

Environmental Product Declaration



In accordance with ISO 14025 and EN 15804 for:

dasso Strand Woven Bamboo
from
Zhejiang Daocheng Bamboo Industry Co., Ltd.



Programme:	The International EPD® System, www.environdec.com
Programme operator:	EPD International AB
EPD registration number:	S-P-01926
Publication date:	2020-04-01
Valid until:	2025-04-01



Programme information

Programme:	The International EPD® System EPD International AB Box 210 60 SE-100 31 Stockholm Sweden www.environdec.com info@environdec.com
Product category rules (PCR):	<i>PCR 2012:01 Construction Products and Construction Services Version 2.31 (2019-12-20)</i>
PCR review was conducted by:	<i>IVL Swedish Environmental Research Institute Moderator: Martin Erlandsson, martin.erlandsson@ivl.se</i>
Independent third-party verification of the declaration and data, according to ISO 14025:2006: <input type="checkbox"/> EPD process certification <input checked="" type="checkbox"/> EPD verification	
Third party verifier:	<i>Bill Kung, Ecovane Environmental E-mail: bill.k@1mi1.cn Telephone: +86-21-61036720</i>
Approved by:	<i>The International EPD® System</i>
Procedure for follow-up of data during EPD validity involves third party verifier: <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	

The EPD owner has the sole ownership, liability, and responsibility for the EPD. EPDs within the same product category but from different programmes may not be comparable. EPDs of construction products may not be comparable if they do not comply with EN 15804.

Company information

Owner of the EPD:

Zhejiang Daocheng Bamboo Industry Co., Ltd.

Address: No.102 Youcheqiao, Xinhe Village, Linpu Town, Xiaoshan District, Hangzhou, P.R. China

Website: <https://www.dassogroup.com>

Tel : 86-571-57163765

Fax : 86-571-57163700

Email: info@dassogroup.com

Description of the organisation:

Founded in 1993, headquartered in Hangzhou, China, dasso has been committed for over two decades to the development and production of innovative bamboo products, including bamboo flooring, decking, siding, and furnishings.

dasso has now 8 manufacturing facilities and over 1000 employees, in addition to owning over 2,700 hectares of productive, sustainable bamboo forest in China. Besides, dasso has also established an independent R&D team with 50 people for product optimization and innovation. Up until now, 65 authorized patents, 24 innovative patents and 13 international patents have been acquired by dasso.



Figure 1 dasso factory in Jiangxi, China

Product information

Product name:

dasso Strand Woven Bamboo

UN CPC code:

3145 Plywood, veneer panels and similar laminated wood of bamboo

Geographical scope: Global

Product description:

Bamboo is one of the fastest-growing plants in the world. It is a renewable and versatile resource with multi-purpose usage. Bamboos are of notable economic and cultural significance in South Asia, Southeast Asia, and East Asia where the climate is best suitable for its cultivation. The material may be cut and laminated into sheets and planks, and may be curved or flattened by the application of heat and pressure. It is an ideal construction material as it is durable, sustainable, and environmentally friendly. Bamboo used for construction purposes must be harvested when the culms reach their greatest strength and when the sugar level in the sap is at its lowest (usually when the bamboo culm is 3 to 5 years old), and afterwards it should be cured and dried properly for further treatment and manufacturing purpose. Harvesting is best taking place at the end of the dry season, and a few months prior to the start of the rainy season.



Figure 2 Bamboo culms and rough processing site near plantations

dasso Strand Woven Bamboo is a high-quality bamboo decking board with high density. It provides the natural look and feel of traditional bamboo products whilst combining excellent performance characteristics. In addition, the surface could be stained to the color of customers' choice prior to the final coating process. The possibility of color options provides the user the capability to integrate an environmentally friendly bamboo product into any design motif.

Product Application:

dasso Strand Woven Bamboo is suitable for indoor, semi-outdoor, and outdoor applications, especially as flooring, decking etc. It is incredibly durable and wear resistant.

Product identification:

Table 1 Product technical specifications

Density	1,050 kg/m ³
Thickness	20 mm
Reaction to Fire	Df1-s1 (EN14342)
Biological Durability	Class 1 (EN335)
Breaking Strength	0.7 KN (EN1533)
Slip Resistance	USRV 100 (CEN/TS15676)

Manufacturing Process:

As shown in Figure 3, during the manufacturing process, strips of bamboo are cut from the bamboo stalks. After that, carbonized bamboo strips are crushed into rough fibrous bamboo strands. After glue impregnation, the strands are compressed with high pressure to make the final intensive bamboo planks.

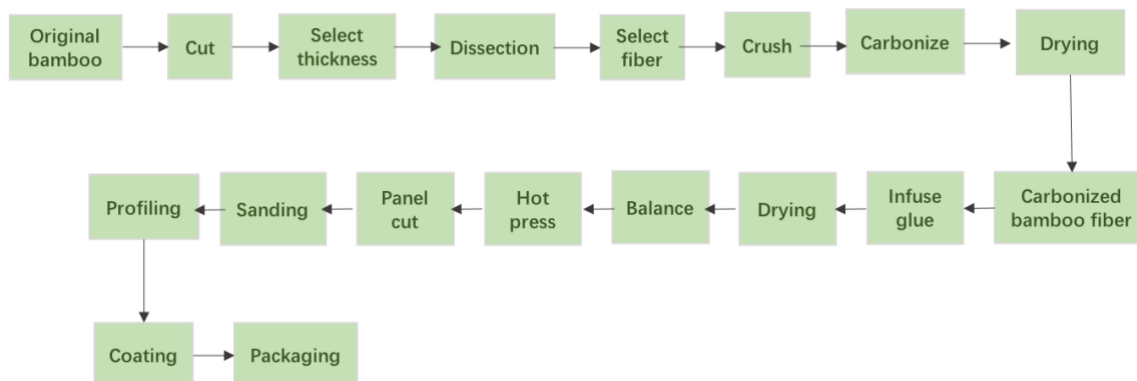


Figure 3 dasso Strand Woven Bamboo manufacturing process

Content declaration

Product

Table 2 Product content

Materials / chemical substances	Percentage	CAS Number	Environmental / hazardous properties
Bamboo	87.00%		No dangerous substances according to (EC) No. 1907/2006
Water based Phenolic Resin	12.78%	9003-35-4	GHS-H302, GHS-H313, GHS-H320, GHS-H332, GHS-H402
Vegetable Oil	0.22%		No dangerous substances according to (EC) No. 1907/2006

*For the substance “Water based Phenolic Resin”, the concentration of phenol is less than 3%, and the concentration of formaldehyde is less than 0.3%.

Packaging

After manufacturing, dasso strand woven bamboo will be packaged with corrugated board, wrapping film, pallet, and packing belt. For each kg of bamboo panel, the following amounts of packaging materials are consumed.

Table 3 Packaging information

Materials	Amount per unit
Pallet	35.2 g
Packing belt	1.0 g
Wrapping film	0.8 g
Corrugated board	12.5 g

LCA information

Functional unit:

The functional unit is 1 kg of bamboo product.

Time representativeness:

The study used primary data collected from November 2018 to November 2019.

Database(s) and LCA software used:

SimaPro9 was used for the LCA modelling. In the study, the key parameters for producer-specific foreground data were based on one year (November 2018 to November 2019) of averaged data from dasso. Generic data for certain processes were sourced from Ecoinvent database in SimaPro 9. Modification of the global background database was done by replacing all the energy data, especially electricity production data, by localized Chinese energy data.

The data quality requirements for this study were as follows:

- Existing LCI data were, at most, 10 years old. Newly collected LCI data were current or up to 3 years old;
- The LCI data related to the geographical locations where the processes took place, e.g. electricity and transportation data from China, disposal data from China and Europe were utilized;
- The scenarios represented the average technologies at the time of data collection.

System diagram:

DESCRIPTION OF THE SYSTEM BOUNDARY (X = INCLUDED IN LCA; MND = MODULE NOT DECLARED)																	
Product Stage			Construction process stage		Use Stage								End of life stage				Resource recovery stage
Raw Material	Transport	Manufacturing	Transport	Assembly / Install	Use	Maintenance	Repair	Replacement	Refurbishment	Operational energy use	Operational water use	De-construction and 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	X	MND	MND	MND	MND	MND	MND	MND	MND	X	X	X	X	X	

Description of system boundaries:

The is a “cradle-to-gate with options” EPD. The LCA study traced all energy and material inputs back to the extraction of resources for each life-cycle stage of the products. In addition, the study quantified emissions from the whole system, and included various waste management scenarios.

The life cycle stages below have been covered:

- A1-A3: Product stage (raw material acquisition, transport to manufacturing site and manufacturing)
- A4: Construction stage (transport to user site)
- C1-C4: End-of-life stage (deconstruction, transport, waste processing and disposal)
- D: Resource recovery stage (reuse, recovery, recycling)

Excluded lifecycle stages:

The installation stage on the construction site and the usage stage of the product are excluded from this study.

Assumption and limitations:

In order to carry out the LCA study, the following main assumptions were made:

- Assumptions on transportation were made where it was not possible to obtain the specific data, such as the distance from distribution centre to outlet and from outlet to consumer. When this occurred, it was clearly stated in the report;
- Electricity consumption data was not obtained for certain processes, so assumptions were made for these. When this occurred, it was clearly stated in the report;
- Modification of the global background database was done by replacing all the energy data, especially electricity production data, by Chinese energy data, and the study used the modified background data to get better indication of the potential environmental impact results by using more localized dataset of energy supply;
- In this study, the environmental benefit from incineration of waste bamboo flooring was considered. It was assumed that there is no recovery, reuse, and recycling of bamboo flooring. During the end-of-life stage, bamboo flooring is burned to generate calorific values. The heat value of bamboo is 18.87MJ/kg. Calorific value recovery replaces coal-fired power generation. The efficiency of thermal power was assumed to be 42%. Therefore, 2.2 kWh electricity can be generated by burning 1kg waste bamboo flooring.

Allocation:

During the production process of dasso strand woven bamboo products, the use of raw materials and resource were calculated according to the relationship between output and energy consumption, water consumption, and related resources, avoiding the use of mass, energy, and economic distribution method.

During manufacturing process, there is no generation of by-products that need to be allocated in this situation.

Cut-off rules:

Raw materials that account for less than 1% of the mass of the product were allowed not to be considered in the study, including the transportation of the associated materials. The infrastructure for manufacturing was not included in the LCA, including the machine, either.

Electricity source:

As required in PCR Section 10, “If the electricity in A3 accounts for more than 30% of the total energy in stage A1 to A3, the energy sources behind the electricity grid in module A3 shall be documented in the EPD and given in g CO₂ e/kWh”.

In this LCA, the grid mix data on electricity for the site in Fujian and Jiangxi Province was based on grid mixes of China. The electricity inventory is based on the year of 2015 for Chinese electricity generation (China Energy Statistics).

In Chinese map of electricity generation, thermal power is the principal part of total national installed capacity and electricity generation. Development of hydropower is slower than that of thermal power, and nuclear power is still in its initial step. Power generation from renewable energy resources, such as wind, solar energy, and tide, are usually not included due to the small share in electricity generation in China. However, the renewable energy was also considered in this study by taking a small ratio of wind, solar, and other renewable energy generation in China into account.

In 2015, the source of power supply is 73.3% thermal power, 19.4% hydropower and 2.9% nuclear power. The transmission of electricity in all cases is taken from the power station via a high voltage electricity grid to low voltage electricity suitable for domestic use, with a loss factor of 7.52% of the electricity produced at the power station, and a loss of 6.15% by the electricity consumption at the power plants.

The applied electricity data set used in the manufacturing phase is 654 g CO₂ e/kWh.

Life cycle assessment scenarios

According to dasso, products are consumed in China and oversea, and transportation distance for product delivery was estimated with reference to external resources. The table below demonstrates the data used for stage A4 in the LCA modelling.

Table 4 Transport to the construction Site (A4)

Additional technical information for stage A4			
Scenario title	Parameter	Units (expressed per declared unit)	Value
A4 Transport to Site	Vehicle type used for transport	Lorry	Lorry
	Vehicle load capacity	Metric ton	32
	Fuel type and consumption	Diesel, L/100km	31.11
	Distance to central warehouse or storage, if relevant	km	1091
	Distance to construction site	km	-
	Capacity utilization (including empty returns)	%	50
	Bulk density of transported products	kg/m ³	unknown
	Volume capacity utilization factor (factor: =1 or <1 or >=1 for compressed or nested packaged products)	Not applicable	

Demounting and demolition of the product were assumed to be conducted manually, so there was no energy and material input involved in the LCA modelling. For waste processing, three sets of background data were used. The first set is electricity generation from waste incineration; the second is the electricity generation in China/EU; the last one is the landfill of waste bamboo product. The table below demonstrates the data used for stage C in the LCA modelling.

Table 5 End of Life (C1-C4)

Additional technical information for end-of-life C stage			
Module	Parameter	Units (expressed per declared unit)	Value
C1 Deconstruction	Collection process specified by type	kg collected separately	1
		kg collected with mixed construction waste	-
C2 Transport	Assumptions for scenario development	km	100
C3 Waste processing	Recovery system specified by type	kg for re-use	-
		kg for recycling	-
		kg for Incineration	0.95
		kg for landfill	0.05
C4 Disposal	Disposal specified by type	kg product or material for final deposition	-

Environmental performance

To analyse the environmental impact of each process, a LCIA was conducted using the CML-IA baseline method. The result was allocated by stages, as shown in tables below.

Potential environmental impact for dasso Strand Woven Bamboo

PARAMETER	UNIT	A1	A2	A3	A4	C2	C4	D-CN	D-EU
Global warming potential (GWP)	kg CO ₂ eq.	8.60E-01	4.90E-02	1.60E-01	1.80E-01	2.29E-02	3.10E-03	-2.22E+00	-7.44E-01
Depletion potential of the stratospheric ozone layer (ODP)	kg CFC 11 eq.	1.70E-08	5.80E-09	7.00E-09	3.30E-08	3.78E-09	1.40E-10	4.82E-07	3.84E-07
Acidification potential (AP)	kg SO ₂ eq.	5.80E-03	2.00E-04	6.70E-04	7.00E-04	8.84E-05	3.60E-06	-1.78E-02	9.04E-04
Eutrophication potential (EP)	kg PO ₄ ³⁻ eq.	9.20E-04	5.90E-05	1.70E-04	1.60E-04	3.39E-05	1.30E-04	3.60E-04	-1.00E-03
Formation potential of tropospheric ozone (POCP)	kg C ₂ H ₄ eq.	3.90E-04	8.10E-06	2.60E-05	2.90E-05	4.02E-06	8.60E-07	-5.60E-04	1.48E-04
Abiotic depletion potential – Elements	kg Sb eq.	1.40E-06	7.00E-08	7.40E-08	5.00E-07	1.59E-08	7.50E-10	2.47E-05	2.45E-05
Abiotic depletion potential – Fossil resources	MJ, net calorific value	1.80E+01	7.50E-01	1.70E+00	2.90E+00	3.62E-01	1.40E-02	-8.53E+00	4.10E-01

* Zero input and output were assumed for deconstruction of the product (C1), waste processing (C3). Therefore, values for these two modules are zero and not presented in the tables. D-EU and D-CN represent respectively the scenario in Europe and in China.

Use of resources for dasso Strand Woven Bamboo

PARAMETER		UNIT	A1	A2	A3	A4	C2	C4	D-CN	D-EU
Primary energy resources – Renewable	Use as energy carrier	MJ, net calorific value	1.00E-01	2.40E-02	3.10E-01	2.80E-02	1.90E-02	2.30E-04	3.60E+00	1.70E+00
	Used as raw materials	MJ, net calorific value	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	TOTAL	MJ, net calorific value	1.00E-01	2.40E-02	3.10E-01	2.80E-02	1.90E-02	2.30E-04	3.60E+00	1.70E+00
Primary energy resources – Non-renewable	Use as energy carrier	MJ, net calorific value	5.40E-02	1.60E-03	3.00E-02	2.60E-03	8.20E-04	1.70E-05	-1.50E-01	1.80E-01
	Used as raw materials	MJ, net calorific value	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	TOTAL	MJ, net calorific value	5.40E-02	1.60E-03	3.00E-02	2.60E-03	8.20E-04	1.70E-05	-1.50E-01	1.80E-01
Secondary material		kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Renewable secondary fuels		MJ, net calorific value	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Non-renewable secondary fuels		MJ, net calorific value	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Net use of fresh water		m³	1.70E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00

Waste production and output flows for dasso strand woven Bamboo

Waste production

PARAMETER	UNIT	A1	A2	A3	A4	C2	C4	D-CN	D-EU
Hazardous waste disposed	kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Non-hazardous waste disposed	kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Radioactive waste disposed	kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00

Output flows

PARAMETER	UNIT	A1	A2	A3	A4	C2	C4	D-CN	D-EU
Components for reuse	kg	-	-	-	-	-	-	-	-
Material for recycling	kg	-	-	-	-	-	-	-	-
Materials for energy recovery	kg	-	-	-	-	-	-	-	-
Exported energy, electricity	MJ	-	-	-	-	-	-	-	-
Exported energy, thermal	MJ	-	-	-	-	-	-	-	-

Additional environmental information

The formaldehyde emission of dasso strand woven bamboo is no more than 3.5 mg/m²h and the product reaches therefore the emission Class E1 according to EN717-2 (Wood-based Panels – Determination of Formaldehyde Release – Formaldehyde release by the gas analysis method).

References

General Programme Instructions of the International EPD® System. Version 3.0.

PCR 2012:01 Construction Products and Construction Services, Version 2.31 (2019-12-20)

EN 15804:2012+A2:2019 Sustainability of construction works - Environmental product declarations - Core rules for the product category of construction products

ISO 21930:2017 Environmental declaration of building products

ISO 14025:2006 Environmental labels and declarations - Type III environmental declarations -Principles and procedures

ISO 14040:2006 Environmental management - Life cycle assessment - Principles and framework

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

