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-KRO-20210237-IBB1-EN
Issue date	20.12.2021
Valid to	19.12.2026

SWISS KRONO Particleboards - coated

SWISS KRONO Group

Institut Bauen und Umwelt e.V.

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

ECO PLATFORM EPD VERIFIED

1. General Information

SWISS KRONO Group

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

Declaration number
EPD-KRO-20210237-IBB1-EN

This declaration is based on the product category rules:
Wood based panels, 12.2018
(PCR checked and approved by the SVR)

Issue date
20.12.2021

Valid to
19.12.2026

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 Particleboards – coated

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

Declared product / declared unit
Coated particle board in m²

Scope:
This document relates to all SWISS KRONO coated particleboards which are manufactured in the following SWISS KRONO Group factories:

SWISS KRONO AG, Menznau, Switzerland

SWISS KRONO S.A.S., Sully-sur-Loire, France

SWISS KRONO Sp. z o.o, Zary, Poland

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

SWISS KRONO particleboards (P2-P5, normal or flame-resistant) as coated board-like wood-based products in accordance with EN 13986, EN 312 and EN 14322 are coated with melamine resin-impregnated paper. The decorative texture of coated SWISS KRONO particleboards is achieved with the aid of printed decorative papers. The corresponding surface feel is embossed during pressing by special pressure plates.

EU regulation no. *305/2011* 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 13986:2015 Wood-based materials for use in construction - Characteristics, evaluation of conformity and marking* and CE labelling. *EN 312:2010-12, Particleboards - Specifications; German version EN 312:2010* also applies. The respective national regulations apply to use.

2.2 Application

Coated SWISS KRONO particleboards can be used in decorative furniture and interior construction as well as exhibition stand and commercial construction. Flame-resistant SWISS KRONO particleboards with melamine facing (SF-B = Stop Fire Board) are used where increased fire protection requirements apply.

2.3 Technical Data

	Mechanical properties *Particle board average values*	Unit	Board thicknesses								
	Bulk density	[kg/m³]	plant-specific								
	Thickness ranges	**[mm]**	**<3**	**3-4**	**4-6**	**>6-13**	**>13-20**	**>20-25**	**>25-32**	**>32-40**	**>40**
P2	Transverse tensile strength *EN319*	[N/mm²]	0.45	0.45	0.45	0.4	0.35	0.3	0.25	0.2	0.2
	Bending strength *EN310*	[N/mm²]	13	13	12	11	11	10.5	9.5	8.5	7
	Modulus of elasticity in bending *EN310*	[N/mm²]	1800	1800	1950	1800	1600	1500	1350	1200	1050
	Surface soundness *EN311*	[N/mm²]	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8
P3	Transverse tensile strength *EN319*	[N/mm²]	0.5	0.5	0.5	0.45	0.45	0.4	0.35	0.3	0.25
	Bending strength *EN310*	[N/mm²]	13	13	14	15	14	12	11	9	7.5
	Modulus of elasticity in bending *EN310*	[N/mm²]	1800	1800	1950	2050	1950	1850	1700	1550	1350
	Swelling 24h *EN317*	[%]	25	23	20	17	14	13	13	12	12
	Moisture resistance *EN321* Transverse tensile strength after cyclic test	[N/mm²]	0.18	0.18	0.18	0.15	0.13	0.12	0.1	0.09	0.08
	Moisture resistance *EN321* Swelling after cyclic test	[%]	15	15	14	14	13	12	12	11	11
	Moisture resistance *EN 1087-1* Transverse tensile strength after boiling test	[N/mm²]	0.09	0.09	0.09	0.09	0.08	0.07	0.07	0.06	0.06
	Thickness ranges	**[mm]**	**<3**	**3-4**	**4-6**	**>6-10**	**>10-13**	**>13-20**	**>20-25**	**>25-32**	**>32-40**	**>40**
P4	Transverse tensile strength *EN319*	[N/mm²]	0.5	0.45	0.45	0.4	0.4	0.35	0.3	0.25	0.2	0.2
	Bending strength *EN310*	[N/mm²]	14	15	16	16	16	15	13	11	9	7
	Modulus of elasticity in bending *EN310*	[N/mm²]	1800	1950	2200	2300	2300	2300	2050	1850	1500	1200
	Swelling 24h *EN317*	[N/mm²]	25	25	21	19	16	15	15	15	14	14
P5	Transverse tensile strength *EN319*	[N/mm²]	0.5	0.5	0.45	0.45	0.45	0.45	0.4	0.35	0.3	0.25
	Bending strength *EN310*	[N/mm²]	16	18	19	18	18	16	14	12	10	9
	Modulus of elasticity in bending *EN310*	[N/mm²]	2000	2400	2450	2550	2550	2400	2150	1900	1700	1550
	Swelling 24h *EN317*	[%]	16	16	14	13	11	10	10	10	9	9
	Moisture resistance *EN321* Transverse tensile strength after cyclic test	[N/mm²]	0.3	0.3	0.3	0.25	0.25	0.22	0.2	0.17	0.15	0.12
	Moisture resistance *EN321* Swelling after cyclic test	[%]	12	12	12	12	12	12	11	10	9	9
	Moisture resistance *EN 1087-1* Transverse tensile strength after boiling test	[N/mm²]	0.15	0.15	0.15	0.15	0.15	0.14	0.12	0.11	0.1	0.09

Surface properties		Unit	Value	
Surface flaws *EN 14323*	- points	[mm²/m²]	≤ 2	
	- Longitudinal	[mm/m]	≤ 20	
Behaviour when scratched *EN 14323*		[N]	≥ 1.5	
Resistance to staining *EN 14323*		[Stage]	≥ 3	
Susceptibility to cracking *EN 14323*		[Stage]	≥ 3	
Abrasion resistance *EN 14323* Different levels may be achieved depending on the configuration of the layer structure.		[rpm]	Class	IP
			1	< 50
			2	≥ 50
			3A	≥ 150
			3B	≥ 250
			4	≥ 350

Constructional data

Name	Value	Unit
Gross density EN 323	600 - 760	kg/m³
Tensile Bending strength (longitudinal) EN 310	7,5 - 18	N/mm²
Transverse tensile strength density EN 319	0,20 - 0,45	N/mm²
E-module (longitudinal) EN 310	1350 - 2550	N/mm²

Swelling 24h EN 317	10-17	%
Transverse tensile strength after cycle test in accordance EN321	0,09 - 0,25	N/mm²
Swelling after cyclic test EN321	11-15	%
Transverse tensile strength after boiling test EN 1087-1	0,06 – 0,08	N/mm²
Fire behaviour EN 13501-1; EN 13986	Standard: D-s2, d0 (≥ 9 mm, ≥ 600 kg/m³); SF-B: B-s1/s2, d0	
Airborne sound insulation EN13986	24-33	dB
Sound absorption 250 - 500 HZ EN 13986	0,1	
Sound absorption 1000 - 2000 HZ EN 13986	0,25	
Thermal conductivity EN 13986	0,11 - 0,14	W/(mK)
Biological durability EN 13986	-	
Formaldehyde emissions EN 717-1; EN ISO 12460-3	E1, E1-D2020; CARB*,	

	TSCA**	

Product performance values in compliance with the declaration of performance in relation to their main characteristics in accordance with *EN 312:2010-12, particleboards– Specifications* and *EN 14322:2017-07, Wood-based panels - Melamine-faced boards for interior uses - Definition, requirements and classification*.

***CARB** are certified in accordance with California Air Resource Board CARB regulation CCR-17-93129.2(a) - Phase 2.
****TSCA** products comply with formaldehyde class to TSCA Title VI – Formaldehyde Standard for Composite Wood Products Section 770.7

2.4 Delivery status

SWISS KRONO coated particleboards are available in the following size ranges (plant-specific):

Length: min. 1730 mm – max. 5600 mm
Width: min. 610 mm – max. 2620 mm
Thickness: min. 8 mm – max. 40 mm

Special sizes on request.

2.5 Base materials/Ancillary materials

SWISS KRONO melamine-coated particleboards consist of SWISS KRONO raw particleboards (approx. 98%) and decorative papers impregnated with melamine formaldehyde resin (approx. 2%).
SWISS KRONO raw particleboards contain no materials from the *ECHA list of materials which* are especially problematic for approval: Substances of Very High Concern – (SVHC) above a mass % of 0.1. They also do not contain Category 1A or 1B CMR materials which are on the candidate list above a mass of 0.1%. SWISS KRONO melamine-faced particleboards also contain no biocidal products in terms of *EU Biocidal Products Ordinance No. 528/2012* and are also not treated with biocidal products. Flame-resistant SWISS KRONO melamine-faced particleboards contain ammonium salt and alkali phosphate and sulphate-based flame retardants.

2.6 Manufacture

1) Laying of impregnated papers under or/and on top of a SWISS KRONO raw particle board.
2) Feeding a hot press with the impregnated papers and the Impregnate and the carrier board.
3) Pressing with structure providers under pressure and heat
4) Trimming of the boards
5) Quality control of the boards produced
6) Stacking, packaging and climatisation of the boards

2.7 Environment and health during manufacturing

SWISS KRONO Group particle board factories are fully integrated wood-based materials plants with their own biomass heating or power plants. Production-related waste materials can thus be expediently thermally recycled.
All noise-emitting parts of the plant such as the chipping and debarking drums are capsuled by constructional measures. Energy management is oriented towards the constant reduction of CO2 emissions at the factory site.

French factory (*ISO 9001; ISO 50001*)
Polish factory
(*ISO 9001; ISO 14001; ISO 50001*)
Swiss factory (*ISO 9001; ISO 14001*)

2.8 Product processing/Installation

SWISS KRONO coated particleboards can be processed and machined with normal woodworking machines.
SWISS KRONO coated particleboards should be checked for visual damage before processing. Various measures such as feed rate, tooth geometry and distribution, sawblade projection, sawblade chip space, etc. must be taken into account in order to achieve good cut quality. Dust masks should be worn when machining by hand without dust extraction.

2.9 Packaging

Wooden particleboards, fibreboards and corrugated cardboard are used as coverings and also PET or steel tape and packaging tape are used.

2.10 Condition of use

The composition of the finished products corresponds to the base materials listed in 2.5 Base materials.

2.11 Environment and health during use

No hazards or impairments to health are to be expected if SWISS KRONO coated particleboards are used normally and as intended. According to the current state of knowledge, no hazards for water, air/the atmosphere and soil can arise if used as intended.

2.12 Reference service life

The service life of SWISS KRONO coated particleboards depends on where they are deployed and is at least 50 years with correct use (according to the *BBSR table*).

2.13 Extraordinary effects

Fire
SWISS KRONO coated particleboards with/without flame retardant have the following fire behaviour (in accordance with *EN 13501-1; EN 13986*):

- Standard products (without flame retardant): D-s2, d0 ($\geq$ 9mm/ Bulk density $\geq$ 600 kg/m³)
- SF-B products (Stop Fire Board, with flame retardant): B-s1/s2, d0

Fire Protection

Name	Value
Building material class	B-D
Burning droplets	d0
Smoke gas development	s1-s2

Water
The product contains no substances which would contaminate water through being washed out. The products must be protected against continuous exposure to moisture since the long-term effects of water lead to the destruction of the composite panel.

Mechanical destruction
The product is brittle under mechanical stress. Splintering and sharp broken edges can form. Resistance to mechanical effects corresponds to the respective board type.

2.14 Re-use phase
Reuse/further use
If SWISS KRONO coated particleboards are correctly sorted on dismantling they can be recycled as a wood-based material in accordance with the cascade.

Reuse
If SWISS KRONO coated particleboards are correctly sorted they can be broken down and added to the manufacturing process. SWISS KRONO coated particleboards can be thermally recycled due to their high heating value because they consist mainly of natural wood. A heating system which is officially approved for this application area is a requirement. Thermal use should, however, remain the use option of last resort in terms of the sustainability of cascading use.

2.15 Disposal
Residues which accrue after working and processing coated SWISS KRONO boards should be first and foremost mainly reused or recycled. These measures are preferable to incineration. Waste code: 17 02 01/ 03 01 05 according to the European Waste Catalogue (*EWC*).
Packaging: Paper or cardboard transport packaging, protective boards and plastic or steel bands can be recycled if sorted correctly. External disposal can be arranged with the manufacturer in individual cases.

2.16 Further information
Further information is available at www.swisskrono.com

3. LCA: Calculation rules

3.1 Declared Unit
The declaration refers to the manufacture of 1m2 of coated particle board with a weight of 11.6 kg/m2.

Angabe der deklarierten Einheit

Name	Value	Unit
Declared unit	1	m^2
conversion factor [Mass/Declared Unit] zu 1 kg	11.6	-
Layer thickness	0.0002	m
Grammage	11.6	kg/m^2
Bulk density	656	kg/m^3

Declaration type in accordance with PCR Part A:
1. Manufacturer's declaration:
1d) Declaration of an average product from several plants of one manufacturer.

3.2 System boundary
This is a cradle to factory gate declaration with options. The lifecycle analysis for the products under examination covers the production stage processes (building construction stage) and also credits and impacts beyond the boundary of the product system. The systems thus contain the following stages in accordance with *EN 15804*:
Product stage (Modules A1-A3):
- A1 Raw material provision and processing and working processes of secondary materials serving as input
- A2 Transport to manufacturer,
A3 Manufacturing – building construction
A5 Assembly (just the disposal of the packaging material for the product).
End of life stage:
C3 Waste treatment
Credits and impacts beyond the system boundary:
D Reuse, recovery or recycling potential

In accordance with *EN 15804*, the boundary between waste disposal in the first system examined and the downstream system (Module D) is defined at the point at which the secondary material reaches its end-of-waste status. The end-of-waste status is defined as the point at which energy is produced.

3.3 Estimates and assumptions
It is assumed that the product can be energetically recycled after use. The assumption that thermal energy and electricity are substituted in accordance with the EU 28 mix corresponds to realistic circumstances as it can be assumed that the boards are recycled within the territory of the EU.
The credit for thermal energy is calculated from data record "EU-28: Thermal energy from natural gas PE" and the credit for electricity from data record "EU-28: Electricity mix PE".

3.4 Cut-off criteria
All data from the operating data collection is included. An anti-adhesive agent and a wetting agent used in the Polish plant have been disregarded. The share of these two in relation to total production is significantly below 1 %. It can therefore be assumed that the total of the processes not included does not exceed 5% of the impact categories and that the cutoff criteria are fulfilled in accordance with *EN 15804*. Chopping and sorting before incineration was also not included.

3.5 Background data
All other relevant background data was taken from the GaBi software database (*GABI 2020.1*) and is not more than 10 years old. The GaBi data used was collected under consistent temporal and methodological framework conditions.

3.6 Data quality
Data for the product under examination was collected directly at the three sites for the period from 2017 to 2018 based on a questionnaire compiled by the Sphera consulting company. The input and output data was provided by SWISS KRONO and checked for plausibility. It can therefore be assumed that the representativeness of the data is good

3.7 Period under review
All primary data from the SWISS KRONO operating data collection (three sites: CH, FR, PL) was included.

The manufacturing data of the companies represents an average for the years from 2017 to 2018. The actual transport distances were used for all inputs and outputs

3.8 Allocation

Energy credits for electricity and thermal energy produced in the biomass power station in the end-of-life stage are added according to the heat value of the input, whereby the efficiency of the plant is also included.
Input-dependent emissions (e.g. CO2, HCl, SO2 or heavy metals) in the end-of-life stage are calculated according to the material composition of the ranges brought in. Technology-dependent emissions (e.g. CO) are added according to the exhaust gas quantity.
Waste is also added to production in full.

With sawmill waste wood, the forest process and associated transport are added to the wood according to the volume share (or dry mass). A calculation key is applied in the manufacturer's controlling to delimit the material flows of other products manufactured in the factory. The respective input and output flows are accordingly allocated to products according to volume.

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.

Background data was taken from the *GaBi 2020.1 software database (SP 40.0/ GUP 14.0).*

4. LCA: Scenarios and additional technical information

In accordance with *EN 15804*, the boundary between waste disposal in the first system examined and the downstream system (Module D) is defined at the point at which the secondary material reaches its end-of-waste status. The end-of-waste status is defined at the point at which energy is produced. The resulting effects are declared in Module C and the credits are declared in Module D.
After the product has reached end-of-life status it is assumed that the wood and paper part (85%) of the product is incinerated as biomass (EU 28 average) which produces thermal energy and electricity. The remains are burnt in an incineration plant for urea-formaldehyde (worst case scenario). The old wood content of the product produces no credits as this material enters production without impacts.

It is assumed that the product was not treated or serviced with chemicals during the use period; for this reason, biomass incineration is assumed to be suitable. It is assumed that the product can be energetically recycled after use with a heat value of < 18.4 MJ/kg (at average wood moisture of 16.5%). Through increasing the moisture of the product during use the heat value is lower than the heat value of the product directly after manufacture.
Since incineration in a biomass power station is assumed by this study, it can be assumed that R1 > 0.6 as the efficiency of biomass plants is generally greater than 0.6.
The biogenic carbon content of the product is 17.10 kg CO2 eq.

Installation into the building (A5)

Name	Value	Unit
Output substances following waste treatment on site	0.124	kg
Carton	1.21E-01	kg
Plastik	1.56E-03	kg
Stahl Band	1.04E-03	kg

Waste processing (C3)

Name	Value	Unit
Energy recovery	11.6	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	X	MND	MND	MNR	MNR	MNR	MND	MND	MND	MND	X	MND	X

RESULTS OF THE LCA - ENVIRONMENTAL IMPACT according to EN 15804+A1: 1 m2 coated particle board

Parameter	Unit	A1-A3	A5	C3	D
Global warming potential	[kg CO_2-Eq.]	-1.44E+1	1.35E-1	1.99E+1	-8.66E+0
Depletion potential of the stratospheric ozone layer	[kg CFC11-Eq.]	5.29E-12	2.31E-17	2.08E-15	-1.37E-13
Acidification potential of land and water	[kg SO_2-Eq.]	1.56E-2	2.64E-5	3.22E-2	-1.05E-2
Eutrophication potential	[kg $(PO_4)^{3-}$-Eq.]	4.06E-3	5.92E-6	6.02E-3	-1.38E-3
Formation potential of tropospheric ozone photochemical oxidants	[kg ethene-Eq.]	5.27E-3	1.69E-6	3.88E-3	-1.03E-3
Abiotic depletion potential for non-fossil resources	[kg Sb-Eq.]	8.26E-7	2.40E-10	3.64E-8	-1.65E-6
Abiotic depletion potential for fossil resources	[MJ]	8.05E+1	1.04E-2	5.28E+0	-1.19E+2

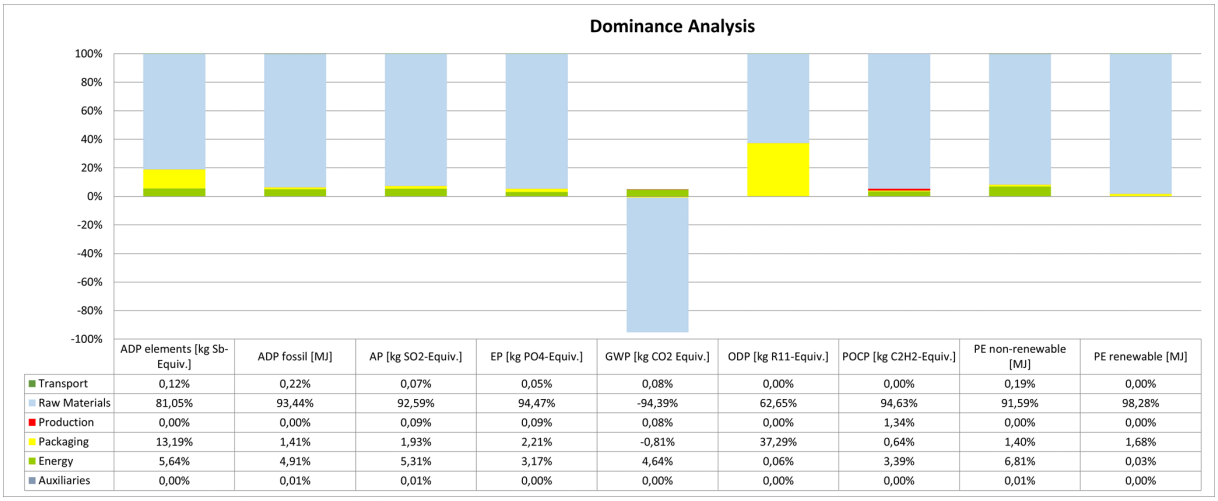
RESULTS OF THE LCA - INDICATORS TO DESCRIBE RESOURCE USE according to EN 15804+A1: 1 m2 coated particle board

Parameter	Unit	A1-A3	A5	C3	D
Renewable primary energy as energy carrier	[MJ]	2.22E+2	2.01E+0	1.61E+1	-3.66E+1
Renewable primary energy resources as material utilization	[MJ]	1.77E+1	-2.01E+0	-1.57E+1	IND
Total use of renewable primary energy resources	[MJ]	2.40E+2	2.91E-3	4.06E-1	-3.66E+1
Non-renewable primary energy as energy carrier	[MJ]	9.01E+1	9.24E-2	8.20E+0	-1.51E+2
Non-renewable primary energy as material utilization	[MJ]	2.83E+0	-6.90E-2	-2.72E+0	IND
Total use of non-renewable primary energy resources	[MJ]	9.29E+1	2.34E-2	5.48E+0	-1.51E+2
Use of secondary material	[kg]	2.60E+0	IND	IND	IND
Use of renewable secondary fuels	[MJ]	IND	IND	IND	IND
Use of non-renewable secondary fuels	[MJ]	IND	IND	IND	IND
Use of net fresh water	[m^3]	2.86E-2	4.56E-4	2.12E-2	-4.23E-2

RESULTS OF THE LCA – WASTE CATEGORIES AND OUTPUT FLOWS according to EN 15804+A1: 1 m2 coated particle board

Parameter	Unit	A1-A3	A5	C3	D
Hazardous waste disposed	[kg]	1.29E-6	1.29E-10	3.35E-9	-6.04E-8
Non-hazardous waste disposed	[kg]	6.89E-2	4.70E-3	1.08E-1	-7.37E-2
Radioactive waste disposed	[kg]	4.60E-3	5.15E-6	7.87E-5	-1.25E-2
Components for re-use	[kg]	IND	IND	IND	IND
Materials for recycling	[kg]	IND	IND	IND	IND
Materials for energy recovery	[kg]	IND	IND	IND	IND
Exported electrical energy	[MJ]	0.00E+0	1.02E-2	0.00E+0	5.09E+1
Exported thermal energy	[MJ]	0.00E+0	1.32E-2	0.00E+0	7.34E+1

6. LCA: Interpretation



	ADP elements [kg Sb-Equiv.]	ADP fossil [MJ]	AP [kg SO2-Equiv.]	EP [kg PO4-Equiv.]	GWP [kg CO2 Equiv.]	ODP [kg R11-Equiv.]	POCP [kg C2H2-Equiv.]	PE non-renewable [MJ]	PE renewable [MJ]
Transport	0,12%	0,22%	0,07%	0,05%	0,08%	0,00%	0,00%	0,19%	0,00%
Raw Materials	81,05%	93,44%	92,59%	94,47%	-94,39%	62,65%	94,63%	91,59%	98,28%
Production	0,00%	0,00%	0,09%	0,09%	0,08%	0,00%	1,34%	0,00%	0,00%
Packaging	13,19%	1,41%	1,93%	2,21%	-0,81%	37,29%	0,64%	1,40%	1,68%
Energy	5,64%	4,91%	5,31%	3,17%	4,64%	0,06%	3,39%	6,81%	0,03%
Auxiliaries	0,00%	0,01%	0,01%	0,00%	0,00%	0,00%	0,00%	0,01%	0,00%

The following interpretation contains a summary of the LCA results in relation to a declared unit of 1 m2 coated particle board. The dominance analysis regards Modules A1-A3 only.
Abiotic depletion potential for non-fossil resources (ADPE) is mainly dominated by the raw materials (81.05%).
For abiotic depletion potential for fossil resources (ADPF) the greatest influence is the urea-formaldehyde adhesive (input in raw and coated particle board (impregnation)).
Acidification and eutrophication potential (AP, EP) are dominated by energy provision in raw particleboards (SO2 and NOx emissions).
Global warming potential (GWP) has a particular status as negative values accrue in the analysis in Modules A1–A3 through the sequestration of carbon dioxide in wood.
The storage of carbon dioxide during the growth of trees is reflected in the raw material provision.
This stored carbon dioxide is released again during incineration in the end-of-life phase. The largest driver of global warming is the production of thermal energy because the burning of waste wood and natural gas releases large quantities of CO2. The ozone depletion potential (ODP) is caused almost exclusively by packaging (corrugated board) in Switzerland, France and Poland. Methyl chloride emissions play a significant role here.
Consumption of non-renewable primary energy as energy carrier (PENRE) is mainly caused by the raw materials (approx. 92%).
The primary energy requirement from renewable energy carriers (PERE) is more than 85% attributable to the provision of wood. The need for renewable energy carriers in the provision of raw materials is caused to a large extent by the provision of roundwood.

7. Requisite evidence

7.1 Formaldehyde

Measuring body: WKI Fraunhofer Wilhelm-Klauditz-Institut Prüf-, Überwachungs- und Zertifizierungsstelle, Braunschweig, D.
Test reports and date: QA-2021-0124 , SWISS KRONO E1 coated particle board, 22/01/2021
Results: The formaldehyde content was checked in accordance with *EN 717-1*. The result is: 0.012 mg/m³ / 0.01 ppm. Board thickness examined: 18 mm. (Representative for the entire thickness range).

7.2 MDI

Measuring body: Entwicklungs- und Prüflabor Holztechnologie GmbH, Dresden
Test report and date: 2520239/2, SWISS KRONO raw particle board, 03/09/2020
Results: The examination was carried out based on *RAL DE-UZ-76*, *DIN EN 16516*. MDI emissions were below the detection threshold (< 0.1 µg/m³) of the analytic process.

7.3 Test for pre-treatment of raw materials

In accordance with *EU Directive 2021/277:*
Measuring body: Entwicklungs- und Prüflabor Holztechnologie GmbH, Dresden
Test report and date: 2520239/2, SWISS KRONO raw particle board, 03/09/2020
Results: Pentachlorophenol (PCP) is below the detection threshold; heavy metals are below the threshold levels of the Waste Wood Ordinance - *Waste Wood V* Appendix II Polychlorinated biphenyls: Individual values smaller than the detection threshold, therefore not calculated (total chlorine compounds 122 mg/kg (threshold value 600 mg/kg), total fluorine compounds 32.6 mg/kg (threshold value 100 mg/kg)

7.4 Toxicity of flue gases

Measuring body: Energie- und Prozesstechnik Aachen GmbH, Solingen
Test reports and date: 0018/2021, 0019/2021, 0020/2021 of 18/10/2021

Results: SWISS KRONO P2 coated particleboards with and without flame retardants were tested. The results to *DIN 53436* show that no chlorine and sulphur compounds could be detected. The gaseous emissions released under the selected test conditions are mainly equivalent to the emissions which are released from wood under the same conditions.

7.5 VOC emissions

Measuring body: Fraunhofer Institut für Holzforschung Wilhelm-Klauditz-Institut.
Test report and date: MAIC-2016-3412, 10/08/2016, SWISS KRONO coated particle board; Test basis - determination of volatile organic compound emissions in accordance with the AgBB schema, *ISO 16000*, Parts 3, 6, 9 and 11.
Results: The product examined fulfils the requirements of the AgBB schema. The material examined fulfil the requirements of the principles for the health-related assessment of building products after three days and the demolition criteria after seven days (*AgBB schema* 2015).

AgBB Overview of results (7 days [µg/m³])

Name	Value	Unit
TVOC (C6 - C16)	19	µg/m³
Sum SVOC (C16 - C22)	0	µg/m³
R (dimensionless)	0.115	-
VOC without NIK	0	µg/m³
Carcinogenic Substances	0	µg/m³

AgBB Overview of results (3 days [µg/m³])

Name	Value	Unit
TVOC (C6 - C16)	19	µg/m³
Sum SVOC (C16 - C22)	0	µg/m³
R (dimensionless)	0.115	-
VOC without NIK	0	µg/m³
Carcinogenic Substances	0	µg/m³

8. References

Standards

EN 310
DIN EN 310:1993-08, Wood-based panels; Determination of modulus of elasticity in bending and of bending strength.

EN 312
DIN EN 312:2010-12, Particleboards - Specifications.

EN 317
DIN EN 317:1993-08, Particleboards and fibreboards; Determination of swelling in thickness after immersion in water.

EN 319
DIN EN 319:1993-08, Particleboards and fibreboards, Determination of tensile strength perpendicular to the plane of the board.

EN 321
DIN EN 321: 2002-03, Wood-based panels - Determination of moisture resistance under cyclic test conditions.

EN 323
DIN EN 323:1993, Wood-based panels; determination of density.

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

EN 1087-1
DIN EN 1087-1:1995, Particleboards - Determination of moisture resistance - Part 1: Boil test.

ISO 9001
DIN EN ISO 9001:2015-11, Quality management systems– Requirements.

ISO 12460-3
DIN EN 12460-3:2016-03, Wood-based panels - Determination of formaldehyde release - Part 3: Gas analysis method.

EN 13501-1
DIN EN 13501-1:2019-05, Fire classification of construction products and building elements - Part 1: Classification using data from reaction to fire tests.

EN 13986
DIN EN 13986:2015-06, Wood-based panels for use in construction - Characteristics, evaluation of conformity and marking.

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

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

EN 14322
DIN EN 14322:2017-07, Wood-based panels - Melamine-faced boards for interior uses - Definition, requirements and classification

EN 15804
DIN EN 15804:2020-03, Sustainability of construction works - Environmental product declarations - Core rules for the product category of construction products.

ISO 16000-3
ISO 16000-3:2011-10, Indoor Air - Part 3: Measurement of formaldehyde and other carbonyl compounds in indoor air and test chamber air - Active sampling method.

ISO 16000-6
ISO 16000-6:2011-12, Indoor air - Part 6: Determination of volatile organic compounds in indoor and test chamber air by active sampling on Tenax TA® sorbent, thermal desorption and gas chromatography using MS or MS-FID.

ISO 16000-9
ISO 16000- 9:2006-02, Indoor Air Pollution - Part 9: Determination of the emission of volatile organic compounds from building products and furnishing – Emission test chamber method.

ISO 16000-11
ISO 16000- 11:2006-02, Indoor Air - Part 11: Determination of the emission of volatile organic compounds from building products and furnishings – Sampling, storage of samples and preparation of test specimens.

EN 16516
DIN EN 16516:2020-10, Construction products: Assessment of release of dangerous substances - Determination of emissions into indoor air.

ISO 50001
DIN EN ISO 50001:2018-12, Energy management systems– Requirements with guidance for use.

DIN 53436
DIN 53436:2015-12, Generation of thermal decomposition products from materials for their analytic-toxicological testing.

Further literature
AgBB schema
Procedure for assessing the impact of emissions of volatile organic compounds (VVOC, VOC and SVOC) from building products on health; committee for assessing the effects of building products on health.

Waste Wood Ordinance
Ordinance on requirements for the recycling and disposal of waste wood - Waste Wood Ordinance (AltholzV), Appendix IV - requirements for analytics for woodchips and shavings for manufacturing wood-based materials.

BBSR table
BBSR table on the useful life of components for lifecycle analyses according to the sustainable building assessment system, Federal Ministry of the Interior, Building and Community, last updated: 24/02/2017.

Ordinance on Biocidal Products
EU Ordinance 528/2012 of the European Parliament and Council of 22nd May 2012 on the Provision on the Market and Use of Biocidal Products.

CARB
CARB - Final regulation order Section 93120-931120.12, title 17, California Code of Regulations: “Airborne toxic control measurement to reduce formaldehyde emissions from composite wood products”.

CPR
CPR - EU Ordinance No. 305/2011 of the European Parliament and Council of 9th March 2011 to define harmonised conditions for marketing building products (EU-BauPVO).

EAK
European Waste Catalogue (EWC) in the version of the Commission’s decision of 2001/118/EC dated 16th January 2001 to modify decision 2000/532/EC on a waste catalogue.

ECHA List
ECHA List: List of materials which are especially problematic for approval (ECHA candidate list), 19/01/2021, published in accordance with Article 59 Paragraph 10 of the REACH regulations. Helsinki: European Chemicals Agency.

GABI 2020.1
GaBi 2020.1 (SP 40.0 / GUP 14.0). Software and database for integrated lifecycle assessment. LBP, University of Stuttgart and Sphera,(http://documentation.gabi-software.com/)

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

IBU programme instructions
General instructions for Institut Bauen und Umwelt e.V.’s EPD programme (general instructions for the IBU EPD programme), version 2.0.2021.

PCR:
Product category rules for building-related products and services. Part B: Requirements of environmental product declarations for wood-based materials, Version 1.7. Berlin: Institut Bauen und Umwelt e.V.(Ed.), 07/01/2019.

PCR Part A
Product category rules for building-related products and services. Part A: Calculation rules for the LCA and requirements of the background report. Version 1.8. Berlin: Institut Bauen und Umwelt e.V.(Ed.), 04/07/2019.

RAL DE-UZ-76
RAL DE-UZ-76:2010-02, Low-emission panel-shaped materials (building and furniture panels) for interior construction.

TSCA
TSCA Title VI - US EPA 40 CFR Part 770 "Formaldehyde Emission Standards for Composite Wood Products", Title VI to the Toxic Substances Control Act (TSCA) - ‘TSCA Title VI’, para 40 CFR § 770.10 (b).

EU Ordinance 2021/277
Delegated EU ordinance 2021/277 of the European Commission of 16th December 2020 to modify Appendix I of EU ordinance 2019/1021.

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