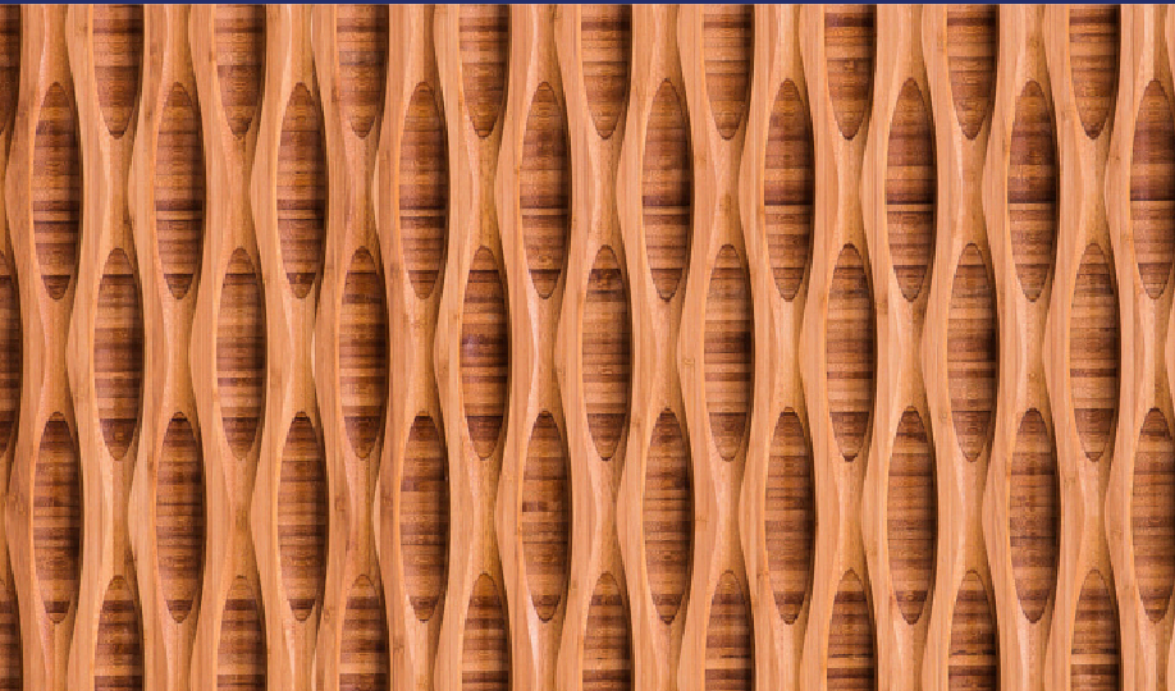


ENVIRONMENTAL PRODUCT DECLARATION

IN ACCORDANCE WITH ISO 14025 AND ISO 21930:2017

SmartEPD-2023-009-0025-01

Carved Bamboo Plywood



SMITH & FONG
plyboo®



Date of Issue:
Dec 13, 2023

Expiration:
Dec 13, 2028

Last updated:
Dec 13, 2023

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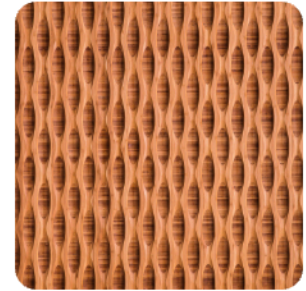
General Information

Smith & Fong

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Product Name:	Carved Bamboo Plywood
Declared Unit:	1 m3
Declaration Number:	SmartEPD-2023-009-0025-01
Date of Issue:	December 13, 2023
Expiration:	December 13, 2028
Last updated:	December 13, 2023
EPD Scope:	Cradle to gate A1 - A3
Market(s) of Applicability:	North America, China

Reference Standards

Standard(s):	ISO 14025, ISO 14040, ISO 14044, ISO 21930:2017
Core PCR:	UL PCR for Building-Related Products and Services Part A v.4, ISO 21930:2017 Date of issue: March 01, 2022
Sub-category PCR:	UL Part B: North American Structural and Architectural Wood Products v.1.1 Date of issue: October 21, 2019 Valid until: October 21, 2024
Sub-category PCR review panel:	📄 Contact Smart EPD for more information.
General Program Instructions:	📄 Smart EPD General Program Instructions v.1.0, November 2022

Verification Information

LCA Author/Creator:	🌐 Maria Amaya ✉ maria.amaya@beath.us
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Verification:

Independent critical review of the LCA and data, according to ISO 14044 and ISO 14071 :

External

🌐 Nicole Kennard | 🏢 Consultant | ✉ nicolejkk.17@gmail.com

Independent external verification of EPD, according to ISO 14025 and reference PCR(s) :

External

🌐 Anna Lasso | 🏢 Smart EPD | ✉ anna.lasso@smartepd.com

Limitations, Liability, and Ownership

Environmental declarations from different programs (ISO 14025) may not be comparable. Comparison of the environmental performance of products using EPD information shall be based on the product's use and impacts at the building level, and therefore EPDs may not be used for comparability purposes when not considering the whole building life cycle. EPD comparability is only possible when all stages of a life cycle have been considered. However, variations and deviations are possible. Example of variations: Different LCA software and background LCI datasets may lead to differences results for upstream or downstream of the life cycle stages declared.

The EPD owner has sole ownership, liability, and responsibility for the EPD.

Organization Information

Smith & Fong (S&F) was founded in 1989 on the premise that bamboo offered unique opportunities and solutions to some of the world's social and environmental challenges. S&F began with laminated bamboo boxes and accessory items, integrating form and function, aesthetics and utility. Within four years, S&F had begun manufacturing bamboo flooring and quickly exhausted manufacturing capacity at their Taiwan facility. Shortly after moving operations to China, S&F converted a tea-processing plant and began producing bamboo flooring there. In 1996, S&F developed a bamboo panel product, introducing the first such product to the North American market. Since then, S&F has continued to develop the laminate bamboo panel product, introducing new sizes, uses and applications for this versatile and highly sustainable material.

Further information can be found at: plyboo.com

Product Description

Carved bamboo plywood (flat and edge grain) is a panel product made entirely from Moso bamboo. All panels are of a 3-ply construction having a face skin on top and bottom with a perpendicular core. On a typical ¾ (19mm) panel the face skins are approximately 3.5mm each and the core is 12mm.

Carved bamboo plywood panels can be used in a wide range of applications both commercial and residential. Applications include cabinetry and casework, furniture, store fixtures and displays, wall and ceiling panel systems, doors, and many other applications where plywood is typically utilized.

Further information can be found at: plyboo.com

Product Information

Declared Unit:	1 m3
Mass:	690 kg
EPD Type:	<input checked="" type="checkbox"/> Industry Average
	<input checked="" type="checkbox"/> Product Specific

Averaging:

This product-specific EPD was developed based on primary annual manufacturing data for carved bamboo plywood products. The EPD represents products manufactured at one facility. This is deemed to be an accurate representation of an average carved bamboo plywood product within this product category.

Plants

China Facility
Zhejiang, China

California Facility
Indio, CA, USA

Product Specifications

Product Classification Codes: UNSPSC - 30103604
Masterformat - 06 10 00
Masterformat - 06 22 00
EC3 - Wood -> Plywood and OSB Sheathing Panels

Thickness to achieve Functional or Declared Unit: 0.006-0.038 m

Density: 690 kg/m³

Moisture Content: 6-9 %

Material Composition

Material/Component Category	Origin	% Mass
Bamboo	None	95
Adhesive	None	5

Packaging Material	Origin	kg Mass
Corrugated Boardbox	None	3.54E+01
Shrink Wrap	None	1.81E-03
Wood Pallet	None	1.17E+02
Particle Board	None	1.15E+02
Medium Density Fiberboard	None	5.69E-02
Metal Binding	None	2.30E+00

Hazardous Materials
No regulated hazardous or dangerous substances are included in this product.

EPD Data Specificity

Primary Data Year:	2022
Manufacturing Specificity:	<input checked="" type="checkbox"/> Manufacturer Specific
	<input checked="" type="checkbox"/> Plant Specific
	<input type="checkbox"/> Batch Specific

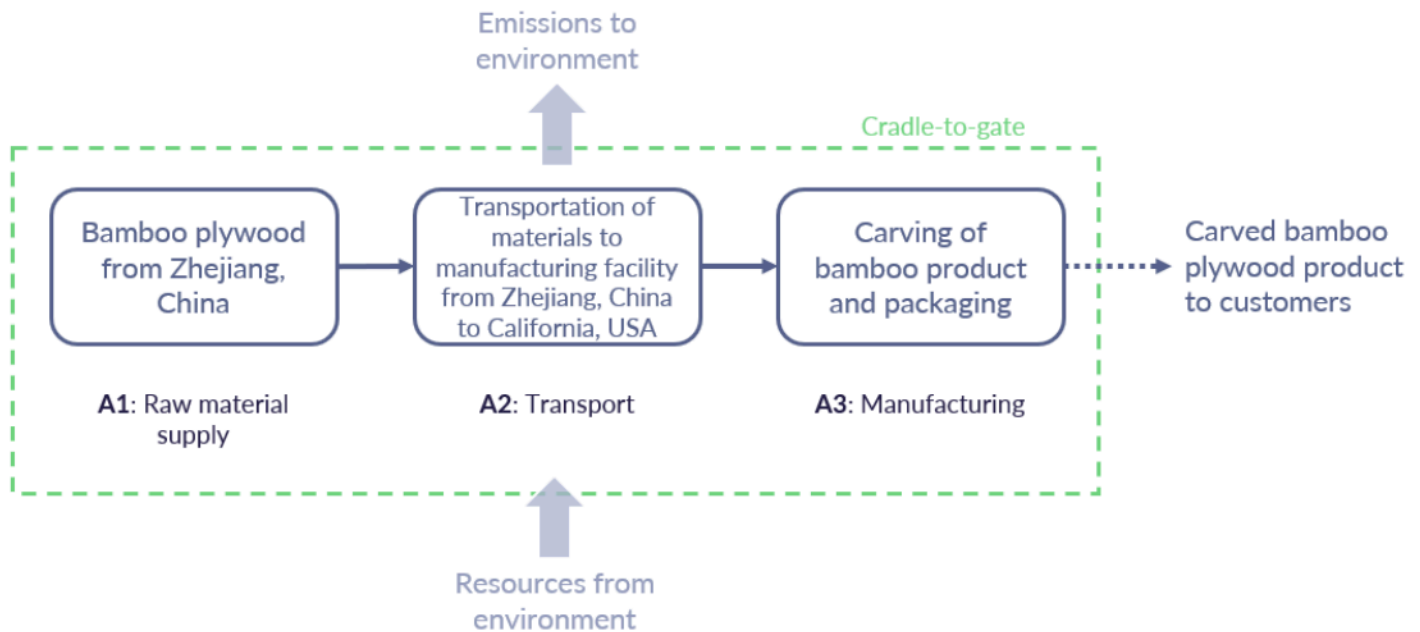
Software and LCI Data Sources

LCA Software:	 openLCA v. 1.11
LCI Foreground Database(s):	 Ecoinvent v. 3.9.1  US, RoW  Cut-off systems model
LCI Background Database(s):	 Ecoinvent v. 3.9.1  US, RoW  Cut-off systems model

System Boundary

Production	A1	Raw material supply	✓
	A2	Transport	✓
	A3	Manufacturing	✓
Construction	A4	Transport to site	ND
	A5	Assembly / Install	ND
Use	B1	Use	ND
	B2	Maintenance	ND
	B3	Repair	ND
	B4	Replacement	ND
	B5	Refurbishment	ND
	B6	Operational Energy Use	ND
	B7	Operational Water Use	ND
End of Life	C1	Deconstruction	ND
	C2	Transport	ND
	C3	Waste Processing	ND
	C4	Disposal	ND
Benefits & Loads Beyond System Boundary	D	Recycling, Reuse Recovery Potential	ND

Product Flow Diagram



Life Cycle Module Descriptions

The carved bamboo plywood manufacturing process starts with growing and harvesting the bamboo poles, followed by a milling process and an assembly process. The raw bamboo is split and then milled through a double milling process and is kiln dried. Once the bamboo strips are dried, adhesive is applied to the strips and pressed face to face to produce a raw bamboo blank. This blank is then refined and multiple blanks are pressed together to form a piece of bamboo plywood during the assembly process. The bamboo plywood is then transported from Zhejiang, China to California, USA for the carving process.

Module A1 includes the raw material processing and production of bamboo plywood. Module A2 include the transport of the bamboo plywood from Zhejiang, China to California, USA. Module A3 includes the carving process, packaging, and waste management.

LCA Discussion

No cut-off criteria were defined for this analysis. All available energy and material flow data were included in accordance with the system boundary. Proxy data were used as needed in the model to capture all considered life cycle impacts.

Annual production volume and product mass were used as basis to allocate facility-level inputs, outputs, and emissions.

At each of the manufacturing plants in Zhejiang, China, a portion of the bamboo trimmings/sawdust generated is used internally as fuel at the plants to generate steam. The waste bamboo products were burned to heat boilers used during the milling process in Zhejiang, China. For the bamboo plywood production process, mass-based allocation procedure was used. The rest of the bamboo coproducts generated are sold to make energy pellets and other products.

Results

Environmental Impact Assessment Results

IPCC AR5 GWP 100, TRACI 2.1, CML 2016

per 1 m3 of product.

LCIA results are relative expressions and do not predict impacts on category endpoints, the exceeding of thresholds, safety margins or risks.

Impact Category	Unit	A1A2A3
GWP-total	kg CO2 eq	7.15e+2
ODP	kg CFC 11 eq	1.03e-5
AP	kg SO2 eq	4.95e+0
EP	kg N eq	1.51e+0
POCP	kg O3 eq	8.85e+1
ADP-fossil	MJ	9.52e+3
GWP-total	kg CO2 eq	7.23e+2
ODP	kg CFC 11 eq	8.61e-6
AP	kg SO2 eq	4.59e+0
EP	kg PO4 eq	1.20e+0
POCP	kg C2H4 eq	3.33e-1
FFD	MJ	8.84e+2

Comparisons cannot be made between product-specific or industry average EPDs at the design stage of a project, before a building has been specified. Comparisons may be made between product-specific or industry average EPDs at the time of product purchase when product performance and specifications have been established and serve as a functional unit for comparison. Environmental impact results shall be converted to a functional unit basis before any comparison is attempted. Any comparison of EPDs shall be subject to the requirements of ISO 21930 or EN 15804. EPDs are not comparative assertions and are either not comparable or have limited comparability when they have different system boundaries. EPDs are not comparative assertions and are either not comparable or have limited comparability when they have different system boundaries, are based on different product category rules or are missing relevant environmental impacts. Such comparison can be inaccurate, and could lead to erroneous selection of materials or products which are higher-impact, at least in some impact categories.

Resource Use Indicators

per 1 m3 of product.

Indicator	Unit	A1A2A3
RPRE	MJ	8.54e+0
RPRM	MJ	2.03e+4
NRPRE	MJ	1.40e+1
NRPRM	MJ	0
SM	kg	0
RSF	MJ	0
NRSF	MJ	0
RE	MJ	0
FW	m3	4.48e+1

Waste and Output Flow Indicators
per 1 m3 of product.

Indicator	Unit	A1A2A3
HWD	kg	0
NHWD	kg	0
HLRW	kg	ND
ILLRW	kg	ND
CRU	kg	0
MFR	kg	1.37e-1
MER	kg	0
EE	MJ	0

Carbon Emissions and Removals
per 1 m3 of product.

Indicator	Unit	A1A2A3	A5	C4	C5
BCRP	kg CO2	-8.68e+3	0	0	0
BCEP	kg CO2	5.79e+3	0	1.27e+3	0
BCRK	kg CO2	-1.51e-1	0	0	0
BCEK	kg CO2	8.88e-1	1.42e+1	0	0
BCEW	kg CO2	1.62e+3	0	0	0
CCE	kg CO2	0	0	0	0
CCR	kg CO2	0	0	0	0
CWNR	kg CO2	0	0	0	0

Interpretation

The results of the LCA indicate that the Module A1 (bamboo plywood entering the California, USA plant) is the largest contributor to the Smith & Fong product footprint across impact categories. The largest contributor to Module A1 is the electricity and steam generation taking place during the manufacturing of the bamboo plywood. The packaging used for the carved bamboo plywood is a significant contributor. Impacts of the packaging are driven by the use of particle board. Inbound transportation of the bamboo plywood to the plant is included and is a small contributor to the product footprint.

The study timeframe is for the year 2022 for Smith & Fong manufacturing in California, USA. This study does not include comparisons or benchmarking. Environmental declarations from different programs based upon different PCRs may not be comparable.

While this EPD does not address landscape level forest management impacts, potential impacts may be addressed through requirements put forth in regional regulatory frameworks, ASTM 7612-15 guidance, and ISO 21930 Section 7.2.11 including notes therein. These documents, combined with this EPD, may provide a more complete picture of environmental and social performance of wood products.

While this EPD does not address all forest management activities that influence forest carbon, wildlife habitat, endangered species, and soil and water quality, these potential impacts may be addressed through other mechanisms such as regulatory frameworks and/or forest certification systems which, combined with this EPD, will give a more complete picture of environmental and social performance of wood products.

EPDs can complement but cannot replace tools and certifications that are designed to address environmental impacts and/or set performance thresholds – e.g. Type 1 certifications, health assessments and declarations, etc.

National or regional life cycle averaged data for raw material extraction does not distinguish between extraction practices at specific sites and can greatly affect the resulting impacts.

Accuracy of Results: EPDs regularly rely on estimations of impacts; the level of accuracy in estimation of effect differs for any particular product line and reported impact when averaging data. Variability was estimated in this EPD by mass allocation.

Additional Environmental Information

Smith & Fong have the following certifications: FSC Chain of Custody Certificate, Plyboo Health Product Declaration, and a Declare Certificate. Please email Dan Smith at dan@plyboo.com to request copies of the certificates.

References

ACLCA. (2018). ACLCA Guidance to Calculating Non-LCIA Inventory Metrics in Accordance with ISO 21930: 2017.

Bare, J. (2011). TRACI - The Tool for the Reduction and Assessment of Chemical and other Environmental Impacts. CLEAN TECHNOLOGIES AND ENVIRONMENTAL POLICY.

Guinée, J.B. et al. (2002). Handbook on life cycle assessment. Operational guide to the ISO standards. I: LCA in perspective. IIa: Guide. IIb: Operational annex. III: Scientific background. Dordrecht: Kluwer Academic Publishers.

IEA. (s.f.). China. Obtenido de <https://www.iea.org/countries/china>

IPCC. (2021). Climate Change 2021: The Physical Science Basis. IPCC.

ISO. (2006). 14025:2006 - Environmental labels and declarations - Type III environmental declarations - Principles and procedures. Geneva: International Organization of Standardization.

ISO. (2006a). 14040:2006/Amd.1:2020 - Environmental management — Life cycle assessment — Principles and framework. Geneva: International Organization of Standardization.

ISO. (2006b). 14044:2006/Amd.1:2017/Amd.2:2020 - Environmental management — Life cycle assessment — Requirements and guidelines. Geneva: International Organization for Standardization.

ISO. (2013). 14046:2013/Amd. 2020 - Environmental management water footprint - Principles, requirements and guidelines. Geneva: International Organization for Standardization.

ISO. (2017). 21930:2017/Amd.1:2023 – Sustainability in buildings and civil engineering works - Core rules for environmental product declarations of construction products and services. Geneva: International Organization of Standardization.

UL Environment. (2022). Part B: Structural and Architectural Wood Products EPD Requirements. v1.1. UL Environment.

UL Environment. (2018). Part A: Life Cycle Assessment Calculation Rules and Report Requirements. v4.0. UL Environment.

Wernet, G., Bauer, C., Steubing, B., Reinhard, J., Moreno-Ruiz, E., & Weidema, B. (2016). The ecoinvent database version 3 (part I): overview and methodology. The International Journal of Life Cycle Assessment, 1218-1230.