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

Institut Bauen und Umwelt e.V.

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ECO PLATFORM EPD EN 15804 VERIFIED

1. General Information

SWISS KRONO Group

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

Declaration number
EPD-20190043-IBD1-EN

This declaration is based on the product category rules:
Wood based panels, 11.2017
(PCR checked and approved by the SVR)

Issue date
11.06.2019

Valid to
10.06.2024

Dipl. Ing. Hans Peters
(chairman of Institut Bauen und Umwelt e.V.)

Dr. Alexander Röder
(Managing Director Institut Bauen und Umwelt e.V.))

SWISS KRONO
Raw and coated MDF and HDF wooden fibreboard

Owner of the declaration
SWISS KRONO TEX GmbH & Co. KG
Wittstocker Chaussee 1
16909 Heiligengrabe
Germany

Declared product / declared unit
1 cubic metre of uncoated and coated wooden fibreboard (APPENDIX) of one square meter each.

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

The owner of the declaration shall be liable for the underlying information and evidence; the IBU shall not be liable with respect to manufacturer information, life cycle assessment data and evidences.
The EPD was created according to the specifications of *EN 15804+A1*. In the following, the standard will be simplified as *EN 15804*.

Verification

The standard *EN 15804* serves as the core PCR
Independent verification of the declaration and data according to *ISO 14025:2010*
☐ internally ☒ externally

Matthias Klingler
(Independent verifier)

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/m³
Grammage e.g. 15 mm	10.5 - 13.5	kg/m²
E-module (longitudinal) to /EN 310/	1900 - 4000	N/mm²
E-module (transverse) to /EN 310/	1900 - 4000	N/mm²
Bending strength (longitudinal) to	17 - 55	N/mm²

/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/mm²
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 protectionmeasures 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/m³	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-oflife 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	[m³]	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 it 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/m³
Sum SVOC (C16 - C22)	0	µg/m³
R (dimensionless)	1	-
VOC without NIK	0	µg/m³
Carcinogenic Substances	0	µg/m³

8. References

Standards

EN 15804
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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.

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

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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

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EN 15804
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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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