

# MOSO<sup>®</sup> Bamboo X-treme<sup>®</sup> outdoor products

WARRANTY  
**25**  
YEARS

Lior Teitler



MOSO<sup>®</sup> BAMBOO X-TREME<sup>®</sup>  
certified  
**100%**  
proven  
durable - stable - sustainable





# bamboo: the fastest growing plant in the world

**MOSO® BAMBOO X-TREME®**  
certified  
**100%**  
proven  
durable - stable - sustainable

**certified**

**proven**

Since 2008 over  
**3 million m<sup>2</sup>**  
installed, in  
more than  
**50 countries.**

**WARRANTY**  
**25**  
**YEARS**

**certified**

**Class 1**  
(CEN/TS 15083-2)  
EN350

**Class 4**  
EN335

**fire resistant**

**Class A**

**Bfl-s1**

**sustainable**

**CO<sub>2</sub>**  
NEUTRAL



# high stability: end-match system

# MOSO®

## Bamboo X-treme®

With Bamboo X-treme®, MOSO® has developed a truly **ecological** and **durable** alternative to increasingly scarce tropical hardwood.

MOSO® uses a unique process to enhance the **hardness, dimensional stability, fire resistance** and **durability** to a level **superior** to the best tropical hardwood species. MOSO® Bamboo X-treme® can be used for **outdoor decking, cladding, fencing** and **outdoor furniture**.

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Luxury Frontiers

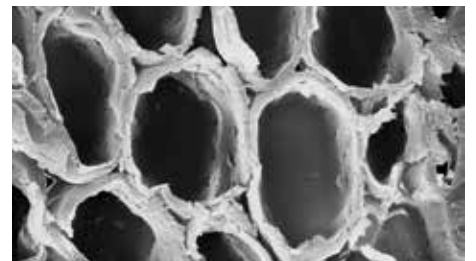


Mark Williams

**Belmond Safaris Savute Elephant Lodge**  
(550 m<sup>2</sup>) Chobe National Park, Botswana

# from bamboo to Bamboo X-treme®

For centuries bamboo poles and bamboo components have been used in outdoor applications. To guarantee a long lasting product for outdoor use, many protective measures have to be taken. In dry environments poles will crack and the bamboo inner wood material, due to its high “sugar”-components, will be easily attacked by micro-organisms and fungi. In China bamboo can be replaced cost efficiently, but in Western countries this is not an option. Therefore, wouldn't it be great to find a way to use one of the fastest growing plants on earth and to make the material suitable for outdoor applications?



Bamboo on molecular level before (top) and after (bottom) the Thermo-Density® treatment: before the sugar molecules are still visible, after the treatment they have disappeared. With this treatment bamboo is no longer a food source for fungi and micro-organisms.

## new production methods

With this challenge MOSO® started to research and test various existing methods to protect bamboo in outdoor applications. The wood protection methods initially tested, which are also often used by other bamboo suppliers, were not satisfactory and did not perform according to MOSO's quality standard. Increasing the density of the bamboo and combining this with a special heat treatment process at (200°C), improves the durability and stability of bamboo. This is called the “Thermo-Density®” treatment.

In 2009 the relevant laboratory and practical tests were done, which proved that the Thermo-Density® treatment is the right method (and currently the only effective solution) to make bamboo suitable for outdoor applications.

## highest durability class

Untreated bamboo has a durability Class 5 according to EN 350 (not durable). By modifying the bamboo with the Thermo-Density® treatment, the dimensional stability of bamboo is improved by approximately 50%. Besides stability improvement, the durability is improved to the best durability class possible, from Class 5 to Class 1 (CEN/TS 15083-2 class 1 - simulated graveyard test, CEN/TS 15083-1 class 1 according to EN 350).

MOSO® Bamboo X-treme® is also well protected against superficial fungi (EN 152, Class 0), and achieves the use/risk Class 4 according to EN 335. MOSO® Bamboo X-treme® is the only bamboo material available on the market to perform to this level.

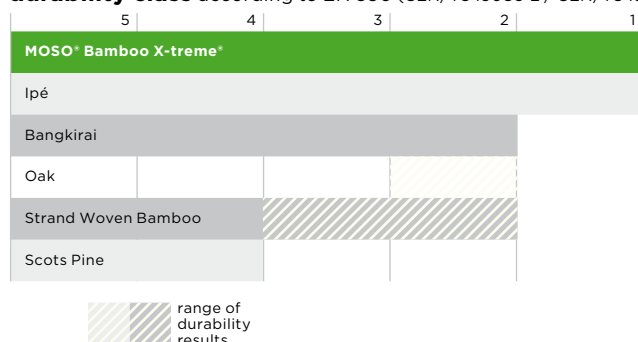
## CO<sub>2</sub> neutral

MOSO® commissioned Delft University of Technology to execute an official LCA and carbon footprint study according to ISO 14040/44. The report, available on request, concludes that MOSO® Bamboo X-treme® is CO<sub>2</sub> neutral or better over the full life cycle. In fact, because of the superior durability, MOSO® Bamboo X-treme® does not have to be replaced as often as other natural materials while at the same time taking advantage of the enormous growth capacity of giant bamboo.

The special Thermo-Density® process increases the density from 650-700 kg/m<sup>3</sup> to approx. 1.150 kg/m<sup>3</sup>, significantly improving the hardness of this product. After pressing, the material is stronger and harder than almost any other hardwood in the world. That is why we call it: **MOSO® Bamboo X-treme®**.

Only with MOSO® Bamboo X-treme® can you be sure to have the original, unique product. Other products that copy the original do not offer the same hardness and level of durability, dimensional stability and ecology. With a look-alike product, there is a large risk of claims after installation. Always ask for the original, certified MOSO® Bamboo X-treme® products!

durability class according to EN 350 (CEN/TS 15083-2 / CEN/TS 15083-1)

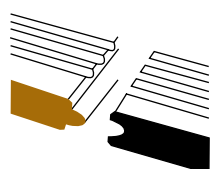


# discover the **Bamboo** X-treme® benefits



## hard & durable

- The only bamboo decking with Class 1 durability (EN 350) tested following CEN/TS 15083-2 class (simulated graveyard test).
- Durability Class 4 in accordance with EN 335 (use class).
- Class 0 fungi resistance in accordance with EN 152.
- Exceptionally hard: Brinell >9.5kg/mm<sup>2</sup> (harder than any tropical hardwood available).



## high stability

- Very stable as a result of the thermo treatment combined with High Density® compression.
- Far more stable than tropical hardwoods - enabling an end-match system.
- Limited tendency to torsion.
- No gap between the end of the boards necessary.
- Only 5-6 mm expansion space between the boards.
- Possible to use pressure treated lumber or metal for joists.



## easy to install

- Can be installed using hidden fasteners or face screwed.
- Both sides of the board - reeded or flat - can be used.
- Fixed board length 1850 mm, easy for 1 person to install, no complicated installation plans necessary.
- MOSO fasteners make it easy to install, release and replace.
- End-match system simplifies the installation by allowing the joint to float between the joists.
- Complementing Thermo-Density® sub frame joists available.



## economical

- Simple and fast installation: Up to 30% savings in installation costs!
- Reduced waste because of the end-match system.
- Cost effective transportation because of the fixed 1850 mm length.
- Cost effective and space reducing stocking because of unique multi usable board.



## beautiful appearance

- A beautiful, natural hardwood look.
- Choice for flat or reeded surface in one reversible board.
- Use of hidden fasteners avoids face screwing and plugging.
- Free of knots and natural plant resins.
- Choice for natural fading, resulting in a natural grey color or maintaining the rich brown color using an exterior finish.



## endless resource

- Made from Moso bamboo; With a growing speed of up to 1 meter per day the fastest growing plant on earth.
- Ready for harvest after 5 years (compared to up to 100 years for hardwood species) - no deforestation.
- Consisting of approx. 90% natural bamboo.



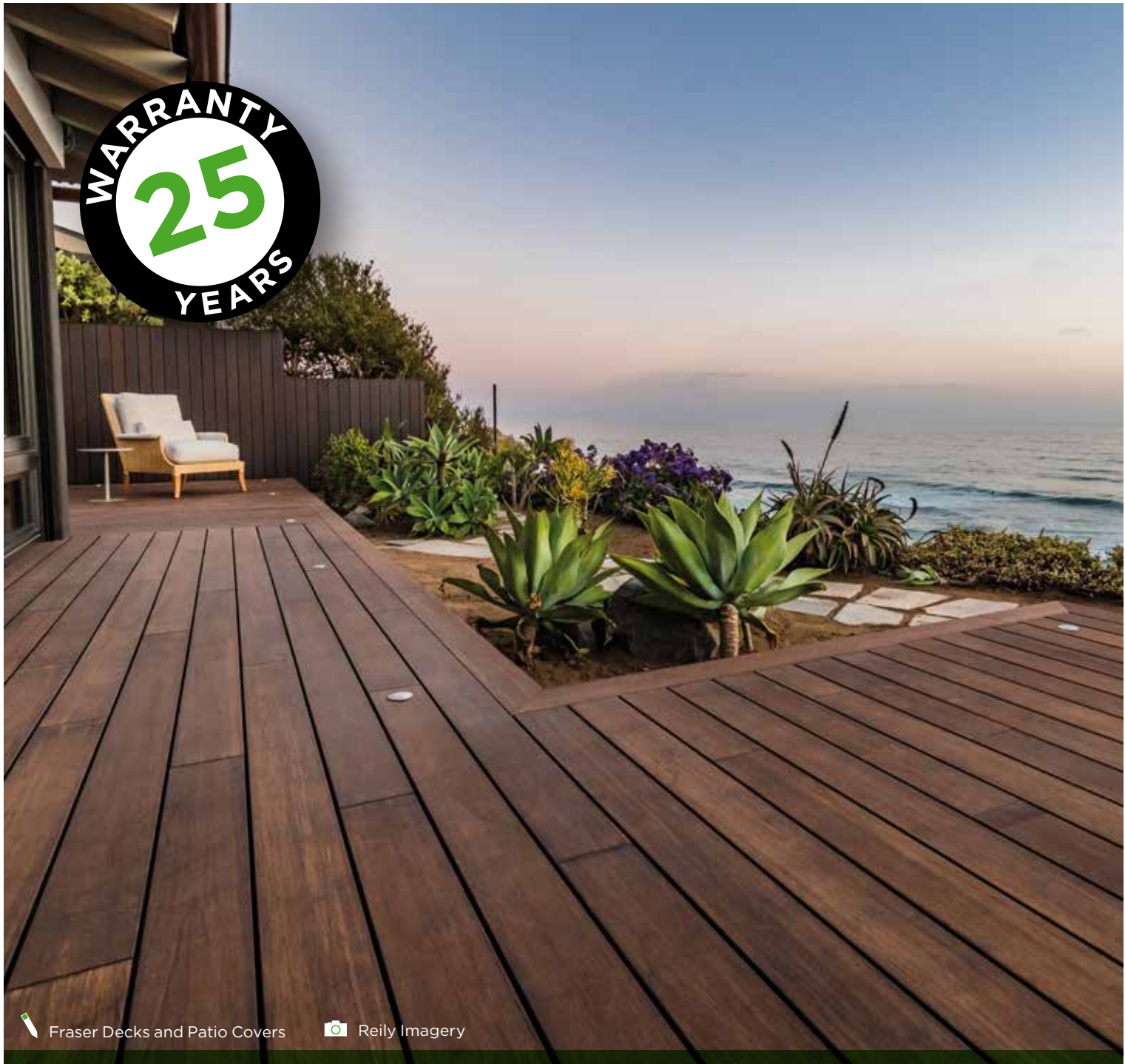
## CO<sub>2</sub> neutral

- Official LCA and carbon footprint studies by Technical University Delft according to ISO 14040/44 confirm that MOSO® Bamboo X-treme® is CO<sub>2</sub> neutral over the full life cycle.
- No use of fungicide in the production.



## fire resistant

- Reaches fire resistance Class Bfl-s1 (decking) and B-s1-d0 (cladding, fencing, beams) following EN 13501-1 without use of fire retardants. As a result, MOSO® Bamboo X-treme® can be easily applied in public projects without additional protective measures.
- Reaches flame spread index Class A following ASTM E84.



Fraser Decks and Patio Covers   Reilly Imagery

**Solana Beach Private Residence**  
California, United States of America



Estudio Vilas   Roberto de Lara

**Ushuaia Ibiza Beach Hotel**  
(3.000 m<sup>2</sup>) Ibiza, Spain

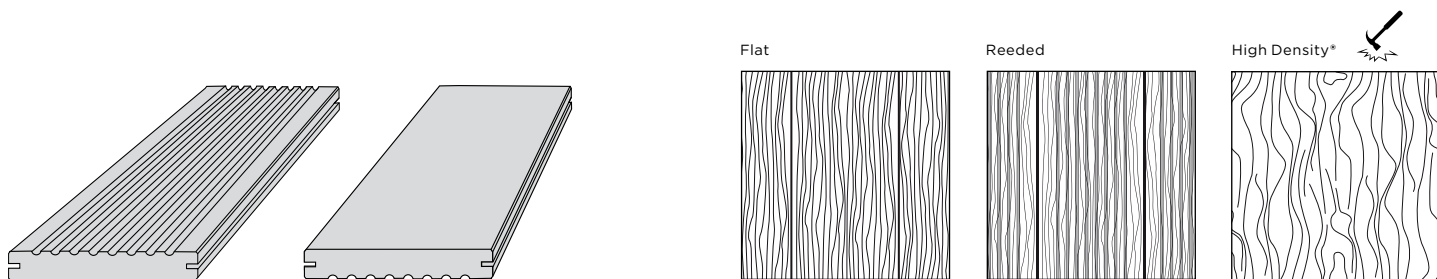


Mayslits Kassifs Architects   Elad Gonen

**2.5 km Central Beach Promenade**  
(700 m<sup>2</sup>) Tel Aviv, Israel

# MOSO® Bamboo X-treme® Outdoor Decking

MOSO® Bamboo X-treme® is a solid, Thermo-Density® decking board, made from compressed bamboo strips. A special, unique heat-treatment process at 200°C provides MOSO® Bamboo X-treme® the highest durability class possible in the appropriate EU norms (see technical characteristics below) and increases the hardness and stability. A unique feature of MOSO® Bamboo X-treme® is the end-match system: this can only be done with very stable materials and enables connection of an unlimited number of boards in the length. The special symmetrical shape of the sides offers the possibility to choose between either the reeded or the flat surface, and allows for quick installation with MOSO® fasteners. Like any untreated tropical hardwood species, when exposed to outdoor conditions, MOSO® Bamboo X-treme® will turn grey over time creating a very natural look.



O: Oil Woca, B: Bevel (also on ends), R: Reeded, F: Flat  
 \*) The end of the boards are protected with wax, \*\*) Check availability.

Product Code	Grooved	Finish	Edges	Surface	End-match system	Dimensions (mm)
BO-DTHT170G	Yes	-	B	R/F	Yes	1850x137x20
BO-DTHT171G	Yes	O	B	R/F	Yes*	1850x137x20
BO-DTHT181G	Yes	O	B	R/F	Yes*	1850x137x18
BO-DTHT190G**	Yes	-	B	R/F	Yes	1850x155x20
BO-DTHT191G	Yes	O	B	R/F	Yes*	1850x155x20
BO-DTHT210G**	Yes	-	B	R/F	Yes	1850x178x20
BO-DTHT211G	Yes	O	B	R/F	Yes*	1850x178x20

## installation summary

(full version available on [www.moso.eu/x-treme](http://www.moso.eu/x-treme))

- Install a suitable, fixed, stable and durable sub frame.
- Determine which side of the board will be used: the reeded or flat side.
- Fix the boards on the sub frame using fasteners (to be inserted in the grooves of the board) or alternatively with screws (through the surface).
- Use a 1-2% slope and ensure good ventilation is available.
- After installation: make sure proper cleaning and maintenance is done, according to the chosen finish.
- When not applying outdoor oil regularly, the deck will acquire a grey colour tone and the typical bamboo wood grain structure will become less visible.
- Bamboo X-treme® is available pre-oiled or unfinished.  
 In order to maintain the rich brown colour an exterior penetrating oil for hardwoods is recommended to be applied 3 to 4 months after installation.  
 We advise to apply the initial coat 3-4 months after installation.
- For further info: please see the installation/maintenance instructions.

## technical characteristics and certifications

- Density: +/- 1150 kg/m<sup>3</sup>
- Dimensional stability: length: + 0.1%; width + 0.9% (24 hours in water 20°C)
- Resistance to Indentation - Brinell Hardness: ≥ 9.5 kg/mm<sup>2</sup> (EN 1534)
- Reaction to fire: Class Bfl-s1 (EN 13501-1)
- Flame spread index: Class A (ASTM E84)
- Slip resistance: USRV 55 (Dry), USRV 29 (Wet) (CEN/TS 15676) / R 10 (CEN/TS 16165 Annex B - DIN 51130) (Dry)
- Thermal emittance: 0.81 (ASTM C1371)\*
- Solar Reflectance (SR): 32 (ASTM C1549)\*
- Solar Reflectance Index (SRI): Low 27, Medium 30, High 33 (ASTM E1980)\*
- Modulus of Elasticity: 13565 N/mm<sup>2</sup> (mean value - EN 408)
- Breaking strength: 54.4 N/mm<sup>2</sup> (characteristic value - EN 408)
- Biological durability:  
 Class 1 (EN 350 / CEN/TS 15083-2), simulated graveyard test  
 Class 1 (EN 350 / CEN/TS 15083-1)
- Effectiveness against Blue Stain: Class 0 (EN 152)
- Use Class: Class 4 (EN 335)
- CO<sub>2</sub> neutral: LCA report TU Delft (ISO 14040/44) ([www.moso.eu/lca](http://www.moso.eu/lca))
- Environmental Product Declaration - EPD (EN 15804) ([www.moso.eu/epd](http://www.moso.eu/epd))
- FSC®: Products available with FSC® certification on request.
- Contribution LEED BD+C - v4: MR 1, MR 2, MR 3 (FSC®), EQ 2 v2009: MR 6, MR 7 (FSC®), IEQ 4.3, IEQ 4.4
- Contribution BREEAM: MAT 1, MAT 3 (FSC®), MAT 5 (HD)
- Guarantee: 25 years

\*) Tested on 3 years weathered MOSO® Bamboo X-treme® vV



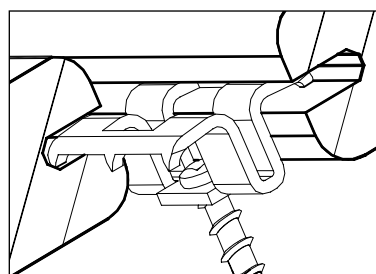
breeam

# MOSO® Bamboo X-treme® Outdoor Decking accessories

## MOSO® fasteners and screws

With these fasteners MOSO® Bamboo X-treme® decking and cladding can be easily installed. When installed correctly there will be 5-6 mm gaps between the boards. The fasteners are supplied with matching stainless steel screws (square bit). For installation on aluminium sub frame joist (not provided by MOSO®), special screws are available.

Product Code	Item	Material	Colour	Dimensions (mm)
CLIP-SCREW-BX031	Fastener (20 mm)	Stainless steel A2 (AISI304)	Brown	27x22.5x10.8
	Screw	Stainless steel A2 (AISI304)	Brown	4.5x30
CLIP-SCREW-BX301	Fastener starter/end (20 mm)	Stainless steel A2 (AISI304)	Brown	27x17x31
	Screw	Stainless steel A2 (AISI304)	Brown	4.5x30
SCREW-03-01	Screw for aluminum sub frame joist	Stainless steel A2 (AISI410)	Brown	4.2x16
CLIP-SCREW-BX041	Fastener (18 mm)	Stainless steel A2 (AISI304)	Brown	27x22.5x9.8
	Screw	Stainless steel A2 (AISI304)	Brown	4.5x30

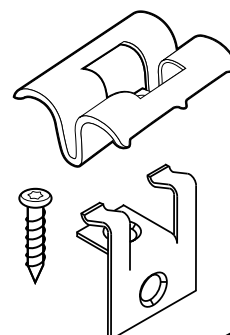


### recommended number of fasteners/m<sup>2</sup>

decking*	cladding**
137 mm -20 pcs/m <sup>2</sup>	137 mm -14 pcs/m <sup>2</sup>
155 mm -17 pcs/m <sup>2</sup>	
178 mm -14 pcs/m <sup>2</sup>	

\*) Based on distance of 462.5 mm between the sub frame joist axes.

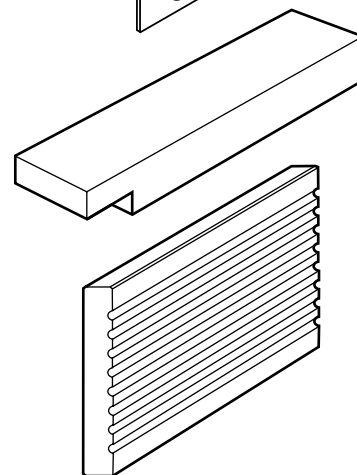
\*\*) Based on distance of 600 mm between the sub frame joist axes.



## sub frame joists

The MOSO® Bamboo X-treme® sub frame joists are made of the same material as the decking boards: Thermo-Density® heat-treated bamboo.

Product Code	Material	Finish	Dimensions (mm)
BO-SB150	Thermo-Density® bamboo	Unfinished	2440x70x40
BO-SB155	Thermo-Density® bamboo	Unfinished	2440x60x40



## endprofile

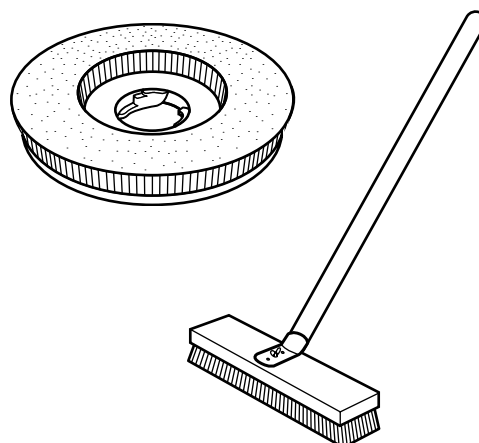
The BO-DTHT162 is an endprofile for an elegant finish of the sides of the decking. It is placed vertically against the sides of the terrace to cover the sub frame.

Product Code	Material	Finish	Dimensions (mm)
BO-DTHT162	Thermo-Density® bamboo	Unfinished	1850x137x20

## maintenance & cleaning

Under the influence of wind, rain, sun and snow the decking will weather. MOSO® recommends to impregnate and maintain the pre-oiled decking with Woca Maintenance materials. Unfinished decking must be treated with Sikkens Saturator or Woca oil right after installation. The silicium carbid broom and machine disk are perfectly suited to clean and smooth the decking surface of Bamboo X-treme® and to remove splinters due to the capability to sand the surface in addition to cleaning it.

Product Code	Material
Wax-bx-01	Wax for board ends X-treme
Oil-Woca-003	WOCA Maintenance Oil Natural
Oil-Woca-011	WOCA Exterior Oil Exclusive Teak
Cleaner-Woca-01	WOCA Exterior Cleaner
SATURATOR-SIK01	SIKKENS Saturator Ipe
SATURATOR-SIK11	SIKKENS Saturator Transparent
Broom-01	Silicium carbid broom
Disk-01	16" Silicium carbid disk
Woca-Applicator	Exterior oil applicator stem, pad holder and pad





# MOSO® Bamboo X-treme® Outdoor Decking

## installation instruction

### before installation

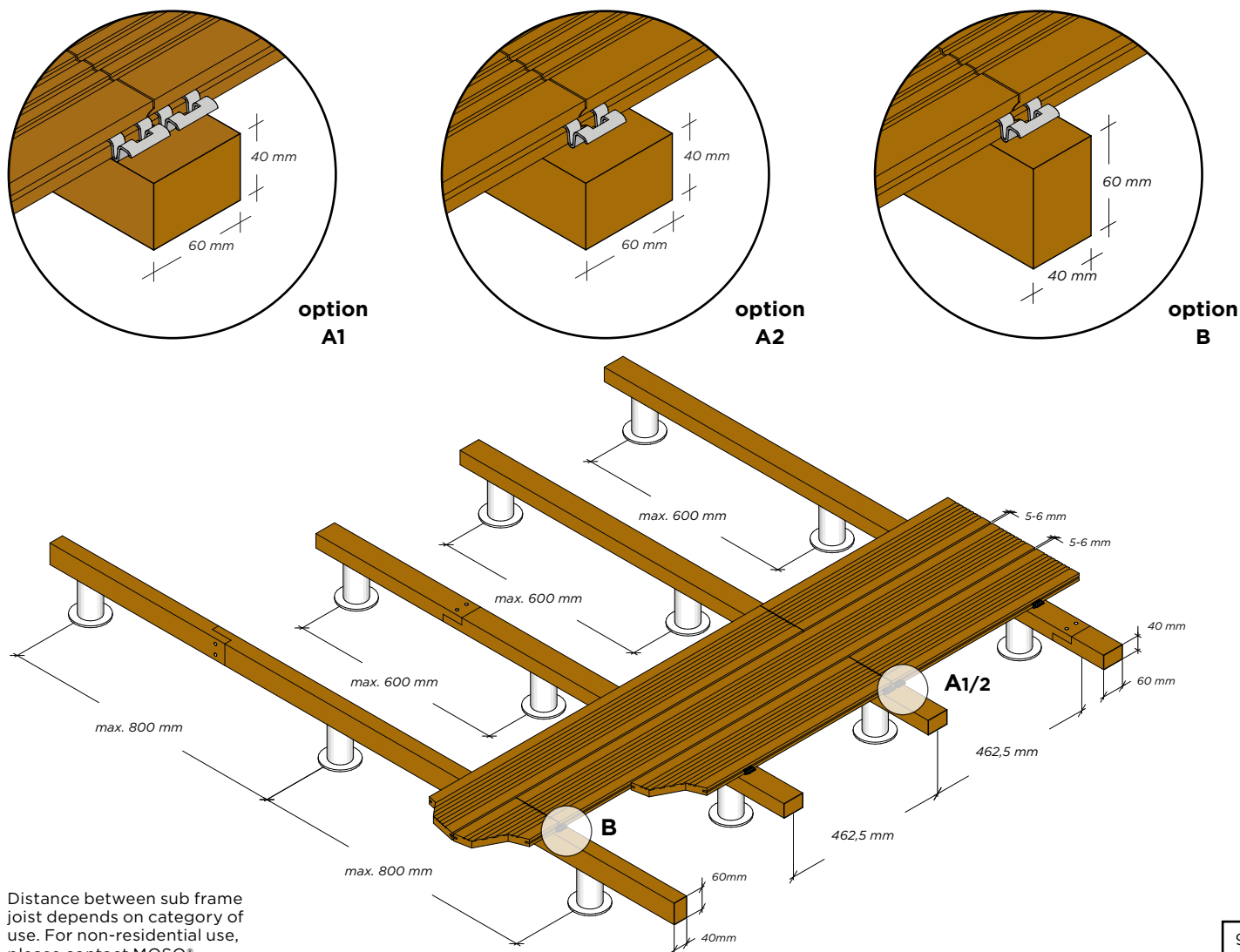
- Water logging under the decking must be avoided by preparing a water permeable ground structure. This can be achieved by sand layers and gravel dispersion above.
- Use cement/stone tiles 40-50 mm thick or pedestals, to support the sub frame (see drawing).
- Place a rootbarrier under the tiles to prevent weeds growing under the decking.
- Install the decking boards with a slope of 1-2% to enable water to run off the surface.
- Ensure good ventilation of the decking by keeping at least 20 mm space at walls and obstacles and avoid closing the terrace on the sides.
- When the surface underneath the decking is not fast drying, there should be at least 100 mm distance between the decking and the surface underneath the floor.
- Use sub frame joists with the minimum size of 40x60 mm. Suitable joists are those with the same durability class as the decking; MOSO® sub frame joists, ALU sub frame joists, stable hardwood joists or impregnated pine joists. Avoid direct contact with the earth.
- MOSO® sub frame joists can be installed without gaps, connecting the joists with screws and glue suited for outdoor use. Other sub frame joists should be installed with 5-8 mm distance between the end of the joists.

- In order to create a stable deck frame, the outsides of the frame have to be connected at regular intervals to the ground/ structure below. Alternatively cross bracing can be applied.
- Install the boards on sub frame joists with 462.5 mm space between the joists (centre-to-centre) so each board is supported by 5 battens. Always install the head sides of the boards exactly on the sub beam.
- If a random installation pattern is preferred, make sure that the sub frame joist (centre-to-centre) are no more than 300 mm apart.
- Always install cut off outdoor boards on at least 3 sub frame joists.

- and cross cut ends. Besides this the surface gets rough. This phenomenon is normal for most wood species and is minimized for this product by its unique 'Thermo-Density®' production method. Head sides cracks can be further minimized by applying wax on cross end sides of the cut boards, see 'the installation'.
- Splinters and roughness can be removed by cleaning the surface of the decking with the silicium carbid broom or machine disk MOSO® supplies, the surface will become smooth and splinters are removed.
- Dimensional change or cupping of the boards can occur after installation. This phenomenon is normal for most wood species and is minimized for this product by its unique Thermo-Density® heat-treated process.
- When using the flat side of the boards as surfium please note that deformation under influence of climate will be significantly more visible. Deformation of the surface is not considered to be fault of the material.

### please note

- The MOSO® Bamboo X-treme® outdoor board is a natural forest product, which varies in colour, grain and appearance. Colour can change fast from dark brown to brown or grey, depending on the maintenance schedule.
- Cracks and splinters on the surface and on the end of the boards will arise from the different drying characteristics of the surface



Distance between sub frame joist depends on category of use. For non-residential use, please contact MOSO®.

# MOSO® Bamboo X-treme® Outdoor Decking

## installation instruction

### the installation

- Keep at least 5-6 mm expansion space between the boards (in width direction). With MOSO® Bamboo X-treme® fastener installation this is automatically the case.
- Because of the stability of the boards and the end-match system no expansion space is needed on the end of the boards.
- Every cut end has to be impregnated with board end wax, to prevent water penetration. Board end wax is available as accessory.

#### installation with fasteners

- Determine the surface side of the boards (reeded- or flat surface).
- Use the MOSO® Bamboo X-treme® fasteners or other suitable fasteners in the following sequence:
  - Press fastener in the groove of one board.
  - Pre-drill the screw holes. On hardwood/ bamboo: use 3.2-3.5 mm extended drill (11 cm long) in order to pre drill deep enough.
  - Mount the screw without fully tightening.
  - Install the following board.
  - Tighten the screw in the fastener and the sub beam. Always screw vertically to the joist. Apply low torque with slow screwing speed on the drilling machine.
 Perform some tests for correct torque speed adjustment before full installation.
- Use approx. 20/17/14 fasteners per m<sup>2</sup>, this is depending on the type or board 137/155/178mm wide. When the tongue and groove are connected on the sub beam, use 1, preferably 2 fasteners, 1 for every board (see drawing options A1/ A2/ B).
- Only use the included stainless steel decking screws (4.5 x 30 mm).
- Please watch the installation video [www.moso.eu/x-treme](http://www.moso.eu/x-treme).

#### screw down installation

- Determine the surface side of the boards (reeded- or flat surface).
- Pre-drill the screw holes 20 mm from the side of the board. Be sure to pre drill with a large enough drill to avoid cracking of the decking.
- Always screw both sides (left and right) of the board.
- Use stainless steel decking screws (ca 5 x 50 mm).

### maintenance and cleaning

#### prefinished version

- MOSO® Bamboo X-treme® outdoor decking is pre-oiled, double sided, with WOCA exterior waterbased decking oil (teak colour).
- Clean the floor at least one time per year with WOCA Decking Cleaner and silicium carbid broom or -disk. Follow the instructions on [www.moso.eu/youtube](http://www.moso.eu/youtube). Depending on climate and use it may be necessary to perform cleaning more than once per year.
  - Remove the dirt water residue on the boards with clean water and let the floor dry.
  - Apply 1-2 new layers of WOCA Decking Oil (WOCA exterior oil, teak colour). When not applying new outdoor oil 1-2x per year, the floor will turn in to a grey colour tone and the typical bamboo wood grain structure will become less visible. First oiling can be performed directly after installation, the best moment for the first maintenance is 3-4 months after installation, when the surface is more open than immediately after installation. Follow the instructions on [www.moso.eu/youtube](http://www.moso.eu/youtube).
  - It is advisable to keep the decking free from dust and dirt as much as possible (clean by broom regularly).

#### unfinished version

- It is possible to leave the decking without oiling, however cleaning once a year is necessary; the result will be a rough and grey appearance. An initial application of waterbased decking oil / saturator is necessary in order to impregnate the decking. This can be done immediately after installation or, to have better impregnation, after 3-4 months when the surface is more open.
- Clean the decking with water, cleaner and silicium carbid broom or - disk.
  - Let the decking dry. When the decking is completely dry please follow the instructions of the supplier of the used oil or saturator.
  - After this first application the decking can remain without oil treatment for natural greying. However annual cleaning with the silicium carbid broom or disk is obligatory. If you want to keep a darker colour, regular application of oil/saturator is needed.
  - It is advisable to keep the decking free from dust and dirt as much as possible (clean by broom regularly).

### storing

Store MOSO® Bamboo X-treme® in a dry, cool place protected against dust and direct sunlight.

### additional note

Whilst all due care is taken to ensure the accuracy of the installation instructions, individual circumstances (location, sub floor and installation procedures) may vary and are beyond the manufacturer's control. In case of doubt, therefore, consult the distributor.

**These instructions are subject to change. For the latest version visit [www.moso.eu/x-treme](http://www.moso.eu/x-treme)**

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# MOSO® Bamboo X-treme® Outdoor Decking

## maintenance & cleaning



Surface of MOSO® Bamboo X-treme® with different maintenance and cleaning scenarios: weathered, dirty decking (left), weathered, cleaned decking (middle), and re-oiled decking (right).

### maintenance WOCA

The surface of decking is weathered under influence of wind, rain, frost and sunshine (UV). As a result, the surface turns grey, dirty and cracks/splinters will appear. WoodCare Denmark has developed different outdoor cleaning- and maintenance products. WOCA Exterior Cleaner loosens dirt and removes green growth from the surface, without damaging it.

### cleaning

- Soak MOSO® Bamboo X-treme® with plenty of water. If possible use a garden hose. Do not use high-pressure cleaners.
- Mix exterior cleaner with water in the ratio 1:2 and apply it. If the decking is extremely dirty, exterior cleaner may be used undiluted. Clean the decking with a silicium carbid brush or machine disk (see accessories). Scrub the soaked material lengthwise following the bamboo grain until the material appears clean. If the decking has a flat surface, first scrub under an angle of 45 degrees before scrubbing in the length direction. When using a machine disk this is not necessary. Repeat the cleaning if necessary. Clean the surface carefully with water.
- Leave MOSO® Bamboo X-treme® to dry for approx. 24 hours. The material must be completely dry before oil treatment can be done.

### application of oil

- Apply in dry weather only. Avoid direct sunlight and high temperatures.
- Stir the oil thoroughly before use. Apply an even thin coat of oil with a brush.
- The oil is cream-coloured when it is wet.
- After a few minutes, the material has an oily appearance as the water is evaporating.
- Wipe off any excess oil with clean cotton cloths after no more than 5-10 minutes.
- Take particular care to remove excess oil from joints and grooves.
- Repeat the above process.
- When the material is dry, it may be polished with a polishing pad or polishing machine to ensure an extra hard-wearing surface. It takes 24 to 48 hours for the oil to harden thoroughly, depending on weather conditions and outdoor temperature. The material should not be exposed to water during this period.

### maintenance of flat side

Please be aware of the fact that on the flat surface, irregularities in the surface (e.g. cracks, splinters) are more visible than on the reeded surface. If regular maintenance with a waterbased decking oil is performed, this will be reduced.

### risk of self-ignition

Due to the risk of self-ignition it is important that oil-wetted cloths are soaked in water and are disposed in a tightly closed container after use.



Check out the maintenance movie at [www.moso.eu/x-treme](http://www.moso.eu/x-treme)





 B2A1  Lior Teitler



**'De Drie Hofsteden' Apartment Blocks**  
(20.000 m) Kortrijk, Belgium



 Bogaerds Architecten & ContrAll  Derako

**Texaco Gas Station**  
(230 m<sup>2</sup>) Nijkerk, The Netherlands



 Landmark Vastgoed Management  Robbert Vögtlander

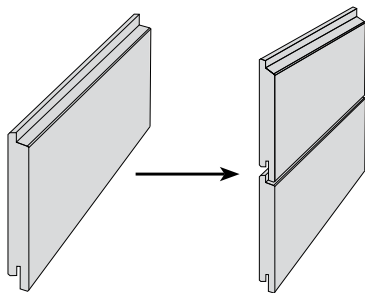
**MOSO Head Office**  
(600 m<sup>2</sup>) Zwaag, The Netherlands

# MOSO® Bamboo X-treme® Outdoor Cladding

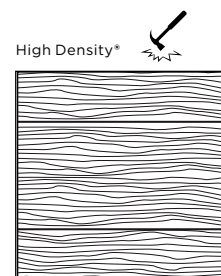
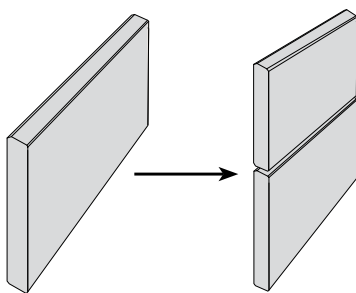
MOSO® Bamboo X-treme® cladding is a solid, Thermo-Density® exterior board, made from compressed bamboo strips. A special, unique heat-treatment process at 200°C provides MOSO® Bamboo X-treme® the highest durability class possible in the appropriate EU norms, increases the stability and density, and consequently the hardness.

Furthermore, contrary to other wood products, this product achieves fire resistance Class B-s1-d0 (EN 13501-1) without impregnation with expensive and eco-damaging fire retardants. MOSO® Bamboo X-treme® cladding is available in 2 shapes: a rebated profile and a trapezium shape. The former is installed with fasteners (18 mm) and screws and the latter with screws. Like any untreated tropical hardwood species, when exposed to outdoor conditions, MOSO® Bamboo X-treme® will turn grey over time creating a very natural look.

BO-DTHT500G (rebated profile)



BO-DTHT510 (trapezium shape)



B: Bevel (also on ends), F: Flat

Product Code	Grooved	Finish	Edges	Surface	End-match system	Effective width (mm)	Dimensions (mm)
BO-DTHT500G	Yes	-	B	F	Yes	128	1850x137x18
BO-DTHT510	No	-	B	F	Yes	132	1850x137x18

## installation summary

(full version available on [www.moso.eu/x-treme](http://www.moso.eu/x-treme))

- Apply a waterproof membrane against the wall and screw vertical battens onto that.
- Each board should be fixed on at least 3 battens: so the maximum centre-to-centre distance between the battens is 616.7 mm (1850 mm/3).
- Install the first, bottom, row of fasteners on the battens and place the first row of boards onto them.
- Place the second row of fasteners / boards and continue like this with the whole surface.
- For further info: please see the installation / maintenance instructions.

## technical characteristics and certifications

- Density: +/- 1150 kg/m<sup>3</sup>
- Dimensional stability: length: + 0.1%; width: + 0.9% (24 hours in water 20°C)
- Resistance to Indentation - Brinell Hardness: ≥ 9.5 kg/mm<sup>2</sup> (EN 1534)
- Reaction to fire: Class B-s1-d0 (EN 13501-1)
- Flame spread index: Class A (ASTM E84)
- Thermal emittance: 0.81 (ASTM C1371)\*
- Solar Reflectance (SR): 32 (ASTM C1549)\*
- Solar Reflectance Index (SRI): Low 27, Medium 30, High 33 (ASTM E1980)\*
- Modulus of Elasticity: 13565 N/mm<sup>2</sup> (mean value - EN 408)
- Breaking strength: 54.4 N/mm<sup>2</sup> (characteristic value - EN 408)
- Biological durability: Class 1 (EN 350 / CEN/TS 15083-2), simulated graveyard test Class 1 (EN 350 / CEN/TS 15083-1)
- Effectiveness against Blue Stain: Class 0 (EN 152)
- Use Class: Class 4 (EN 335)
- CO<sub>2</sub> neutral: LCA report TU Delft (ISO 14040/44) ([www.moso.eu/lca](http://www.moso.eu/lca))
- Environmental Product Declaration - EPD (EN 15804) ([www.moso.eu/epd](http://www.moso.eu/epd))
- FSC®: Products available with FSC® certification on request.
- Contribution LEED BD+C - v4: MR 1, MR 2, MR 3 (FSC®) v2009: MR 6, MR 7 (FSC®)
- Contribution BREEAM: MAT 1, MAT 3 (FSC®), MAT 5 (HD)
- Guarantee: 25 years

\*) Tested on 3 years weathered MOSO® Bamboo X-treme®



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FSC® C002063  
[www.fsc.org](http://www.fsc.org)  
Only the products defined as such,  
are FSC certified



breeam

# MOSO® Bamboo X-treme® Outdoor Cladding

## installation instruction

### important

- The MOSO® Bamboo X-treme® outdoor cladding board is a natural product, and some variation in colour, grain and appearance is normal. Colour can change fast from dark brown to brown or grey, depending on the climatic conditions and maintenance schedule.
- Small cracks and splinters on the surface and on the end of the boards can arise from the different drying characteristics of the surface and cross cut ends. The surface will also get rougher over time. This phenomenon is normal for most wood species and is minimized for this product by its unique 'Thermo-Density®' production method. Cracks can be further minimized by applying wax on the ends of the boards.
- Slight dimensional change or cupping of the boards can occur after installation. This phenomenon is normal for most wood species and is minimized for this product by its unique 'Thermo-Density®' production method.
- Keep at least 5-6 mm ventilation space between the boards (in vertical direction). Installation with MOSO® Bamboo X-treme® fasteners ensures correct spacing automatically.
- Because of the stability of the boards and the shape of the end-match system no expansion space is needed on the length (the end of the boards).
- We recommend applying end sealer wax on every (cut) end to prevent water penetration. End sealer wax is available as an accessory.
- If a random joint pattern is desired, the distance between the battens can be maximum 300 mm (see drawing random pattern).

### maintenance

It is possible to leave the cladding without maintenance; the result will be a rough and grey appearance. If you want to keep a darker colour, regular application of oil/saturator is needed:

- Clean the cladding with water.
- Let the cladding dry.  
When the cladding is completely dry apply the oil or saturator according to the supplier's instructions.

### storing

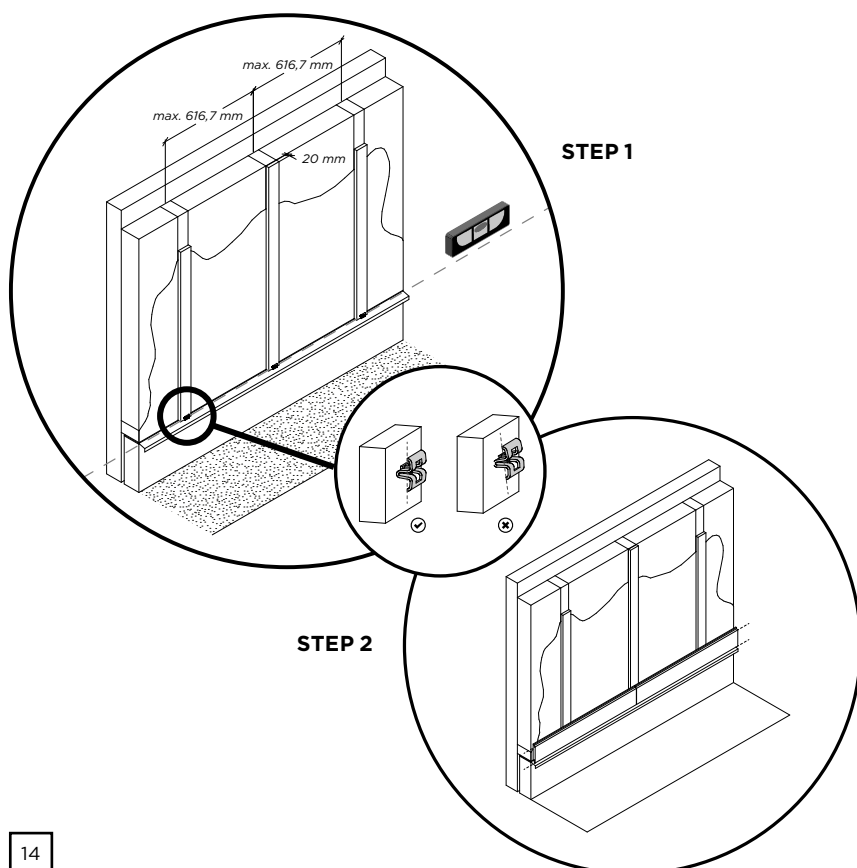
Store MOSO® Bamboo X-treme® in a dry, cool place protected against dust and direct sunlight.

### the installation

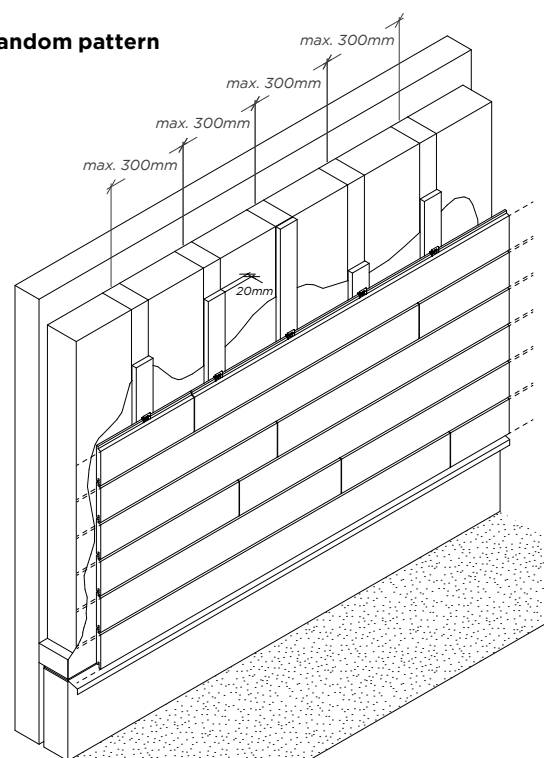
#### rebated profile BO-DTHT500G

- Apply a waterproof membrane against the wall and screw vertical battens (at least 20 mm thick, 60 mm wide) onto that, creating a rigid/flat surface onto which the boards can be fixed.
- Each board should be fixed on at least 3 battens: so the maximum centre-to-centre distance between the battens is 616.7 mm (1850 mm/3).
- The cladding boards should be fixed using the MOSO fastener. Use a screw which performs in the material of the batten. Make sure the MOSO® Fastener is screwed in the middle of the batten so that it is fully supported.
- Please note: At the edges of the cladding, keep a distance of 5-10 mm from adjacent materials, to allow for sufficient ventilation.
- **STEP 1 levelling first row of fasteners**
  - Start with the lowest row of fasteners and make sure they are placed fully level (using a spirit level).
  - Avoid overtightening the screws as this can pull the fastener slightly into the wood, making it difficult to place the board onto the fastener.
- **STEP 2 install first row of boards**
  - Holding the first boards level, slide the lip of the groove on the lower edge behind the tabs on the fasteners.
  - Make sure that the fasteners engage deeply enough in the groove so that the boards lay level. Tapping the boards should be done carefully, preferably with a rubber mallet.
  - We advise always fixing the end (end joints) of the boards on a batten/beam, using 2 fasteners.

#### rebated profile BO-DTHT500G



#### random pattern



# MOSO® Bamboo X-treme® Outdoor Cladding

## installation instruction

• **STEP 3 second row of fasteners**

- Install the second row of fasteners, pushing them down on the top edge of the first row of boards.

• **STEP 4 install second row of boards**

• **STEP 5 Continue with the rest**

- Continue to install the cladding boards in this way to cover the full surface. Make sure you keep the fasteners level and make sure enough ventilation space (5-10 mm) is kept on the edge.

### trapezium profile BO-DTHT510

- Apply a waterproof membrane against the wall and screw vertical battens (at least 20 mm thick, 60 mm wide) onto that, creating a rigid/flat surface onto which the boards can be fixed.
- Each board should be fixed on at least 3 battens: so the maximum centre-to-centre distance between the battens is 616.7 mm (1850 mm/3).
- Fix the cladding boards using countersunk screws. Use a screw which performs in the material of the batten.
- Please note: At the edges of the cladding, keep a distance of 5-10 mm from adjacent materials, to allow for sufficient ventilation.

• **STEP 1 Install first row**

- Start with the lowest row of boards and make sure they are placed fully level (using a spirit level).
- Take care about the positioning of screws, try to align them and thereby obtain an equal distribution. Always use 2 screws at each fixing point. Please see the detailed drawing below, which indicates the positioning of screws.
- Make use of a countersink drill to ensure the same sinking depth for every screw.

• **STEP 2 Install second row**

- Install the second row of boards, using a minimum 6 mm spacer.
- Please regularly check that the boards are still level.

• **STEP 3 Continue with the rest**

- Continue to install the cladding boards in this way to cover the full surface. Make sure you keep the boards level and make sure enough ventilation space (5-10 mm) is kept on the edge.

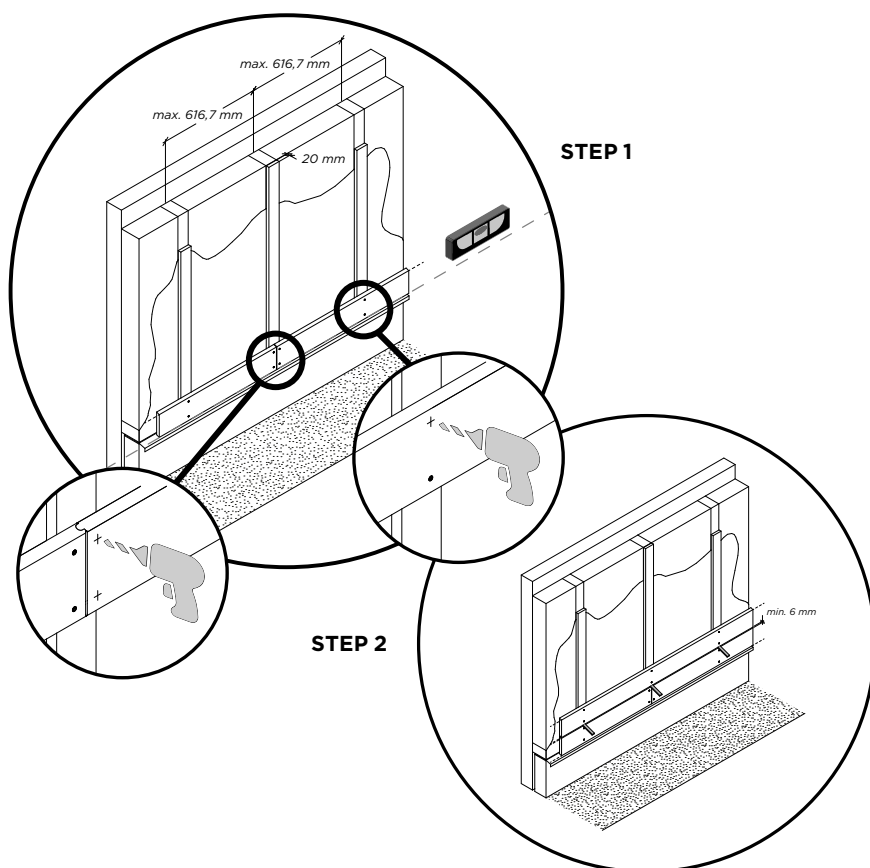
### additional note

Whilst all due care is taken to ensure the accuracy of the installation instructions, individual circumstances (location, sub structure and installation procedures) may vary and are beyond the manufacturer's control. In case of doubt, therefore, consult the distributor.

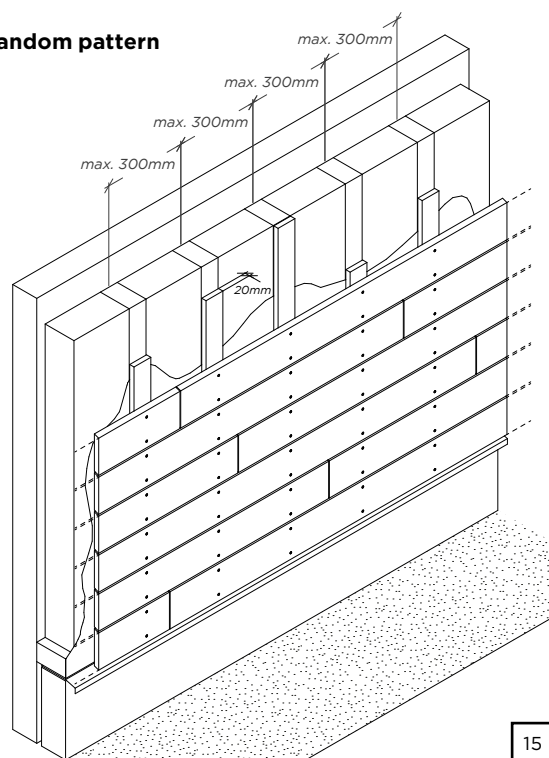
**These instructions are subject to change. For the latest version visit [www.moso.eu/x-treme](http://www.moso.eu/x-treme)**

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### trapezium profile BO-DTHT510

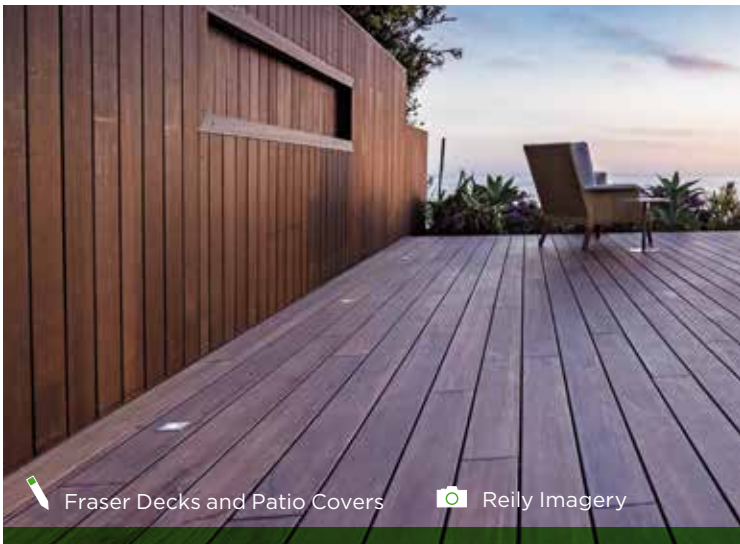


### random pattern



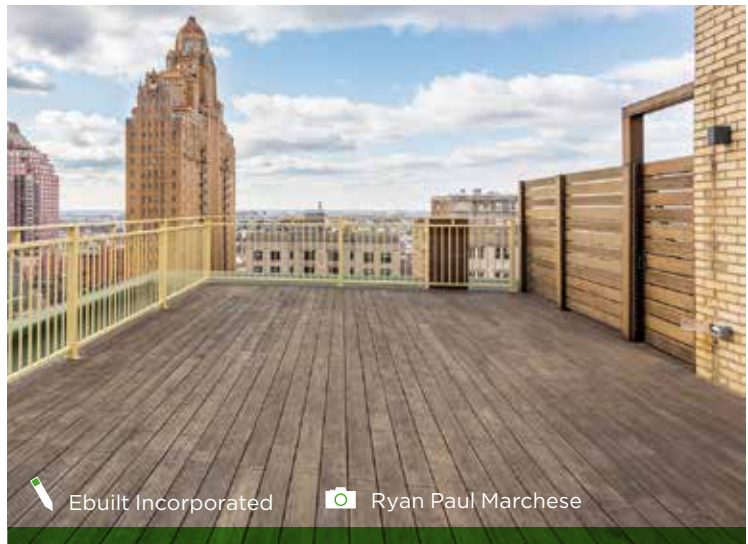


**MOOM 57 Restaurant**  
(400 m<sup>2</sup>) La Coruña, Spain



Fraser Decks and Patio Covers    Reilly Imagery

**Solana Beach Private Residence**  
California, United States of America



Ebuilt Incorporated    Ryan Paul Marchese

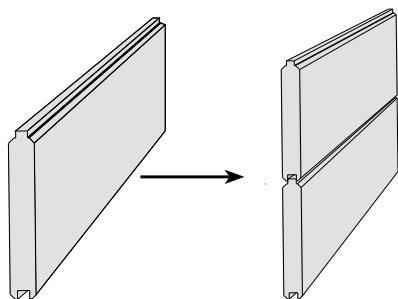
**The Versailles Apartment Complex**  
(418 m<sup>2</sup>) Philadelphia, United States of America



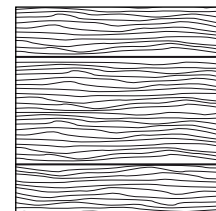
# MOSO® Bamboo X-treme® Fencing

MOSO® Bamboo X-treme® fence boards are solid, Thermo-Density® exterior boards, made from compressed bamboo strips. A special, unique heat-treatment process at 200°C provides MOSO® Bamboo X-treme® the highest durability class possible in the appropriate EU norms and increases the stability and density. The fence boards, with end-match system, are mounted between posts with U-profiles (not provided by MOSO®). Like any untreated tropical hardwood species, when exposed to outdoor conditions, MOSO® Bamboo X-treme® will turn grey over time creating a very natural look.

BO-DTHT301TG (fencing board shape)



High Density\*



O: Oil Woca, B: Bevel (also on ends), F: Flat

Product Code	Grooved	Finish	Edges	Surface	End-match system	Effective width (mm)	Dimensions (mm)
BO-DTHT301TG	Board ends	O	B	F	No	131	1800x137x20

## technical characteristics and certifications

- Density: +/- 1150 kg/m<sup>3</sup>
- Dimensional stability:  
length: + 0,1%; width + 0,9% (24 hours in water 20°C)
- Resistance to Indentation - Brinell Hardness: ≥ 9.5 kg/mm<sup>2</sup> (EN 1534)
- Reaction to fire: Class B-s1-d0 (EN 13501-1)
- Flame spread index: Class A (ASTM E84)
- Thermal emittance: 0.81 (ASTM C1371)\*
- Solar Reflectance (SR): 32 (ASTM C1549)\*
- Solar Reflectance Index (SRI): Low 27, Medium 30, High 33 (ASTM E1980)\*
- Modulus of Elasticity: 13565 N/mm<sup>2</sup> (mean value - EN 408)
- Breaking strength: 54.4 N/mm<sup>2</sup> (characteristic value - EN 408)
- Biological durability:  
Class 1 (EN 350 / CEN/TS 15083-2), simulated graveyard test  
Class 1 (EN 350 / CEN/TS 15083-1)
- Effectiveness against Blue Stain: Class 0 (EN 152)
- Use Class: Class 4 (EN 335)
- CO<sub>2</sub> neutral: LCA report TU Delft (ISO 14040/44) (www.moso.eu/lca)
- Environmental Product Declaration - EPD (EN 15804) (www.moso.eu/epd)
- FSC®: Products available with FSC® certification on request.
- Contribution LEED BD+C - v4: MR 1, MR 2, MR 3 (FSC®)  
v2009: MR 6, MR 7 (FSC®)
- Contribution BREEAM: MAT 1, MAT 3 (FSC®), MAT 5 (HD)
- Guarantee: 25 years

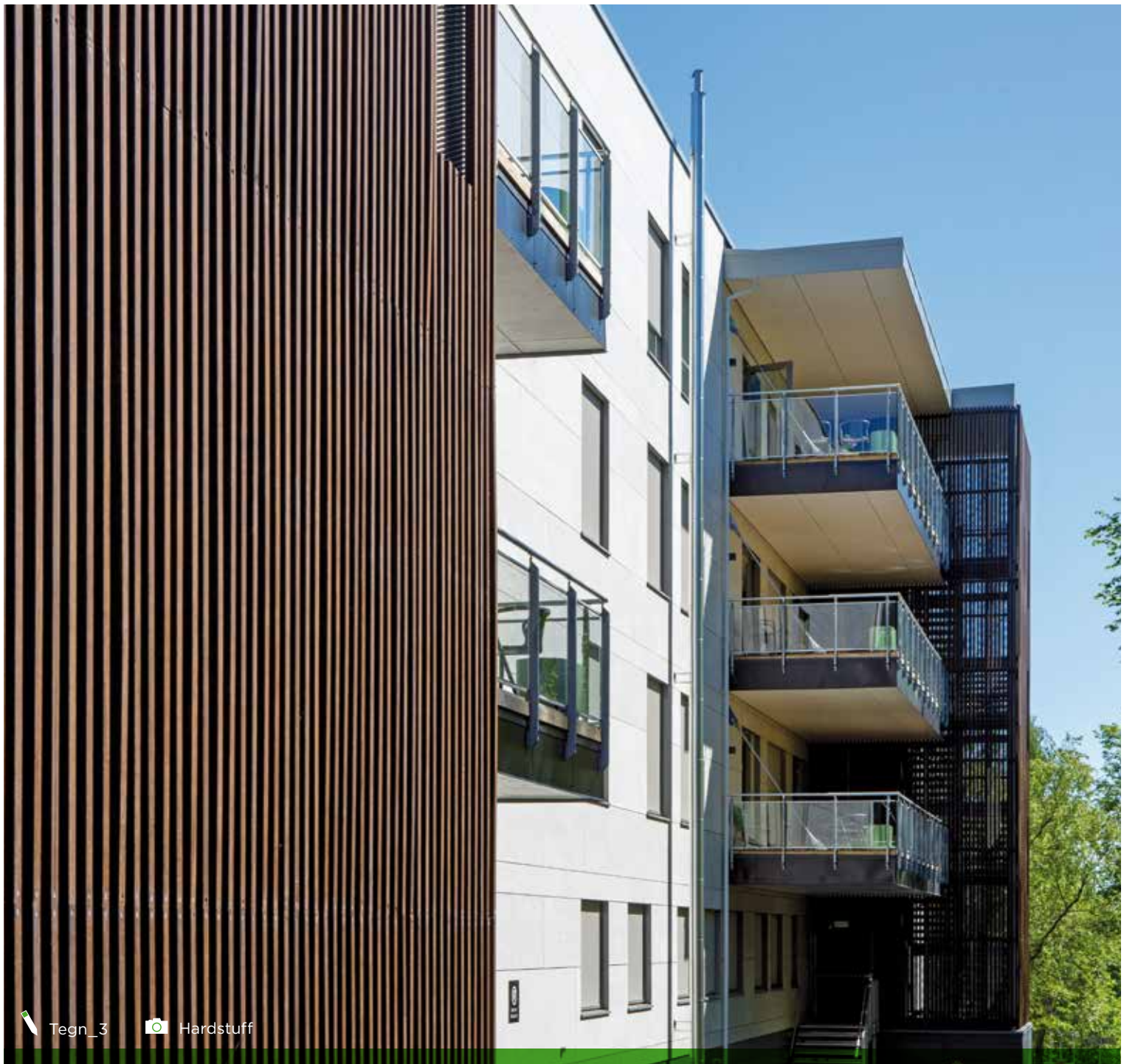
\*) Tested on 3 years weathered MOSO® Bamboo X-treme®



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Tegn\_3 Hardstuff

**Bo-og Nursing Home**  
(11.300 m<sup>2</sup>) Oslo, Norway



Sabbagh Arquitectos Hunter Douglas Chile

**Catholic University Lira Offices**  
(1.200 m<sup>2</sup>) Santiago de Chile, Chile

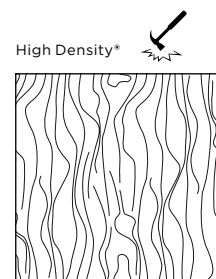
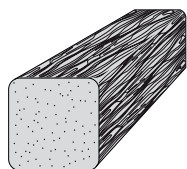


Grijzen

**Floriade Outdoor Furniture**  
Almere, The Netherlands

# MOSO® Bamboo X-treme® Outdoor Beams

A special unique heat-treatment process at 200°C and increased density (by compressing the bamboo strips) make the MOSO® Bamboo X-treme® material extremely durable and stable. This durability and stability, and the pre-profiled rounded edges, make MOSO® Bamboo X-treme® beams ideal for use in outdoor furniture products. The elaborate manufacturing process provides MOSO® Bamboo X-treme® outdoor beams the highest durability class possible in the applicable EU norms. As with tropical hardwoods, the colour of the material changes under the influence of wind, rain, frost and sunshine (UV-light). This results in a typical weathered natural grey-tone. Regular cleaning and maintenance with a Lasur/oil protects the material against this weather related discolouration.



LR: Lasur Sikkens

Product Code	Finish	Bevel	Dimensions (mm)
BO-DTHT2170-01	LR	R=6mm	2000x115x40
BO-DTHT2171-01	LR	R=6mm	2000x80x40
BO-DTHT2172-01	LR	R=6mm	2000x60x40
BO-DTHT2173-01	LR	R=6mm	2000x40x40
BO-DTHT2174-01	LR	R=6mm	2000x55x40
BO-DTHT2175-01	LR	R=6mm	2000x90x40

Other dimensions can be produced custom made.

## technical characteristics and certifications

- Density: +/- 1150 kg/m<sup>3</sup>
- Dimensional stability: length: + 0,1%; width + 0,9% (24 hours in water 20°C)
- Resistance to Indentation - Brinell Hardness: ≥ 9.5 kg/mm<sup>2</sup> (EN 1534)
- Reaction to fire: Class B-s1-d0 (EN 13501-1)
- Flame spread index: Class A (ASTM E84)
- Thermal emittance: 0.81 (ASTM C1371)\*
- Solar Reflectance (SR): 32 (ASTM C1549)\*
- Solar Reflectance Index (SRI): Low 27, Medium 30, High 33 (ASTM E1980)\*
- Modulus of Elasticity: 13565 N/mm<sup>2</sup> (mean value - EN 408)
- Breaking strength: 54.4 N/mm<sup>2</sup> (characteristic value - EN 408)
- Biological durability: Class 1 (EN 350 / CEN/TS 15083-2), simulated graveyard test Class 1 (EN 350 / CEN/TS 15083-1)
- Effectiveness against Blue Stain: Class 0 (EN 152)
- Use Class: Class 4 (EN 335)
- CO<sub>2</sub> neutral: LCA report TU Delft (ISO 14040/44) (www.moso.eu/lca)
- Environmental Product Declaration - EPD (EN 15804) (www.moso.eu/epd)
- FSC®: Products available with FSC® certification on request.
- Contribution LEED BD+C - v4: MR 1, MR 2, MR 3 (FSC®) v2009: MR 6, MR 7 (FSC®)
- Contribution BREEAM: MAT 1, MAT 3 (FSC®), MAT 5 (HD)
- Guarantee: 10 years

\*) Tested on 3 years weathered MOSO® Bamboo X-treme®



The mark for responsible forestry FSC® C002063 www.fsc.org Only the products defined as such, are FSC certified




breeam

# MOSO® Bamboo X-treme®

## test results



The excellent performance of MOSO® Bamboo X-treme® has been extensively tested by acknowledged research institutes. Find a summary of the most important test results below. Full reports are available upon request. **Only with MOSO® Bamboo X-treme® can you be sure to have the original, unique product.** Other products that copy the original do not offer the same hardness and level of durability, dimensional stability and ecology. With a look-alike product, there is a large risk of claims after installation. Always ask for the original, certified MOSO® Bamboo X-treme® products!

 Durability of MOSO Bamboo X-treme, *Heat Treated Strand Woven Bamboo*: resistance against soft-rotting micro fungi according to CEN/TS 15083-2

Report code: 17.0083-C      Date: 29 March 2017      Page: 8/14

According to EN 350, the durability class is determined based on the x-value. To calculate the x-value, the median mass loss or the test species is compared to the median mass loss of the Beech or Pine references. Hardwoods are compared to Beech, Softwoods are compared to Pine. As Bamboo is neither softwood nor hardwood a comparison is made with both reference wood species Pine sapwood and Beech.


Based on the mass loss found and the comparison to Beech and Pine, the tested MOSO Bamboo X-treme, *Heat Treated Strand Woven Bamboo*, can be classified in durability class 1 when using the method described in EN 350.

MOSO Bamboo X-treme, *Heat Treated Strand Woven Bamboo*, performs comparable to Azobé and Merbau. Little variance is found between the different boards.

### durability

ENV 807  
(CEN/TS 15083-2) /  
EN 350

class 1

 Durability of het treated strand woven bamboo: resistance against degradation by Basidiomycetes according to EN 350 and CEN/TS 15083-1


Report code: 17.0083-B      Date: 29 March 2017      Page: 8/14

According to EN 350, the durability class is calculated based on the mass loss obtained with the fungus resulting in the highest median mass loss. For all fungi the mass loss is less than 5%. This implies that, when using the EN 350 to determine the durability, MOSO Bamboo X-treme, *Heat Treated Strand Woven Bamboo* can be classified in durability class 1.

### durability

EN 113  
(CEN/TS 15083-1) /  
EN 350

class 1

 Resistance of Heat Treated Strand Woven Bamboo against blue staining fungi

Report code: 9.061-E      8 September, 2009      Page: 10/10

#### 4 Conclusion

On behalf of Moso International BV an EN 152 blue stain test was performed on Heat Treated Strand Woven bamboo. UV- weathering was used as preconditioning of part of the samples. The combination of UV light and water spray resulted in strong discoloration of the surfaces of both the bamboo samples and the Pine sapwood reference samples.

Neither on the weathered nor on the original Bamboo samples discoloration of the blue stain fungi or the hyphae of the blue stain fungi could be observed. As a result it can be concluded that the susceptibility of this Heat Treated Strand Woven Bamboo towards blue stain is very low.

### resistance against surface fungi

EN 152

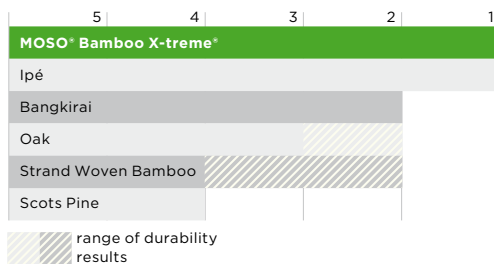
class 0

## harder and more durable than almost any other hardwood

### durability class

class 1

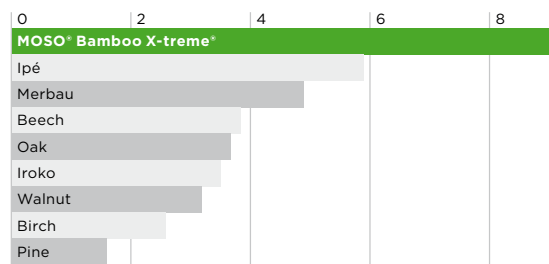
(EN 350 (CEN/TS 15083-2 / CEN/TS 15083-1))



### brinell hardness

9.5 kg/mm<sup>2</sup>

(EN 1534)



### Classification Durability Class

Use Class	1. very durable	2. durable	3. moderately durable	4. slightly durable	5. not durable
1 interior	o	o	o	o	o
2 moist interior	o	o	o	(o)	(o)
3 exterior, above ground	o	o	(o)	(o)-(x)	(o)-(x)
4 ground contact / fresh water	o	(o)	(x)	x	x
5 salt water	*	(x)	(x)	x	x

- o Natural durability sufficient.
- (o) Natural durability normally sufficient, but for certain end uses treatment may be advisable.
- (o)-(x) Natural durability may be sufficient, but depending on end use, preservative treatment may be necessary.
- (x) Preservative treatment is normally advisable.
- x Preservative treatment necessary.
- \* Natural durability of Bamboo X-treme® not tested in salt water.

### durability

EN 350 (CEN/TS 15083-2 / CEN/TS 15083-1)

class 1

### use/risk class

EN 350-1

class 1



### fire resistance

EN 13501-1

decking

class Bfl-s1

cladding, fencing, beams

class B-s1-d0

### Classification ASTM E84

Classification	Flame Spread Index	Smoke Developed Index
A	0 - 25	0 - 450
B	26 - 75	0 - 450
C	76 - 200	0 - 450

### reaction to fire

(FSI 25 / SDI 45)

ASTM E84

class A

WUI approved

CAN/ULC-S102

### Carbon Footprint (CO<sub>2</sub>eq) per kg final product

PRODUCTION	END OF LIFE	CO <sub>2</sub>	CO <sub>2</sub>	CO <sub>2</sub>
CO <sub>2</sub> footprint	CO <sub>2</sub> credit	Storage	Total	Neutral
CO <sub>2</sub> eq/kg	CO <sub>2</sub> eq/kg	CO <sub>2</sub> eq/kg	CO <sub>2</sub> eq/kg	Y / N
1.193	-0.704	-0.607	-0.118	Yes

### Eco-costs (€) per kg final product

PRODUCTION	END OF LIFE	ECO-COSTS	ECO-COSTS
Eco-costs	Eco-costs	CO <sub>2</sub> storage	Total
Euro/kg	Euro/kg	Euro/kg	Euro/kg
0.356	-0.132	-0.082	0.142

### carbon footprint

ISO 14040/44

CO<sub>2</sub> neutral



The life cycle and the carbon footprint of MOSO products are evaluated according to ISO 14040/44. For more information: [www.moso.eu/lca](http://www.moso.eu/lca). The full report is available on request.

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# user information for Bamboo X-treme®



Gradual greying of MOSO® Bamboo X-treme® over time: new, non-weathered decking (left), after 3 months of weathering (middle) and after 18 months of weathering (right).

## appearance and colour

MOSO® Bamboo X-treme® is a natural product, which can vary in colour, grain and appearance. Colour will change over time depending on the maintenance schedule. The boards have a brown to dark brown colour when installed, which turns into a lighter caramel colour several weeks after installation. Without further maintenance the colour gets greyish relatively fast (similar to most other wood species).

If a brown colour is preferred, maintenance should be done with WOCA exclusive exterior oil teak colour or a comparable waterbased oil/saturator with teak pigments (for the unfinished version).

Direct after installation 1 layer of oil (pre-oiled version) or 2 layers of oil (unfinished version) have to be applied. See for further details the installation instructions. MOSO® Bamboo X-treme® shows similarity to other hardwoods in grain and structure. The characteristic bamboo nodes however can still be recognized and gives the product a special and lively look.

## swimming pool

If MOSO® Bamboo X-treme® outdoor decking is to be used around swimming pool areas, the following has to be taken into account: MOSO® Bamboo X-treme® is a natural (wood like) product. As with any wooden product used outdoors, there is always a risk of formation of splinters, however splinters from MOSO® Bamboo X-treme® are normally smaller than (tropical) hard wood splinters. A regular application of oil (more frequently necessary around swimming pools) is required to reduce the formation of splinters. Furthermore, regular maintenance with the silicium carbid broom or -disk is required to effectively remove splinters and smoothen the surface.

## normal phenomena

Cracks on the surface and on the end of the boards can arise from the different drying characteristics of the surface and cross cut ends. This does not affect the stability or durability of the board.

The surface sides of the boards will get rougher over time and will form (small) splinters as a result of continuous water absorption and desorption due to dry and wet weather periods. Dimensional change, grain raise or cupping of the boards can occur after installation. These phenomena are normal for most hardwood species and MOSO® Bamboo X-treme®.

Like many wood species, some tannins can come out of the Bamboo X-treme material and into the water when it gets wet, e.g. when it rains. This is a normal phenomenon and will decrease over time. The brownish liquid can easily be cleaned from the Bamboo X-treme material, however be careful of possible staining of materials adjacent to or below the Bamboo X-treme (i.e. white walls underneath a balcony).



wet condition



dry condition

since 2008 over  
**3 million m<sup>2</sup>**  
installed in  
more than **50**  
countries



photo taken 2 years after installation



Bar Orian Architects - Rokach Ashkenazi



Lior Teitler

### Beer Sheva Bridge

(1.400 m<sup>2</sup>) Beer Sheva, Israel

photo taken 5 years after installation



MVSA Architects



Lior Teitler

### Jumbo Head office

(2.500 m<sup>2</sup>) Schiedam, The Netherlands

photo taken 8 years after installation



Luc Richard

### Riberach Hotel

(1.200 m<sup>2</sup>) Bélesta, France



see the ease of  
installation, cleaning and  
maintenance of MOSO®  
Bamboo X-treme® on:  
[www.moso.eu/x-treme](http://www.moso.eu/x-treme)

## MOSO® Bamboo X-treme® : the only certified & proven bamboo product!



**durable**



**fire  
resistant**



**sustainable**



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**bamboo  
products**