Result summary

X-treme (EN15804) (Decking)

MOSO

Calculation number:	EPD-NIBE-20210625-20247
Generation on:	14-03-2022
Issue date:	14-03-2022
Valid until:	14-03-2027
Status:	verified

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1 X-treme (EN15804) (Decking)

1.1 COMPANY INFORMATION / DECLARATION OWNER

Manufacturer: MOSO

Production Location: Manufacturing plant CN

Address: Adam Smithweg 2, 1689 ZWZwaag

E-mail: info@moso.eu

Website: www.moso-bamboo.com

1.2 EPD INFORMATION

Calculation number: EPD-NIBE-20210625-20247

Date of issue: 14-03-2022

End of validity: 14-03-2027

Version NIBE's EPD Application: v2.0

Version database: v3.07 (2021-11-08)

PCR: EN15804+A2:2019

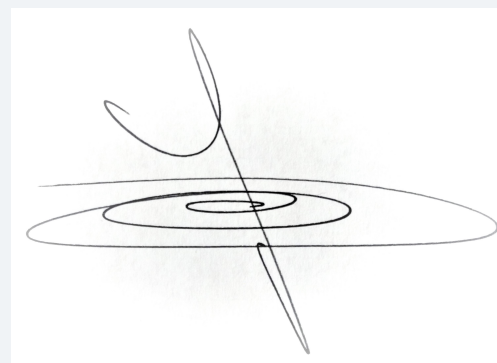## 1.3 VERIFICATION OF THE DECLARATION

CEN standard EN 15804:2012 serves as the core PCR.

Independent verification of the declaration. according to EN ISO 14025:2010.

☐ Internal   ☑ External

I hereby confirm that, following detailed examination as independent 3rd party verifier, I have not been able to trace any relevant deviations by the report concerning bamboo products by MOSO, and by its project report from the requirements outlined in the corresponding product category regulations based on the EN 15804:2019 and as PCR, the Dutch Assessment (Determination) Method version 1.0 July 2020, including the amendments Hereby the report meets also the standards given in ISO 14040/44 and ISO 21930.

A.K. Jeeninga is recognized by NMD as verifier.

Third party verifier: Anne Kees Jeeninga, Advieslab

1.4 DECLARED UNIT

1 m2 decking

A square meter of decking with the minimum technical thickness required end meets requirements of the Dutch Buildings Decree. Subframe joists and fasteners are not included.

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1.5 SCOPE OF DECLARATION

A1	A2	A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
X	X	X	X	X	X	X	X	MND	MND	MND	MND	X	X	X	X	X

(X = included, MND = module not declared)

1 X-treme (EN15804) (Decking)

1.6 PRODUCT DESCRIPTION

MOSO® Bamboo X-treme® goes through a unique Thermo-Density® process of heat treatment at 200°C followed by High Density® compression to enhance the hardness, dimensional stability, fire resistance and durability to a level superior to the best tropical hardwood species.

MOSO® Bamboo X-treme products consist for approx. 90 % of rough strips made from the giant bamboo species "Phyllostachus Pubescens (Edulis)" from China (diameter up to 15 cm, length up to 15 meters) and about 10% of glue (phenol formaldehyde), and is also available with FSC certificate on request.

Dimensions

Decking: 1850 x 137/155/178/208 x 20 mm

Decking: 1850 x 75/137 x 12/18 mm

Biological durability:

Class 1 (EN 350)

Hardness (Brinell)

> 9,5 kg / mm² (EN 1534)

Reaction to fire

Cladding: Class Bfl-s1 (EN 13501-1)

Cladding: Class B-s1-d0 (EN 13501-1)

Biogenic CO2

Density of material kg/m3 (u=12%)	ρ	1.150
glue content	%	12,2%
carbon content	%	50,24%

Bamboo without glue kg/m3	Pw	1.009
Density without 12% moisture content kg/m3	Pw x Vw*/1,12	901
kg carbon / m3	cf x Pw x Vw*/1,12	453
kg CO2 / m3	44/12	1.661,68
kg CO2 / m2	m2	31,84

Substances of very high concern
The product does not contain any substances listed in the "Candidate List of Substances" of Very High Concern (SVHC) for authorisation" exceeding 0.1% of the weight of the product.

1.7 DESCRIPTION OF THE MANUFACTURING PROCESS

Bamboo strips are crushed to open up the material for further processing and become bundles of bamboo fibres, called strands. During the subsequent thermal processing, the moisture content changes and the sugar content is removed from the material. Furthermore, this process changes the colour of the bamboo from white/yellow to deep/dark brown.

The thermally modified bamboo strands are then dipped into thermosetting resin. After drying, the strands are put into a mould and are then compressed under high temperature and pressure to cure the glue. The combination of compressing and thermally treating the bamboo strands (Thermo-Density® process) increases the density from 650-700 kg/m³ to approx. 1.150 kg/m³ and improves the hardness of the product significantly. At the same time, the dimensional stability of bamboo is improved by approximately 50% and the durability increases to the highest class possible (class 1 following EN 350), whereas because of the densification the product can reach the European fire class B without the use of fire retardants.

The output is a large panel, which is cut into smaller sections (boards or beams). These are then further processed and profiled to acquire the required shape. Waste created during this process is used in the factory to create energy / heat for the internal processes. As a last step, depending on the customer's request, the boards can be prefinished. This optional step is not included in this LCA.

The final product is a very stable and durable board or beam for use in multiple outdoor applications, typically decking and cladding but also for use in outdoor furniture.

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1.8 RESULTS

Environmental effects	Unit	A1	A2	A3	A4	A5	B1	B2	B3	C1	C2	C3	C4	D	Total
AP	mol H+ eqv.	4.86E-2	3.29E-3	7.41E-2	6.99E-2	1.04E-2	0.00E+0	0.00E+0	0.00E+0	0.00E+0	2.55E-3	6.28E-3	8.36E-5	-3.95E-2	1.76E-1
GWP-total	kg CO2 eqv.	-2.28E+1	5.68E-1	1.48E+1	3.35E+0	1.85E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	4.40E-1	3.66E+1	1.70E+0	-1.29E+1	2.37E+1
GWP-b	kg CO2 eqv.	-3.20E+1	2.62E-4	-7.27E-1	-1.49E-3	-2.38E-2	0.00E+0	0.00E+0	0.00E+0	0.00E+0	2.03E-4	3.02E+1	1.67E+0	-1.65E-1	-1.02E+0
GWP-f	kg CO2 eqv.	9.19E+0	5.68E-1	1.55E+1	3.35E+0	1.87E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	4.39E-1	6.37E+0	2.40E-2	-1.27E+1	2.47E+1
GWP-luluc	kg CO2 eqv.	6.73E-3	2.08E-4	3.97E-3	3.57E-3	7.63E-4	0.00E+0	0.00E+0	0.00E+0	0.00E+0	1.61E-4	5.46E-5	2.67E-6	-1.47E-2	7.98E-4
ETP-fw	CTUe	3.69E+2	7.64E+0	3.98E+2	3.85E+1	4.24E+1	0.00E+0	0.00E+0	0.00E+0	0.00E+0	5.91E+0	5.82E+0	2.07E-1	-7.50E+1	7.93E+2
PM	disease incidence	5.00E-7	5.11E-8	9.46E-7	1.93E-7	8.98E-8	0.00E+0	0.00E+0	0.00E+0	0.00E+0	3.95E-8	5.06E-8	1.74E-9	-1.03E-7	1.77E-6
EP-m	kg N eqv.	1.14E-2	1.16E-3	1.64E-2	1.79E-2	2.56E-3	0.00E+0	0.00E+0	0.00E+0	0.00E+0	8.98E-4	2.91E-3	5.83E-5	-5.96E-3	4.73E-2
EP-fw	kg P eqv.	3.60E-4	5.73E-6	3.63E-4	2.87E-5	3.96E-5	0.00E+0	0.00E+0	0.00E+0	0.00E+0	4.43E-6	3.98E-6	1.49E-7	-6.63E-4	1.43E-4
EP-T	mol N eqv.	1.16E-1	1.28E-2	1.78E-1	1.99E-1	2.78E-2	0.00E+0	0.00E+0	0.00E+0	0.00E+0	9.90E-3	3.33E-2	3.37E-4	-7.16E-2	5.06E-1
HTP-c	CTUh	5.99E-8	2.48E-10	2.71E-8	2.70E-9	5.20E-9	0.00E+0	0.00E+0	0.00E+0	0.00E+0	1.92E-10	1.34E-8	7.02E-12	-1.99E-9	1.07E-7
HTP-nc	CTUh	1.59E-7	8.35E-9	1.87E-7	3.99E-8	2.26E-8	0.00E+0	0.00E+0	0.00E+0	0.00E+0	6.46E-9	4.14E-8	2.39E-10	-5.99E-8	4.05E-7
IR	kBq U235 eqv.	2.38E-1	3.59E-2	1.37E-1	1.91E-1	3.39E-2	0.00E+0	0.00E+0	0.00E+0	0.00E+0	2.78E-2	5.34E-3	1.15E-3	-1.17E+0	-4.99E-1
SQP	Pt	5.83E+3	7.43E+0	1.97E+3	2.12E+1	3.92E+2	0.00E+0	0.00E+0	0.00E+0	0.00E+0	5.75E+0	7.55E-1	6.43E-1	-3.22E+1	8.20E+3
ODP	kg CFC 11 eqv.	8.95E-7	1.25E-7	4.23E-7	6.78E-7	1.17E-7	0.00E+0	0.00E+0	0.00E+0	0.00E+0	9.70E-8	2.64E-8	3.45E-9	-1.45E-6	9.19E-7
POCP	kg NMVOC eqv.	4.35E-2	3.65E-3	5.09E-2	5.35E-2	8.24E-3	0.00E+0	0.00E+0	0.00E+0	0.00E+0	2.83E-3	8.67E-3	1.22E-4	-1.95E-2	1.52E-1
ADP-f	MJ	1.86E+2	8.56E+0	1.55E+2	4.55E+1	2.06E+1	0.00E+0	0.00E+0	0.00E+0	0.00E+0	6.63E+0	2.20E+0	2.53E-1	-2.34E+2	1.91E+2
ADP-mm	kg Sb-eqv.	1.68E-4	1.44E-5	9.35E-5	6.62E-5	1.79E-5	0.00E+0	0.00E+0	0.00E+0	0.00E+0	1.11E-5	1.46E-6	8.72E-8	-1.55E-5	3.57E-4

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WDP	m3 world eqv.	1.08E+1	3.06E-2	5.77E+0	1.53E-1	8.49E-1	0.00E+0	0.00E+0	0.00E+0	0.00E+0	2.37E-2	3.31E-2	2.45E-3	-1.42E+0	1.63E+1

AP=Acidification (AP) | **GWP-total**=Global warming potential (GWP-total) | **GWP-b**=Global warming potential - Biogenic (GWP-b) | **GWP-f**=Global warming potential - Fossil (GWP-f) | **GWP-luluc**=Global warming potential - Land use and land use change (GWP-luluc) | **ETP-fw**=Ecotoxicity, freshwater (ETP-fw) | **PM**=Particulate Matter (PM) | **EP-m**=Eutrophication marine (EP-m) | **EP-fw**=Eutrophication, freshwater (EP-fw) | **EP-T**=Eutrophication, terrestrial (EP-T) | **HTP-c**=Human toxicity, cancer (HTP-c) | **HTP-nc**=Human toxicity, non-cancer (HTP-nc) | **IR**=Ionising radiation, human health (IR) | **SQP**=Land use (SQP) | **ODP**=Ozone depletion (ODP) | **POCP**=Photochemical ozone formation - human health (POCP) | **ADP-f**=Resource use, fossils (ADP-f) | **ADP-mm**=Resource use, minerals and metals (ADP-mm) | **WDP**=Water use (WDP)

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Parameter	Unit	A1	A2	A3	A4	A5	B1	B2	B3	C1	C2	C3	C4	D	Total
PERE	MJ	8.46E+0	1.07E-1	1.86E+1	5.64E-1	1.44E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	8.30E-2	8.92E-2	9.22E-3	-2.24E+1	7.04E+0
PERM	MJ	2.71E+2	0.00E+0	9.07E+1	0.00E+0	1.81E+1	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	-3.82E-1	3.79E+2
PERT	MJ	2.79E+2	1.07E-1	1.09E+2	5.64E-1	1.95E+1	0.00E+0	0.00E+0	0.00E+0	0.00E+0	8.30E-2	8.92E-2	9.22E-3	-2.27E+1	3.86E+2
PENRE	MJ	1.47E+2	9.09E+0	1.45E+2	4.84E+1	1.84E+1	0.00E+0	0.00E+0	0.00E+0	0.00E+0	7.03E+0	2.37E+0	2.69E-1	-2.51E+2	1.26E+2
PENRM	MJ	5.31E+1	0.00E+0	1.88E+1	0.00E+0	3.59E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	-3.97E-2	7.54E+1
PENRT	MJ	2.00E+2	9.09E+0	1.64E+2	4.84E+1	2.20E+1	0.00E+0	0.00E+0	0.00E+0	0.00E+0	7.03E+0	2.37E+0	2.69E-1	-2.51E+2	2.02E+2
SM	Kg	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0
RSF	MJ	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0
NRSF	MJ	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0
FW	M3	2.72E-1	1.04E-3	1.44E-1	5.01E-3	2.19E-2	0.00E+0	0.00E+0	0.00E+0	0.00E+0	8.07E-4	9.40E-3	3.07E-4	-1.09E-1	3.45E-1
HWD	Kg	1.22E-4	2.17E-5	1.34E-4	8.15E-5	1.99E-5	0.00E+0	0.00E+0	0.00E+0	0.00E+0	1.68E-5	1.33E-5	3.19E-7	-1.76E-4	2.34E-4
NHWD	Kg	9.52E-1	5.43E-1	1.59E+0	1.38E+0	3.17E-1	0.00E+0	0.00E+0	0.00E+0	0.00E+0	4.20E-1	2.24E-1	1.10E+0	-4.49E-1	6.08E+0
RWD	Kg	2.18E-4	5.62E-5	1.38E-4	3.02E-4	4.02E-5	0.00E+0	0.00E+0	0.00E+0	0.00E+0	4.35E-5	6.53E-6	1.64E-6	-9.84E-4	-1.78E-4
CRU	Kg	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0
MFR	Kg	0.00E+0	0.00E+0	0.00E+0	0.00E+0	1.58E-3	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	1.58E-3
MER	Kg	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0
EET	MJ	0.00E+0	0.00E+0	-2.68E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	-9.19E+1	-9.45E+1
EEE	MJ	0.00E+0	0.00E+0	-1.55E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	-5.33E+1	-5.49E+1
SP	**s€**	**s€ 0,00**	**s€ 0,00**	**s€ 0,00**	**s€ 0,00**	**s€ 0,00**	**s€ 0,00**	**s€ 0,00**	**s€ 0,00**	**s€ 0,00**	**s€ 0,00**	**s€ 0,00**	**s€ 0,00**	**s€ 0,00**	**s€ 0,00**

PERE=renewable primary energy ex. raw materials | **PERM**=renewable primary energy used as raw materials | **PERT**=renewable primary energy total | **PENRE**=non-renewable primary energy ex. raw materials | **PENRM**=non-renewable primary energy used as raw materials | **PENRT**=non-renewable primary energy total | **SM**=use of secondary material | **RSF**=use of renewable secondary fuels | **NRSF**=use of non-renewable secondary fuels | **FW**=use of net fresh water | **HWD**=hazardous waste disposed | **NHWD**=non hazardous waste disposed | **RWD**=radioactive waste disposed | **CRU**=Components for re-use | **MFR**=Materials for recycling | **MER**=Materials for energy recovery | **EET**=Exported Energy Thermic | **EEE**=Exported Energy Electric

1.9 ADDITIONAL INFORMATION

Allocation

There is no allocation applied for the environmental profiles / datasets used in this LCA.