information

Further information is available at www.swisskrono.com.

3. LCA: Calculation rules

3.1 Declared Unit

This declaration relates to the manufacture of 1 m³ raw MDF fibreboard with an average density of 810 kg/m³ and a product humidity of approximately 4.8%. The MDF board (raw) was produced in Germany (59%), Switzerland (7%) and Poland (35%). MDF coated board was only produced in Poland (95%) and Switzerland (5%).

Specification of the declared unit

| Name | Value | Unit |
|----------------------------------|---------|-------------------|
| Declared unit | 1 | m ³ |
| Conversion factor to 1 kg | 0.00123 | - |
| Mass reference kg/m ³ | 810 | kg/m ³ |

Coated MDF per 1 m² was additionally declared in the appendix to the EPD. This is produced in Switzerland and Poland. The functional unit (FU) for coated boards is equivalent to 6.87 kg/m² with 4.5% humidity.

3.2 System boundary

This is an EPD of the type "Cradle to factory gate with options". This LCA addresses the lifecycle stages A1-A3, C3 and D in accordance with /EN 15804/. The product stage covers the production of all necessary raw materials including all pre-chains and also the CO₂ absorption of the raw materials (wood growth through photosynthesis). The further processes are the production of the raw and coated Krono MDF board in the factory including energy provision taking into account the corresponding pre-chains. All necessary associated transport of raw and auxiliary materials has been included in the LCA. The biogenic CO₂ bound up in the product is listed in Module C3; this ensures CO₂ neutrality within the product system.

After the product has reached the end-of-life status following dismantling, it is assumed that the product is incinerated as biomass which produces thermal energy and electricity. Impacts and potential credits (energy substitution) which accrue from this are declared in Module D.

3.3 Estimates and assumptions

More wood waste is produced in Heiligengrabe, Germany than the process requires (thermal energy production in own biomass power station). In accordance with /EN15804/ the credit is therefore left in the system (A1-A3).

It is assumed that the product which leaves the system has the same characteristics as the matured timber which enters the system. The bound CO₂ and the primary energy for the mature timber is taken into account.

The end-of-life system boundary between Module C3 and Module D is set where outputs such as secondary material or fuel reach their end-of-waste status. The end-of-waste status for the boards is reached after their removal from the building, correct sorting and processing.

Transport from mature timber processing to the biomass power station is ignored.

Energy produced in the form of electricity and thermal energy from biomass incineration replaces thermal energy from natural gas and also electrical energy (EU-28).

3.4 Cut-off criteria

All data from the operating data collection, i.e. all raw materials used according to the formulation, their transport to the plant, the thermal and electrical energy used, packaging materials (for coated MDF), all direct production waste and all available emissions measurements are included in the lifecycle. Material and energy flows with a share of less than 1% were therefore also included. The threshold of 5% of processes to be ignored demanded in PCR Part A is thus complied with.

Machines, equipment and infrastructure required for manufacture were ignored and therefore not examined. Transport impacts for packaging were included.

3.5 Background data

The background data originates from thinkstep's /GaBi 8.0/ database. The database used as a basis is version 8.0 of the /GaBi 2018/ database.

3.6 Data quality

The foreground data collected at the manufacturers' premises is based on annual quantities or projections from measurements in specific works.

Data for the basic materials used in the corresponding formulations is available to a large extent in the /GaBi 8.0 database/. The database was last updated in 2018. Further data for the pre-chain for manufacturing basic materials is approximated with data for similar chemicals or estimated through combining existing data.

3.7 Period under review

The primary data was provided by Krono. The foreground data for manufacturing represents an average for 2015.

3.8 Allocation

An allocation is understood to be the allocation of the input and output flows of a lifecycle module to the product system examined /ISO 14040/. Energy credits for electricity and thermal energy produced in the biomass power station in the end-of-life are added according to the heat value of the input, whereby the efficiency of the plant is also included.

The credit for thermal energy is calculated from data record "EU-28: Thermal energy from natural gas ts" and the credit for electricity from data record "EU-28: Electricity mix ts".

The input of dependent emissions in the end-of-life is calculated according to the material composition of the assortment brought in. Technology-dependent emissions (e.g. CO) are added according to exhaust gas quantity.

Waste is also added to production in full.

The pre-chain for the forest is balanced according to /Hasch 2002/. The forest process and associated transport according to the volume share (or dry mass) are added to the wood for sawmill waste wood; no impacts from sawmill processes are added to the sawmill waste.

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 database used as a basis is version 8.0 of the /GaBi 2018/ database.

4. LCA: Scenarios and additional technical information

End-of-life (C3)

Thermal recycling (biomass plant) is modelled with a processing quota of the boards of 100%. This scenario represents an assumption. When using this data record in the building context for calculating lifecycles of buildings, assuming realistic processing quotas is unavoidable in order to assume the actual circumstances. This can exhibit big differences depending on the use of boards in the building (big losses with use for interior design, less losses with areal use).

In the end-of-life the boards are burnt in a biomass power station which corresponds to the EU average. Emission factors, electricity offtake and efficiency (68%) were thus adapted to the EU average. This gives a larger share of electricity compared to thermal energy. This is for example due to factors such as the renewable energy law in Germany which created a trend for electrical energy use. The biomass plant was modelled in accordance with the product-specific heating value (scenario EoL: MDF (raw) with 12% humidity has a heating value of 17.53 MJ/kg). Since it can be assumed that the boards will be recycled within the territory of the EU, the assumption that thermal energy and electricity will be substituted in accordance with the EU-28 mix is realistic.

| Name | Value | Unit |
|----------------------------------------------------------|-------|------|
| Collected separately Abfalltyp (Bau- und Abbruchabfälle) | 810.2 | kg |
| Energy recovery | 810.2 | kg |

5. LCA: Results

DESCRIPTION OF THE SYSTEM BOUNDARY (X = INCLUDED IN LCA; MND = MODULE 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 | MND | MND | MND | MND | MNR | MNR | MNR | MND | MND | MND | MND | X | MND | X |

RESULTS OF THE LCA - ENVIRONMENTAL IMPACT according to EN 15804+A1: 1 m³ MDF Platte (Roh)

| Parameter | Unit | A1-A3 | C3 | D |
|------------------------------------------------------------------|-------------------------------------------|----------|---------|----------|
| Global warming potential | [kg CO ₂ -Eq.] | -7.10E+2 | 1.34E+3 | -7.40E+2 |
| Depletion potential of the stratospheric ozone layer | [kg CFC11-Eq.] | 3.22E-10 | 0.00E+0 | -2.05E-9 |
| Acidification potential of land and water | [kg SO ₂ -Eq.] | 1.96E+0 | 0.00E+0 | 7.87E-1 |
| Eutrophication potential | [kg (PO ₄) ³ -Eq.] | 4.41E-1 | 0.00E+0 | -1.39E-3 |
| Formation potential of tropospheric ozone photochemical oxidants | [kg ethene-Eq.] | 2.65E-1 | 0.00E+0 | 1.54E-1 |
| Abiotic depletion potential for non-fossil resources | [kg Sb-Eq.] | 2.15E-4 | 0.00E+0 | -2.58E-4 |
| Abiotic depletion potential for fossil resources | [MJ] | 9.90E+3 | 0.00E+0 | -1.02E+4 |

RESULTS OF THE LCA - INDICATORS TO DESCRIBE RESOURCE USE according to EN 15804+A1: 1 m³ MDF Platte (Roh)

| Parameter | Unit | A1-A3 | C3 | D |
|------------------------------------------------------------|-------------------|---------|----------|----------|
| Renewable primary energy as energy carrier | [MJ] | 3.51E+3 | 0.00E+0 | -3.17E+3 |
| Renewable primary energy resources as material utilization | [MJ] | 1.42E+4 | -1.42E+4 | 0.00E+0 |
| Total use of renewable primary energy resources | [MJ] | 1.77E+4 | -1.42E+4 | -3.17E+3 |
| Non-renewable primary energy as energy carrier | [MJ] | 9.72E+3 | 0.00E+0 | -1.37E+4 |
| Non-renewable primary energy as material utilization | [MJ] | 8.81E+2 | -8.81E+2 | 0.00E+0 |
| Total use of non-renewable primary energy resources | [MJ] | 1.06E+4 | -8.81E+2 | -1.37E+4 |
| Use of secondary material | [kg] | 0.00E+0 | 0.00E+0 | 0.00E+0 |
| Use of renewable secondary fuels | [MJ] | 0.00E+0 | 0.00E+0 | 1.42E+2 |
| Use of non-renewable secondary fuels | [MJ] | 0.00E+0 | 0.00E+0 | 8.80E+2 |
| Use of net fresh water | [m ³] | 2.99E+0 | 0.00E+0 | -3.21E+0 |

RESULTS OF THE LCA – WASTE CATEGORIES AND OUTPUT FLOWS according to EN 15804+A1: 1 m³ MDF Platte (Roh)

| Parameter | Unit | A1-A3 | C3 | D |
|-------------------------------|------|---------|---------|----------|
| Hazardous waste disposed | [kg] | 8.52E-5 | 0.00E+0 | -4.94E-6 |
| Non-hazardous waste disposed | [kg] | 6.97E+0 | 0.00E+0 | 3.19E-1 |
| Radioactive waste disposed | [kg] | 2.64E-1 | 0.00E+0 | -1.40E+0 |
| Components for re-use | [kg] | 0.00E+0 | 0.00E+0 | IND |
| Materials for recycling | [kg] | 0.00E+0 | 0.00E+0 | IND |
| Materials for energy recovery | [kg] | 0.00E+0 | 8.10E+2 | IND |
| Exported electrical energy | [MJ] | 0.00E+0 | 0.00E+0 | IND |
| Exported thermal energy | [MJ] | 0.00E+0 | 0.00E+0 | IND |

6. LCA: Interpretation

This interpretation is based on the assumptions and limitations described in this document both with regard to the methods and also the data. A dominance analysis is used for interpretation.

Interpretation of results

Most noticeable is the analysis of the greenhouse gas potential - large quantities of CO₂ are bound up whilst wood grows. This CO₂ is released again during the thermal recycling of the board at the end-of-life. For the majority of impact categories, raw material provision plays a significant role (45%-94% of the

impact). It has the least influence in the ODP (depletion potential of the stratospheric ozone layer) and POCP (formation potential for tropospheric ozone photochemical oxidants) impact categories and in AP (acidification potential).

The influence of thermal energy fluctuates greatly between the different impact categories. The provision of thermal energy has its highest values for POCP and AP but only a small influence on the remaining categories.

Electricity production has a certain influence on all impact categories with a strong outlier for OPD (53%). ADPf (abiotic depletion potential for fossil resources)

(28%) and AP (21%).

Packaging (with the exception of ADPE (abiotic depletion potential for non-fossil resources), transport, the auxiliary materials used and production have a negligible influence (waste treatment and emissions).

The composition of the MDF boards is always identical; the only difference is the thickness. That means that in order to obtain different qualities, either more or less pressure is applied during production. Since the MDF boards of different thicknesses are manufactured on the same production lines the fluctuation range is estimated. Principally, only the press is affected for changing the thickness. It is

estimated that the press represents approximately 50% of the total energy requirement in the production line. Here, a fluctuation of some 10% more energy requirement can be assumed if the declared and maximum thickness are compared.

If we assume a maximum of 57% effective share (for POCP) for electricity and thermal energy, 28.5% would be attributable to the press. With a 10% increase we can assume a total rise of POCP by 2.8% through the extra time and effort.

The share of the energy requirement in the other impact categories is smaller; a smaller fluctuation range for these impact categories can therefore be assumed.

7. Requisite evidence

7.1 Formaldehyde

Measuring body: Fraunhofer WKI,

Test report: NoQA-2017-1286

Result: The boards examined fulfil the requirements of DIBt guideline 100: "Guideline on the classification and monitoring of wood-based panels with regard to formaldehyde emissions" and comply with E1 quality, i.e. formaldehyde emission by the perforator method is below 8.0 mg HCHO/100 g. The requirements of the /Chemical Prohibitions Ordinance; 1993/ of 19/07/1996 are fulfilled accordingly.

7.2 PCP/Lindane

Measuring body: Fraunhofer WKI,

Test report: No. QA-2016-2226

Results: No PCP or Lindane were detected in the sample examined. The sample was free of PCP and Lindane and fulfils the German /Chemicals Prohibition

Ordinance/.

7.3 Test for pre-treatment of raw materials

No waste wood is used in the manufacture of SWISS KRONO MDF / HDF. Therefore not relevant.

7.4 VOC emissions

Measured for "MDF 16 mm raw board". Measuring body Fraunhofer WKI, Braunschweig, No. MAIC-2013-1750 of 19/06/2013.

AgBB Overview of results (28 days)

| Name | Value | Unit |
|-------------------------|-------|-------------------|
| TVOC (C6 - C16) | 0.6 | µg/m ³ |
| Sum SVOC (C16 - C22) | 0 | µg/m ³ |
| R (dimensionless) | 1 | - |
| VOC without NIK | 0 | µg/m ³ |
| Carcinogenic Substances | 0 | µg/m ³ |

8. References

Standards

EN 15804

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

EN 15804

EN 15804:2019+A2 (in press), Sustainability of construction works — Environmental Product Declarations — Core rules for the product category of construction products.

ISO 14025

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

Further References

Title of the software/database

Title of the software/database. Addition to the title, version. Place: Publisher, Date of publication [Access on access date].

IBU 2016

Institut Bauen und Umwelt e.V.: General Programme Instructions for the Preparation of EPDs at the Institut

Bauen und Umwelt e.V. Version 1., Berlin: Institut Bauen und Umwelt e.V., 2016.

www.ibu-epd.com

Software/database title

Software/database title. Addendum to title, version. Location: Publisher, date of publication [access on access date].

EWC

European Waste Catalogue (EWC) of 10/12/2001 (Federal Legal Gazette I, p. 3379) last modified by the ordinance of 04/03/2016 (Federal Legal Gazette I, p. 382)

German Chemicals Prohibition Ordinance/: 1993

Ordinance on the prohibition of and limitations on the putting on the market and supply of certain substances

EN 622-1

/DIN EN 622-1:2003-09/, Fibreboards - Specifications - Part 1: General requirements

EN 622-2

/DIN EN 622-2:2004-07/, Fibreboards - Specifications - Part 2: Requirements for hardboards.

EN 13501-1

/EN 13501-1:2009/: Fire classification of construction

products and building elements - Part 1: Classification using data from reaction to fire tests.

EN 15804

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

GaBi 8.0

/GaBi 8.0/ Software system and database for lifecycle engineering. Copyright, TM[JH2] . Stuttgart, thinkstep AG, Leinfelden-Echterdingen, 1992-2018.

Hasch: 2002

Hasch, J.: Ecological observations on chipboards and wooden fibreboards (Ökologische Betrachtungen von Holzspan- und Holzfaserverplatten). Dissertation, Hamburg, 2002 - revised 2007: Rueter, S. (BFH HAMBURG; Wood Technology), Albrecht, S. (Uni Stuttgart, GaBi).

ISO 9001

/ISO 9001:2015/, Quality management systems – Requirements with guidance for use.

ISO 14001

/ISO 14001:2015/, Environmental management systems – Requirements with guidance for use.

IBU 2016

IBU (2016): General EPD programme instructions from

Institut Bauen und Umwelt e.V. (IBU). Version 1.1, Institut Bauen und Umwelt e.V., Berlin.

IBU 2018

PCR - Part A: Calculation rules for Life Cycle Assessment and Requirements of the Background Report, Version 1.7, Institut Bauen und Umwelt e.V., www.bau-umwelt.com, 2018.

IBU 2018

Requirements of the EPD for wood-based materials, 1.6 Institut Bauen und Umwelt e.V. (IBU), Version 1.7, 2017. www.bau-umwelt.com, 2017

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.

Swiss Krono formaldehyde test report: 2017

Fraunhofer WKI, Bienroder Weg 54 E, 38108 Braunschweig, Germany.

Swiss Krono PCP/Lindane test report: 2017

Fraunhofer WKI, Bienroder Weg 54 E, 38108 Braunschweig, Germany.

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Annex

Für beschichtete MDF und HDF Holzfasерplatten

SWISS KRONO Group

der

UMWELT-PRODUKTDEKLARATION

nach ISO 14025 und EN 15804+A1

| | |
|---------------------|-------------------------------|
| Deklarationsinhaber | SWISS KRONO TEX GmbH & Co. KG |
| Deklarationsnummer | EPD-20190043-IBD2-DE |
| Ausstellungsdatum | 11.06.2019 |
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Allgemeine Angaben

Dieser Anhang enthält die Ökobilanzergebnisse für eine deklarierte Einheit von 1 m² beschichtete MDF/HDF Holzfaserverplatten.

Allgemeine Informationen zum Produkt

Durch die Addition der Umweltwirkungen der Beschichtung von rohen MDF/HDF Holzfaserverplatten soll eine vereinfachte Berechnung der Umweltwirkungen beschichteter Produkte ermöglicht werden. Dafür ist die volumenbasierte Deklaration der MDF/HDF Rohfaserplatten unter Berücksichtigung der eingesetzten Quadratmeter einzubeziehen.

1. LCA: Rechenregeln und Szenarien

Es handelt sich um eine EPD vom Typ: "Wiege bis zum Werkstor – mit Optionen". Diese Ökobilanz adressiert die Lebenszyklusstadien A1 A3, C3 und D gemäß /EN15804+A1/. Das Produktstadium umfasst die Produktion aller notwendigen Rohstoffe inklusive aller Vorketten sowie der CO₂ Aufnahme der Rohstoffe (Holzwachstum durch Photosynthese). Die weiteren Prozesse sind die Produktion der SWISS KRONO MDF/HDF Platte roh und beschichtet im Werk inklusive der Energiebereitstellung unter Berücksichtigung der entsprechenden Vorketten. Alle notwendigen dazugehörigen Transporte der Roh- und Hilfsstoffe sind in der Ökobilanz berücksichtigt. In Modul C3 werden die Emissionen des im Produkt gebundenen biogenen CO₂ aufgeführt. Damit wird innerhalb des Produktsystems die CO₂-Neutralität sichergestellt.

Nachdem das Produkt den End of Waste Status nach der Demontage erreicht hat, wird angenommen, dass das Produkt einer Biomasseverbrennung zugeführt wird, welche thermische Energie und Elektrizität erzeugt. Daraus entstehende Wirkungen und potenzielle Gutschriften (Energiesubstitution) sind im Modul D deklariert.

Im Herstellwerk Heiligengrabe(Deutschland) werden mehr Holzreste erzeugt als der Prozess benötigt (Thermische Energie Produktion in eigenen Biomasse Kraftwerken). Gemäß /EN15804+A1/ wird deshalb die Gutschrift im System (A1–A3) belassen. Es wird angenommen, dass das Produkt (Altholz), welches das System verlässt (nachdem das Produkt den End of Waste Status nach Demontage erreicht hat) die gleichen Charakteristika aufweist, wie das Altholz, welches in das System eintritt. Für das Altholz werden das eingebundene CO₂ und die Primärenergie berücksichtigt.

Die End of Life-Systemgrenze zwischen Modul C3 und Modul D wird gesetzt, wo Outputs wie zum Beispiel Sekundärmaterial oder Brennmaterial ihren End of Waste Status erreichen. Der End of Waste Status für die Platten wird nach der Demontage aus dem Gebäude, sortenreinen Sortierung und Aufbereitung erreicht. Der Transport von der Altholzaufbereitung zum Biomasse Kraftwerk wird vernachlässigt. Produzierte Energie in Form von Elektrizität und thermischer Energie aus der Biomasseverbrennung ersetzt thermische Energie aus Erdgas sowie elektrische Energie (EU28).

2. LCA: Ergebnisse

ANGABE DER SYSTEMGRENZEN (X = IN ÖKOBILANZ ENTHALTEN; MND = MODUL NICHT DEKLARIERT)

| Produktionsstadium | | | Stadium der Errichtung des Bauwerks | | Nutzungsstadium | | | | | | | Entsorgungsstadium | | | | Gutschriften und Lasten außerhalb der Systemgrenze |
|--------------------|-----------|-------------|---------------------------------------------|---------|---------------------|----------------|-----------|--------|------------|-----------------------------------------------|----------------------------------------------|--------------------|-----------|------------------|-------------|-------------------------------------------------------------|
| Rohstoffversorgung | Transport | Herstellung | Transport vom Hersteller zum Verwendungsort | Montage | Nutzung / Anwendung | Instandhaltung | Reparatur | Ersatz | Erneuerung | Energieeinsatz für das Betreiben des Gebäudes | Wassereinsatz für das Betreiben des Gebäudes | Rückbau / Abriss | Transport | Abfallbehandlung | Beseitigung | Wiederverwendungs-, Rückgewinnungs- oder Recyclingpotenzial |
| A1 | A2 | A3 | A4 | A5 | B1 | B2 | B3 | B4 | B5 | B6 | B7 | C1 | C2 | C3 | C4 | D |
| X | X | X | X | X | ND | ND | MNR | MNR | MNR | ND | ND | X | X | X | X | X |

ERGEBNISSE DER ÖKOBILANZ UMWELTAUSWIRKUNGEN: 1 m² MDF/HDF Platte Beschichtet (6,87 kg/m²)

| Parameter | Einheit | A1-A3 | A4 | A5 | C1 | C2 | C3 | C4 | D |
|-----------|--------------------------------------------|-----------|----|----|----|----|----------|----|-----------|
| GWP | [kg CO ₂ -Äq.] | -3,44E+00 | | | | | 9,70E+00 | | -4,59E+00 |
| ODP | [kg CFC11-Äq.] | 6,16E-12 | | | | | 0,00E+00 | | -1,74E-11 |
| AP | [kg SO ₂ -Äq.] | 2,12E-02 | | | | | 0,00E+00 | | 6,70E-03 |
| EP | [kg (PO ₄) ³⁻ -Äq.] | 4,38E-03 | | | | | 0,00E+00 | | -1,18E-05 |
| POCP | [kg Ethen-Äq.] | 4,30E-03 | | | | | 0,00E+00 | | 1,31E-03 |
| ADPE | [kg Sb-Äq.] | 1,05E-06 | | | | | 0,00E+00 | | -2,20E-06 |
| ADPF | [MJ] | 9,50E+01 | | | | | 0,00E+00 | | -8,69E+01 |

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| Legende | GWP = Globales Erwärmungspotenzial; ODP = Abbau Potential der stratosphärischen Ozonschicht; AP = Versauerungspotenzial von Boden und Wasser; EP = Eutrophierungspotenzial; POCP = Bildungspotenzial für troposphärisches Ozon; ADPE = Potential für die Verknappung von abiotischen Ressourcen - nicht fossile Ressourcen (ADP - Stoffe); ADPF = Potential für die Verknappung abiotischer Ressourcen - fossile Brennstoffe (ADP - fossile Energieträger) |
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ERGEBNISSE DER ÖKOBILANZ RESSOURCENEINSATZ: 1 m² MDF/HDF Platte Beschichtet (6,87 kg/m²)

| Parameter | Einheit | A1-A3 | A4 | A5 | C1 | C2 | C3 | C4 | D |
|-----------|-------------------|----------|----|----|----|----|-----------|----|-----------|
| PERE | [MJ] | 3,56E+01 | | | | | 0,00E+00 | | -2,70E+01 |
| PERM | [MJ] | 1,06E+02 | | | | | -1,06E+02 | | 0,00E+00 |
| PERT | [MJ] | 1,42E+02 | | | | | -1,06E+02 | | -2,70E+01 |
| PENRE | [MJ] | 7,30E+01 | | | | | 0,00E+00 | | -1,17E+02 |
| PENRM | [MJ] | 2,53E+01 | | | | | -2,53E+01 | | 0,00E+00 |
| PENRT | [MJ] | 9,83E+01 | | | | | -2,53E+01 | | -1,17E+02 |
| SM | [kg] | 0,00E+00 | | | | | 0,00E+00 | | 0,00E+00 |
| RSF | [MJ] | 0,00E+00 | | | | | 0,00E+00 | | 1,03E+00 |
| NRSF | [MJ] | 0,00E+00 | | | | | 0,00E+00 | | 2,52E+01 |
| FW | [m ³] | 2,28E-02 | | | | | 0,00E+00 | | -2,73E-02 |

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| Legende | PERE = Erneuerbare Primärenergie als Energieträger; PERM = Erneuerbare Primärenergie zur stofflichen Nutzung; PERT = Total erneuerbare Primärenergie; PENRE = Nicht-erneuerbare Primärenergie als Energieträger; PENRM = Nicht-erneuerbare Primärenergie zur stofflichen Nutzung; PENRT = Total nicht erneuerbare Primärenergie; SM = Einsatz von Sekundärstoffen; RSF = Erneuerbare Sekundärbrennstoffe; NRSF = Nicht erneuerbare Sekundärbrennstoffe; FW = Einsatz von Süßwasserressourcen |
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**ERGEBNISSE DER ÖKOBILANZ OUTPUT-FLÜSSE UND ABFALLKATEGORIEN:
1 m² MDF/HDF Platte Beschichtet (6,87 kg/m²)**

| Parameter | Einheit | A1-A3 | A4 | A5 | C1 | C2 | C3 | C4 | D |
|-----------|---------|----------|----|----|----|----|----------|----|-----------|
| HWD | [kg] | 6,54E-07 | | | | | 0,00E+00 | | -4,21E-08 |
| NHWD | [kg] | 7,95E-02 | | | | | 0,00E+00 | | 2,71E-03 |
| RWD | [kg] | 1,31E-03 | | | | | 0,00E+00 | | -1,19E-02 |
| CRU | [kg] | 0,00E+00 | | | | | 0,00E+00 | | IND |
| MFR | [kg] | 0,00E+00 | | | | | 0,00E+00 | | IND |
| MER | [kg] | 0,00E+00 | | | | | 8,10E+02 | | IND |
| EEE | [MJ] | 0,00E+00 | | | | | 0,00E+00 | | IND |
| EET | [MJ] | 0,00E+00 | | | | | 0,00E+00 | | IND |

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| Legende | HWD = Gefährlicher Abfall zur Deponie; NHWD = Entsorgter nicht gefährlicher Abfall; RWD = Entsorgter radioaktiver Abfall; CRU = Komponenten für die Wiederverwendung; MFR = Stoffe zum Recycling; MER = Stoffe für die Energierückgewinnung; EEE = Exportierte Energie elektrisch; EET = Exportierte Energie thermisch |
|---------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|