

# ENVIRONMENTAL PRODUCT DECLARATION

as per ISO 14025 and EN 15804

Owner of the Declaration	<b>Unilin Division Panels</b>
Programme holder	Institut Bauen und Umwelt e.V. (IBU)
Publisher	Institut Bauen und Umwelt e.V. (IBU)
Declaration number	EPD-UNI-20150019-IBA1-EN
Issue date	09/06/2015
Valid to	08/06/2020

## Particle board - Belspan P2, Stellwand, Liso **UNILIN**

[www.bau-umwelt.com](http://www.bau-umwelt.com) / <https://epd-online.com>



## 1. General Information

### UNILIN DIVISION PANELS

#### Programme holder

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

#### Declaration number

EPD-UNI-20150019-IBA1-EN

#### This Declaration is based on the Product Category Rules:

Wood based panels, 07.2014  
 (PCR tested and approved by the SVR)

#### Issue date

09/06/2015

#### Valid to

08/06/2020



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



Dr. Burkhard Lehmann  
 (Managing Director IBU)

### PARTICLE BOARD

#### Owner of the Declaration

UNILIN division Panels  
 Ingelmunstersesteenweg 229  
 8780 Oostrozebeke

#### Declared product / Declared unit

The declared product is 1m³ of particle board.

#### Scope:

This EPD refers to the production of 1 m³ of particle board. This product is available under different brand names: Liso, Belspan and Stellwand. Production site is in Wielsbeke, Belgium.

The owner of the declaration shall be liable for the underlying information and evidence; the IBU shall not be liable with respect to manufacturer information, life cycle assessment data and evidences.

#### Verification

The CEN Norm /EN 15804/ serves as the core PCR

Independent verification of the declaration  
 according to /ISO 14025/

☐ internally ☒ externally



Dipl. Geog. Stefan Seum  
 (Independent verifier appointed by SVR)

## 2. Product

### 2.1 Product description

This Environmental Product Declaration refers to the production of 1m³ particle board.

A particle board is a wood based panel that consists of 3 layers: Two surface layers with a fine structure and in between a core layer which has a coarse structure.

The particleboard is manufactured from wood particles that are bonded together by the use of a thermohardening glue. The wood particles and the glue are mixed together with additives (e.g.hardeners) and compressed at high pressure and temperature into a wooden panel.

### 2.2 Application

Particle board is used as a base material in the furniture industry (e.g. for kitchen, bathroom furniture). The surface allows many different types of coatings to be applied.

Besides the furniture industry, it is also used as a decorative or constructive element in the building industry (e.g. as construction board, concrete shuttering).

### 2.3 Technical Data

#### Constructional data

Name	Value	Unit
Gross density acc. to EN 323:1994	600 - 700	kg/m³

Bending strength (longitudinal) EN 310	11	N/mm²
E-module (longitudinal) EN 310	1600	N/mm²
Tensile strength rectangular EN 319	0.35	N/mm²

Thickness: 20mm +-10%

### 2.4 Placing on the market / Application rules

The product complies with the requirements of table 3 in the /EN 312/.

### 2.5 Delivery status

The most common standard sizes are (length, width) : 2440 mm\*1220 mm / 3050 mm\*1220 mm. Other dimensions are also possible according to client specifications.

The product is available in thicknesses ranging from 8 to 50 mm.

### 2.6 Base materials / Ancillary materials

The main components of the particle board are wood particles. These particles are produced from virgin wood and/or recycled wood. The recycled wood comes from post-consumer recycled wood. The amount of recycled wood is approx. 50% of the total wood content. The wood is taken from /PEFC/ (Programme for the Endorsement of Forest Certification Schemes certified sources). Urea-formaldehyde-glue is used to bond the wood particles. Wax is added as a water repellent agent.

A board typically consists of

- Wood : 84%
- Binder (glue) : 10%
- Moisture (water) : 6%
- Wax : 0,5%

The product contains one substance (formaldehyde) which is included in the current 'Candidate List of Substances of Very High Concern for Authorization' /REACH/.

## 2.7 Manufacture

- 1) Wood preparation : The fresh wood is bought in logs or woodchips and needs no pre-treatment before entering the process. The recycled wood can contain contamination(e.g. metals, rubber, glass,...) and is therefore first cleaned in a high performance cleaning installation that will separate the contaminants from the wood. After this pre-treatment step, the recycled wood will follow the same procedure as the fresh wood.
- 2) Preparation of the wood chips : Logs are first cut into woodchips.  
Recycled wood is crushed into smaller woodchips. These chips are then further refined into smaller wood particles
- 3) The particles are dried.
- 4) The surface particles are separated from the core particles by sieving techniques.
- 5) The glue is applied to the core and surface particles separately.
- 6) A three layer mat of glued particles is formed and pressed in a continuous hotpress.
- 7) The endless board that leaves the press is cut into masterboards.
- 8) Sanding of both surfaces of the boards.
- 9) Cutting to size of the boards, then packaging and finally storing.

## 2.8 Environment and health during manufacturing

The production conditions do not demand any special health protection measures over and beyond those designated by Belgium authorities.

## 2.9 Product processing/Installation

Particleboard can be machined using standard equipment that is used in the woodworking industry. This can be the type of industrial machinery as well as the standard handmachines suited for wood, used in DIY.

The normal safety precautions need to be taken (safety glasses, dustmasks when there is dust production).

## 2.10 Packaging

The boards are stacked and placed on wooden beams. The beams are bonded to the boards using straps (plastic, metal).  
The boards are to be stored in a dry environment without exposing them to rain or high moisture.

## 2.11 Condition of use

The substantial composition during the use phase refers to the composition during the manufacturing. The conditions of use are described in the producer's documentation. See <http://www.unilinpanels.com/>.

## 2.12 Environment and health during use

Environmental protection: When the products are used as designated and according to the current state of knowledge, there are no hazards for water, air and soil.

Health protection: When used in accordance with the designated purpose, no health risks or restrictions are to be anticipated by particle boards in line with the current state of knowledge.

## 2.13 Reference service life

Due to the many application areas it is not possible to define a product reference service life.

## 2.14 Extraordinary effects

### Fire

According to EN 13501 - 1 the particle board has the following performances: D-S2-d0.

### Fire protection

Name	Value
Building material class	D
Burning droplets	d0
Smoke gas development	S2

### Water

The particle board is intended to be used in dry conditions (humidity of 65% only a few weeks a year and a temperature of 20°C /EN 1995 -1-1/).  
If the particle board comes in contact with water, the panel will swell and will lose its mechanical properties. No ingredients are washed out which could be hazardous to water.

### Mechanical destruction

In case of mechanical destruction, sharp edges can arise at points of rupture.

## 2.15 Re-use phase

UNILIN particle boards leftovers which arise on the construction site as well as those from deconstruction measures should primarily be routed to a material utilisation stream. If this is not possible, then they should be used for energy utilisation rather than being placed in the landfill.

## 2.16 Disposal

UNILIN particle boards leftovers which arise on the construction site as well as those from deconstruction measures should primarily be routed to a material utilisation stream. In Belgium waste wood shall not be landfilled, but re-used in accordance with the VLAREMA.

Classification according to /EWC/: 17 02 01

The local requirements for waste disposal and recycling shall always be followed

## 2.17 Further information

For more information on the particle boards, please visit us at Unilin's website: [www.Unilinpanels.com](http://www.Unilinpanels.com).

# 3. LCA: Calculation rules

### 3.1 Declared Unit

The declared unit is 1 m<sup>3</sup> of particle board (density 675kg/m<sup>3</sup>).

#### Declared unit

Name	Value	Unit
Declared unit	1	m <sup>3</sup>
Conversion factor to 1 kg	0.00148	-
Mass reference	675	kg/m <sup>3</sup>

### 3.2 System boundary

Type of EPD: cradle-to-gate with options

1a) Declaration of a specific product from a manufacturer's plant.

Modules A1-A3 include processes that provide materials and energy input for the system, manufacturing and transport processes up to the factory gate, as well as waste processing. Processes for the preparation of recycled wood are included (cleaning, shredding).

The end of life scenario assumes that post-consumer particle board waste reaches the end-of-waste state and is 100% incinerated in a European biomass power plant.

Module D includes benefits from all net flows in the end-of-life stage that leave the product boundary system after having passed the end-of-waste state. In module C3 only the release of biotic CO<sub>2</sub> is declared. Loads from material incineration (excluding biotic CO<sub>2</sub> emissions) and resulted energy credits are declared within module D.

### 3.3 Estimates and assumptions

Specific life cycle inventories are available for all input materials.

Particle boards are commonly used as secondary material for energy recovery. They reach the end-of-waste state after being dismantled in a building. The end of life scenario in this EPD is based on the assumption that post-consumer waste is 100% incinerated in a European biomass power plant.

### 3.4 Cut-off criteria

In the assessment, all available data from the production process are considered, i.e. all raw

materials used, utilized thermal energy, and electric power consumption using best available LCI datasets. Packaging materials and auxiliary materials for cutting and sanding are not considered in the LCA due to negligible amounts (<0.1%). But besides these materials, all material and energy flows contributing also less than 1% of mass or energy are considered. The sum of the excluded material flows does not exceed 5% of mass, energy or environmental relevance.

### 3.5 Background data

For life cycle modeling of the considered products, the GaBi Software System for Life Cycle Engineering, developed by PE INTERNATIONAL AG, has been used. All relevant background datasets are taken from the /GaBi 6/ software database. The datasets from the GaBi database are documented in the online documentation /GaBi 6 2012/.

### 3.6 Data quality

The data quality can be described as good. The primary data collection was done thoroughly, all flows were considered. Technological, geographical and temporal representativeness is given. Primary data refers to the year 2013. Background datasets are taken from the /Gabi 6/ software database. The last update of the database was in 2013.

### 3.7 Period under review

The period under review is the year 2013.

### 3.8 Allocation

The overall production of Unilin comprises further products beside the product considered in this study. Data for thermal and electrical energy as well as auxiliary material refer to the declared product. During data collection the allocation is done via volume (m<sup>3</sup>). Specific information on allocation within the background data is given in the GaBi dataset documentation. (<http://www.gabi-software.com/databases/>).

### 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.

## 4. LCA: Scenarios and additional technical information

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

Scenario: 100% of particle board (675kg/m<sup>3</sup>) to energy recovery in an European biomass power plant.

Name	Value	Unit
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## 5. LCA: Results

In module C3 only the release of biotic CO<sub>2</sub> is declared. Loads from material incineration (excluding biotic CO<sub>2</sub> emissions) and resulted energy credits are declared within module D.

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

PRODUCT STAGE			CONSTRUCTION PROCESS STAGE		USE STAGE							END OF LIFE STAGE				BENEFITS AND LOADS BEYOND THE SYSTEM BOUNDARIES
Raw material supply	Transport	Manufacturing	Transport from the gate to the site	Assembly	Use	Maintenance	Repair	Replacement <sup>1)</sup>	Refurbishment <sup>1)</sup>	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: 1m<sup>3</sup> UNILIN particle board

Parameter	Unit	A1-A3	C3	D
Global warming potential	[kg CO <sub>2</sub> -Eq.]	-8.45E+2	1.05E+3	-6.04E+2
Depletion potential of the stratospheric ozone layer	[kg CFC11-Eq.]	1.38E-7	IND	-2.98E-7
Acidification potential of land and water	[kg SO <sub>2</sub> -Eq.]	7.05E-1	IND	-4.71E-1
Eutrophication potential	[kg (PO <sub>4</sub> ) <sup>3</sup> -Eq.]	3.93E-1	IND	7.79E-3
Formation potential of tropospheric ozone photochemical oxidants	[kg ethene-Eq.]	2.31E-1	IND	6.25E-2
Abiotic depletion potential for non-fossil resources	[kg Sb-Eq.]	2.26E-4	IND	-6.81E-5
Abiotic depletion potential for fossil resources	[MJ]	3.17E+3	IND	-9.12E+3

### RESULTS OF THE LCA - RESOURCE USE: 1m<sup>3</sup> UNILIN particle board

Parameter	Unit	A1-A3	C3	D
Renewable primary energy as energy carrier	[MJ]	1.71E+3	IND	IND
Renewable primary energy resources as material utilization	[MJ]	1.05E+4	IND	IND
Total use of renewable primary energy resources	[MJ]	1.22E+4	IND	-1.42E+3
Non-renewable primary energy as energy carrier	[MJ]	3.32E+3	IND	IND
Non-renewable primary energy as material utilization	[MJ]	6.48E+2	IND	IND
Total use of non-renewable primary energy resources	[MJ]	3.97E+3	IND	-1.19E+4
Use of secondary material	[kg]	3.05E+2	IND	IND
Use of renewable secondary fuels	[MJ]	0.00E+0	IND	IND
Use of non-renewable secondary fuels	[MJ]	0.00E+0	IND	IND
Use of net fresh water	[m <sup>3</sup> ]	6.37E-1	IND	-2.72E+0

### RESULTS OF THE LCA – OUTPUT FLOWS AND WASTE CATEGORIES: 1m<sup>3</sup> UNILIN particle board

Parameter	Unit	A1-A3	C3	D
Hazardous waste disposed	[kg]	3.07E-1	IND	-1.07E+0
Non-hazardous waste disposed	[kg]	1.46E+1	IND	8.15E+0
Radioactive waste disposed	[kg]	3.17E-1	IND	-1.12E+0
Components for re-use	[kg]	IND	IND	IND
Materials for recycling	[kg]	IND	IND	IND
Materials for energy recovery	[kg]	IND	IND	IND
Exported electrical energy	[MJ]	IND	IND	IND
Exported thermal energy	[MJ]	IND	IND	IND

## 6. LCA: Interpretation

The negative value in the production stage is determined by the CO<sub>2</sub> bound in wood. This CO<sub>2</sub> is locked in the wooden product until it is released into the atmosphere in the EoL-incineration process. The release of biotic CO<sub>2</sub> is declared in C3 (carbon neutrality).

The Global warming potential (GWP) value in life cycle stage D is the sum of loads and benefits for the next product system. In this stage the loads are determined by the incineration process of the panel (excluding biotic CO<sub>2</sub> emissions which are declared in C3) and the benefits by energy substitution of fossil fuels. The overall GWP of D results in a negative value.

### Production stage (A1-A3):

The environmental impact categories (except GWP) and the non-renewable primary energy demand are mainly determined by the production of resin in the supply chain and the energy consumption necessary for the described production step.

For Abiotic depletion potential for non fossil resources (ADP elements), ADP fossil, Eutrophication potential (EP) and Primary energy (PE) non-renewable the impact from resin is most important, followed by the environmental impact caused by energy consumption. Depletion potential of the stratospheric ozone layer (ODP) and Acidification potential (AP) are mainly determined by the environmental impact of the energy consumption.

For formation potential of tropospheric ozone photochemical oxidants (POCP) the formaldehyde emissions from the production process and the environmental impact from energy consumption are very important. The wood plays an important role in GWP. The negative value for GWP in A1-A3 results from the greenhouse gas carbon dioxide which is incorporated via photosynthesis and locked in the wood during the

use stage of the product. In the category GWP the environmental impact (positive value) of resin and energy consumption in the production stage is fairly important. The overall CO2 balance for A1-A3 is negative. PE renewable is mainly determined by the wood (approx. 80%) and thermal energy from renewable resources (approx. 20%).

## 7. Requisite evidence

### 7.1 Formaldehyde

The product fulfills the requirement according to EN 120 (1992) (Perforator method) and EN 717-1 (2004) (Chamber method).

### 7.2 VOC emissions:

The product fulfills the requirements according to /ZEK 01.4-08/. Test report of TÜV Rheinland - report nr. AZ152640.

### 7.3 Lindan/PCP

The concentration of Lindan/PCP is determined by means of gas chromatography (GC-ECD)

after extraction by ethyl alcohol - internal procedure /PT-08-D61/. Report nr. 30842-3-1-E.

### 7.4 FSC certificate:

The product fulfills the requirements according to /FSC-STD-40-004/ V2.1: FSC Standard for Chain of Custody Certification.

### 7.5 PEFC certificate:

The product fulfills the requirements according to PEFC ST 2002: 2013: "Chain of Custody of Forest Based Products - Requirements".

## 8. References

### EN 312

EN 312:2010: Particleboards - Specifications;

### EN 319

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

### EN 310

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

### EN 323

EN 323:1994 - Wood-based panels - Determination of density.

### EN 13501

EN 13501 - 1+A1:2009: Fire classification of construction products and building elements - Part 1: Classification using data from reaction to fire tests.

### Formaldehyde:

Testreport of CTIB - Report nr. 140324-1-E to nr. 140324-4-E: Determination of the content of formaldehyde (perforator method).  
 Testreport of CTIB - Report nr. 140324-5-E to nr. 140324-6-E: Determination of the emission of formaldehyde (chamber method). The product fulfills the requirements according to EN 717-1 (2004) (Chamber method).  
 Test institute CTIB-TCHN - Hof ter Vleesdreef 3 - 1070 Brussel - Belgium

### FSC certificate:

FSC standard for Chain of Custody Certification - /FSC-STD-40-004/ v.2.1. - Rapportnummer CTIB-COC-001338.

CTIB - TCHN- Hof ter Vleesdreef 3 - 1070 Brussel - Belgium.

### PEFC certificate:

Chain of Custody of Forest Based Products - Requirements - /PEFC ST 2002:2013. Rapportnummer CTIB-TCHN 0305.  
 CTIB - TCHN- Hof ter Vleesdreef 3 - 1070 Brussel - Belgium.

### CEN/TR 15941

Sustainability of construction works - Environmental product declarations - Methodology for selection and use of generic data; CEN/TR 15941:2010

### EN 12088

DIN EN 12088:2013-06: Thermal insulating products for building applications - Determination of long term water absorption by diffusion; German version EN 12088:2013

### EN 12091

DIN EN 12091:2013-06: Thermal insulating products for building applications - Determination of freeze-thaw resistance; German version EN 12091:2013

### EN 13165

DIN EN 13165:2013-03: Thermal insulation products for buildings - Factory made rigid polyurethane foam (PU) products - Specification; German version EN 13165:2012

### EN 15801

DIN EN 15801:2010-04: Conservation of cultural property - Test methods - Determination of water absorption by capillarity; German version EN 15801:2009.

### EN ISO 14040

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

**EN ISO 14044**

EN ISO 14044:2006-10 Environmental management -  
Life cycle assessment - Requirements and guidelines

**EN 29052**

DIN EN 29052-1:1992-08: Acoustics; determination of  
dynamic stiffness; part 1: materials used under floating  
floors in dwellings; German version EN 29052-1:1991

**EN 1995-1-1:**

EN 1995-1-: Design of Timber Structures - General –  
Common rules and rules for buildings

**GaBi 6**

GaBi 6.3 dataset documentation for the software-  
system and databases, LBP, University of Stuttgart  
and PE INTERNATIONAL AG, Leinfelden-  
Echterdingen, 2013 (<http://documentation.gabi-software.com/>)

**GaBi 6 2012D**

GaBi 6: Documentation of GaBi 6: Software-System  
and Database for Life Cycle Engineering. Copyright,  
TM. Stuttgart, Leinfelden-Echterdingen, 1992-2012.  
<http://documentation.gabi-software.com/>

**IBU 2013 Part B**

PCR – Part B: Requirements on the EPD wooden  
panels

**REACH**

Candidate List of Substances of Very High Concern for  
Authorisation. Published in accordance with Article  
50(10) of the REACH Regulation.  
<http://echa.europa.eu/de/candidate-list-table>

**DFR**

Décret français n° 2011 - 321 du 23 mars 2011:  
[http://www.legifrance.gouv.fr/affichTexte.do?cidTexte=](http://www.legifrance.gouv.fr/affichTexte.do?cidTexte=JORFTEXT000023759679&dateTexte=&categorieLien=id)  
[JORFTEXT000023759679&dateTexte=&categorieLien=](http://www.legifrance.gouv.fr/affichTexte.do?cidTexte=JORFTEXT000023759679&dateTexte=&categorieLien=id)  
[id](http://www.legifrance.gouv.fr/affichTexte.do?cidTexte=JORFTEXT000023759679&dateTexte=&categorieLien=id)

**EWC**

EWC 2002: Commission Decision 2000/532/EC of 3  
May 2000 replacing Decision 94/3/EC establishing a  
list of wastes pursuant to Article 1 (a) of Council  
Directive 75/442/EEC on waste and Council Decision  
94/904/EC establishing a list of hazardous waste  
pursuant to Article 1 (4) of Council Directive  
91/689/EEC on hazardous waste.

**Institut Bauen und Umwelt**

Institut Bauen und Umwelt e.V., Berlin(pub.):  
Generation of Environmental Product Declarations  
(EPDs);

**General principles**

for the EPD range of Institut Bauen und Umwelt e.V.  
(IBU), 2013/04  
[www.bau-umwelt.de](http://www.bau-umwelt.de)

**ISO 14025**

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

**EN 15804**

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

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