MOSO® bamboo x-treme®
decking
With the introduction of Bamboo X-treme, MOSO has developed a truly ecological and durable alternative for increasingly scarce tropical hardwood. MOSO uses a unique patented process to alter the hardness, dimensional stability, fire safety and durability to a level superior to the best tropical hardwood species. Although Bamboo X-treme may be used in several outdoor applications, at the moment the main use is for decking and cladding.

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**bamboox-treme**

**up to 30% savings in installation costs**

**high stability:**
- head side tongue & groove

**certified durable**
- fire resistant
- sustainable

**proven**
- Since 2008 over 6,000,000 boards installed in more than 40 countries.

**stable head side tongue & groove**

**the fast growing hardwood alternative**
introduction

Since centuries bamboo poles and bamboo components are used in outdoor circumstances. Unfortunately many additional protective measurements are needed to guarantee a sufficient and acceptable lifetime. In dry circumstances 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 the land of origin bamboo can be replaced fast and cost efficient, 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 as an alternative for scarce hardwood species and to make the material suitable for outdoor applications?

With this challenge MOSO started to research and test various existing methods to protect bamboo in outdoor circumstances. The initial tested wood protection methods, which are also often used by other bamboo suppliers, were not satisfying and did not perform according to MOSO’s quality standard. Therefore MOSO decided to develop its own way to solve the problem by modifying the density of the bamboo and combining this with a special heat treatment process to improve the durability and stability of bamboo, referred to as “density-thermo treatment” in this text. In 2008 MOSO’s invention was registered internationally. In 2014 the patent was registered in all European countries and several countries worldwide. In 2009 the relevant laboratory and practical tests were done, before (left) and after (right) the density-thermo treatment: before the sugar molecules are still visible, after the treatment they have disappeared. With this treatment bamboo is no longer a feeding place for fungi and micro-organisms.

Untreated bamboo has a durability class 5 according to EN350 (not durable). By modifying the bamboo with the density-thermo treatment, the dimensional stability of bamboo is improved with almost 50%. Besides stability improvement, the durability is improved to the best durability class possible, from class 5 to class 1 (ENV807 class 1 - simulated graveyard test). Durability Class 4 in accordance with EN335 is obtained. Class O fungi-resistance performance with EN152. Exceptionally hard: Brinell >9,589/mm² (hardest wood available).

does not guarantee the product not to have to be replaced as often as other hardwood species while at the same time taking advantage of the enormous growth capacity of giant bamboo.

The special high density pressing (increasing the density from 650-700kg/m³ to approx. 1200kg/m³) more than compensates the disadvantage of material brittleness of heat treated bamboo, and will strongly improve 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 Bamboo X-treme®.

discover the bamboo x-treme benefits

hard & durable

- The only bamboo decking with class 1 durability (EN350) tested following ENV807 (simulated graveyard test).
- Durability Class 4 in accordance with EN335 (not durable). By modifying the bamboo with the density-thermo treatment: before the sugar molecules are still visible, after the treatment they have disappeared. With this treatment bamboo is no longer a feeding place for fungi and micro-organisms.
- Very stable as a result of the thermo treatment combined with high durability compression.
- Far more stable than any other tropical hardwood - enabling head side tongue and groove connection.
- Limited tendency to torsion.
- No head side gap between boards necessary.
- Only 5.4mm expansion space between (the sides of) the boards.
- Possibility to use pressure impregnated pine as sub frame.
- The only bamboo with maintenance.
- Limited tendency to torsion.
- No head side gap between boards necessary.
- Only 5.4mm expansion space between (the sides of) the boards.
- Possibility to use pressure impregnated pine as sub frame.

beautiful appearance

- A Beautiful, natural bamboo look.
- Customer choice for flat or ribbed surface.
- With fasterter installation no damage of the boards by screw holes.
- Free of knots and natural plant resins.
- Customer choice for natural graining or keeping brown colour with maintenance.

endless resource

- Made from Moso bamboo. With a growing speed of up to 1 meter per year, 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 fibres.

CO₂ neutral

- Official LCA and carbon footprint studies by Technical University Delft according to ISO 14040/44 confirm that Bamboo X-treme® is CO₂ neutral over the full life cycle.
- No use of fungicide in the production.

easy to install

- 2 installation possibilities with just 1 product: (invisible) fixation with fasteners or screw down.
- Both sides of the board - ribbed or flat - can be used.
- Fixed board length: 100cm, easy for 1 person to install; no complicated installation plans necessary.
- Head side tongue and groove for flexible installation.
- Macro bevel on head side, avoiding sharp edges.
- Complementing density-thermo sub frame joints available.

fireproof

- Reaches fire safety class Bfl-s1 following EN13501-1 without use of fire retardants. As a result, Bamboo X-treme can be easily applied in public projects without additional measures.

economical

- Simple and fast installation. Up to 30% savings in costs!
- Reduced loss of material during installation, because of the head side tongue and groove.
- Every plank has been hand checked after production, therefore no loss of material.
- Cost effective transportation because of the fixed 1850mm length.
- Cost effective and space reducing stocking because of unique multi usable board.
- 1 pallet 448,66 sqm/approx. 1.100kg, therefore easy for transportation and stocking.

Since centuries bamboo poles and bamboo components are used in outdoor circumstances. Unfortunately many additional protective measurements are needed to guarantee a sufficient and acceptable lifetime. In dry circumstances 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 the land of origin bamboo can be replaced fast and cost efficient, 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 as an alternative for scarce hardwood species and to make the material suitable for outdoor applications?

With this challenge MOSO started to research and test various existing methods to protect bamboo in outdoor circumstances. The initial tested wood protection methods, which are also often used by other bamboo suppliers, were not satisfying and did not perform according to MOSO’s quality standard. Therefore MOSO decided to develop its own way to solve the problem by modifying the density of the bamboo and combining this with a special heat treatment process to improve the durability and stability of bamboo, referred to as “density-thermo treatment” in this text. In 2008 MOSO’s invention was registered internationally. In 2014 the patent was registered in all European countries and several countries worldwide. In 2009 the relevant laboratory and practical tests were done, before (left) and after (right) the density-thermo treatment: before the sugar molecules are still visible, after the treatment they have disappeared. With this treatment bamboo is no longer a feeding place for fungi and micro-organisms.

Untreated bamboo has a durability class 5 according to EN350 (not durable). By modifying the bamboo with the density-thermo treatment, the dimensional stability of bamboo is improved with almost 50%. Besides stability improvement, the durability is improved to the best durability class possible, from class 5 to class 1 (ENV807 class 1 - simulated graveyard test). Durability Class 4 in accordance with EN335 is obtained. Class O fungi-resistance performance with EN152. Exceptionally hard: Brinell >9,589/mm² (hardest wood available).

The density heat treated bamboo is also very well protected against superficial fungi (EN152, Class 0). This bamboo outdoor product reaches, as only bamboo material available on the market, the use/ risk class 4 according to the EN335, which means it can be used in direct fresh water contact, direct earth contact and it does not need any additional treatment.

Doesn’t the density-thermo process compromise the environmental sustainability of this product? No it does not: 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 this bamboo outdoor product is CO₂ neutral or better over the full life cycle. In fact, because of the superior durability, the product does not have to be replaced as often as other hardwood species while at the same time taking advantage of the enormous growth capacity of giant bamboo.

The special high density pressing (increasing the density from 650-700kg/m³ to approx. 1200kg/m³) more than compensates the disadvantage of material brittleness of heat treated bamboo, and will strongly improve 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 Bamboo X-treme®.
MOSO Bamboo X-treme is a solid, high density bamboo board, made from compressed bamboo strips. Bamboo X-treme is suitable for outdoor applications, especially as decking. A special, patented heat treatment process provides Bamboo X-treme the highest durability class possible in the appropriate EU norms (see technical characteristics below) and increases the density – making it very hard. The special symmetrical shape of the sides offers the possibility to choose between either the ribbed or the flat surface, and allows for quick installation with MOSO fasteners. Like any untreated tropical hardwood species, when exposed to outdoor circumstances, Bamboo X-treme will turn grey over time creating a very natural look.

**installation summary**

- Install a suitable, stable and durable sub frame.
- Determine which side of the board will be used: the ribbed 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 1:12 slope and make sure good ventilation is secured.
- After installation: make sure proper cleaning and maintenance is done, fitting to the chosen finish.
- When not applying outdoor oil 2x per year, the floor 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. Final treatment after installation with water based oil ³ saturator is necessary for all versions.

- For further info: please see the installation/maintenance instructions.

**technical characteristics**

- **Density:** ± 1200 kg/m³
- **Dimensional stability:** length: ± 0.1 %; width ± 0.2 % (24 hours in water 20°C)
- **Resistance to indentation:** Brian hardness: ≥ 3.3 kg/mm² (EN153)
- **Reaction to fire:** Class Bfl-s1 (EN13501-1)
- **Slight resistance:** USRV 27 (Dry), USRV 29 (Wet) / CEN/TS 15676 / R 11 (Dry), R 10 (Wet) (DIN 51130)
- **Modulus of Elasticity:** 10737 N/mm² (EN 408)
- **Biological durability:** Class 1 (EN 1150 / EN 113)
- **Effectiveness against Blue Stain:** Class 0 (EN152)
- **Use Class:** Class 4 (EN351)
- **FSC**: Products available with FSC certification on request.
- **Contribution LEEA BD 4:** RkI, Mrl, Hr2. Mrl3 (FSC*) v2009: MR6, MR 7 (FSC*)
- **Contribution BREEAM:** MAT 1, MAT 3 (FSC*), MAT 5 (HD)

**MOsO fastener and screw**

With these fasteners Bamboo X-treme decking can be easily installed. When installed correctly there will be 5-6mm gaps between the boards. The fastener is supplied with matching stainless steel screws (square bit).

<table>
<thead>
<tr>
<th>Product Code</th>
<th>Item</th>
<th>Material</th>
<th>Color</th>
<th>Dimensions (mm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>CLIP-SCREW-BX03</td>
<td>Fastener</td>
<td>Stainless steel A2 (AISI304)</td>
<td>Brown</td>
<td>27x22.5x10.8</td>
</tr>
<tr>
<td>Screw</td>
<td>Stainless steel A2 (AISI304)</td>
<td>Brown</td>
<td>4.5x30</td>
<td></td>
</tr>
</tbody>
</table>

**Advised number of fasteners/m²**

- 157 mm -20 pcs/m²
- 155 mm -17 pcs/m²
- 178 mm -14 pcs/m²

**sub frame joists**

The Bamboo X-treme sub frame joists are made of the same material as the decking boards: high density heat treated bamboo.

<table>
<thead>
<tr>
<th>Product Code</th>
<th>Material</th>
<th>Finish</th>
<th>Dimensions (mm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>BO-SB150</td>
<td>High density heat treated bamboo</td>
<td>Unfinished</td>
<td>3440x70x40</td>
</tr>
</tbody>
</table>

**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.

<table>
<thead>
<tr>
<th>Product Code</th>
<th>Material</th>
<th>Finish</th>
<th>Dimensions (mm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>BO-DTHT162</td>
<td>High density heat treated bamboo</td>
<td>Unfinished</td>
<td>1850x157x20</td>
</tr>
</tbody>
</table>

**broom stick and disk**

The silicium carbid broom and machine disk are perfectly suited to clean and smoothen the decking surface of Bamboo X-treme and to remove splinters due to the capability to sand the surface in addition to cleaning it.

<table>
<thead>
<tr>
<th>Product Code</th>
<th>Material</th>
<th>Dimensions (mm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Disk-01</td>
<td>16” Silicium carbid disk</td>
<td></td>
</tr>
<tr>
<td>Product Code</td>
<td>Material</td>
<td>Dimensions (mm)</td>
</tr>
<tr>
<td>Broom-01</td>
<td>Silicium carbid broom</td>
<td></td>
</tr>
</tbody>
</table>

*) Based on distance of 462.5mm between the sub beam axes.
Lentini’s restaurant
(400m²) Torino, Italy

Iberostar Resort
(1,850m²) Nayarit, Mexico

Commercial Center Glorias
(1,200m²) Barcelona, Spain

Venco Campus - BREEAM Outstanding
The Netherlands

Iberostar Resort
(1,850m²) Nayarit, Mexico

Tel-Aviv University - LEED Platinum
Israel

Residencia Lotus
(1,600m²) Lago Maggiore, Switzerland

Headoffice GL Events
(1,200m²) Lyon, France

The Gas Museum - LEED Gold
(700m²) Sabadell, Spain

Headoffice AGC Glass - BREEAM Excellent
Louvain la Neuve, Belgium

Bijenkorf Amsterdam
(120m²) The Netherlands

Restaurant DOM
(400m²) La Coruña, Spain

Venco Campus - BREEAM Outstanding
The Netherlands

Hotel Riberach
(1,200m²) Belesta, France

Headoffice GL Events
(1,200m²) Lyon, France
installation instruction bambooX-treme (outdoor decking)

before installation

• Water logging under the decking must be avoided by preparing a water permeable sound structure. This can be achieved by sand layers and gravel dispersion above.
• There should be cement/fine tiles 40–50mm thick, to distribute the pressure of the sub frame. See drawing.
• Place a root barrier under the tiles to prevent roots from growing under the sub frame. See drawing.
• Cracks and splinters on the surface and on the end of the boards will arise from different drying characteristics of the surface 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 patented ‘Density-Thermo’ production method. Head sides cracks can be further minimized by applying wax on cross and sides of the cut boards, see below.
• Always use the MOSO Bamboo X-treme fasteners or stainless steel decking screws (ca 5x65mm).

please note

• The Bamboo X-treme outdoor board is a natural forest product, which varies in colour, grain and appearance. Colour can change from fast dark brown to brown or grey, depending on the maintenance schedule.
• Cracks and roughness can be removed by cleaning the surface of the decking with the silicon carbide 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 patented density - heat treated production method.
• Keep at least 5-6mm expansion space between the boards. In warm weather, re-tighten the screws.
• Always use the MOSO Bamboo X-treme fasteners or stainless steel decking screws (ca 5x65mm).

use accessories

• Use MOSO Bamboo X-treme fasteners or stainless steel decking screws for every board.
• Use 3.2-3.5mm extended drill penetration. Head side wax is available as an accessory.
• Head side wax is available as an accessory.
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• Head side wax is available as an accessory.

maintenance & cleaning

screw down installation

• Delimit the surface side of the boards (ribbed or flat surface).
• Pre-drill the screws 20mm from the side of the board. Be sure to pre drill with a large enough drill to avoid cracking of the decking.
• Always use the MOSO Bamboo X-treme fasteners or stainless steel decking screws (ca 5x65mm).
• Always drill both sides (left and right) of the board.

maintenance and cleaning prefinished version

Bamboo X-treme outdoor decking is pre-sanded, double sided, with WOCA exterior water based silicium carbide oil (teak colour).

• Clean the floor at least one time per year with WOCA Decking Cleaner and silicon carbide broom or disk. Follow the instructions on www.mosox.eu.
• 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.
• It is advisable to keep the decking free from dust and dirt as much as possible. (Clean by blowing or vacuuming).

unfinished version

It is possible to leave the decking without oiling, and to leave it in its original colour. If this is not necessary, the result will be a rough and grey appearance. An initial application with water based 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 silicon carbide 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).

• When this first application the decking can remain without oil treatment for natural greying. However annual cleaning with the silicon carbide broom or disk is obligatory. If you want to keep a darker colour, regular application of oil/saturator is necessary.
• It is advisable to keep the decking free from dust and dirt as much as possible. (clean by broom regularly).

application 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 oil appearance as the water is evaporating.
• Wipe off any excess oil with clean cotton clothes 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.

risk of self-ignition

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

storing

Store 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 soil and installation procedures) may vary and are beyond the manufacturer’s control. In case of doubt, therefore, consult the distributor.

Check out the maintenance video at www.mosox.eu/youtube

The instructions are subject to change. For the latest version visit www.bamboo-xtreme.eu

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

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The excellent performance of Bamboo X-treme has been extensively tested by MOSO through acknowledged research institutes. Find a summary of the most important test results below. Full reports are available upon request.

### Durability

<table>
<thead>
<tr>
<th>Use Class</th>
<th>Service situation</th>
<th>Biological agents</th>
<th>Used test standard</th>
<th>Test result</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Interior, covered</td>
<td>Wood boring beetles</td>
<td>EN152</td>
<td>Class 0</td>
</tr>
<tr>
<td>2</td>
<td>Exterior, above ground</td>
<td>As above + Disfiguring fungi</td>
<td>EN152 / EN1350</td>
<td>Class I</td>
</tr>
<tr>
<td>3</td>
<td>Exterior, in ground contact</td>
<td>As above + Soft rot</td>
<td>EN9807 / EN11350</td>
<td>Class 1</td>
</tr>
</tbody>
</table>

### Resistance against Surface Fungi

- **EN335**
  - Use Class: Service situation: Biological agents: Used test standard: Test result
  - 1 Interior, covered: Wood boring beetles: EN113: Class 0
  - 2 Interior or covered: As above + Disfiguring fungi: EN113: Class 0
  - 3 Exterior above ground: As above + Soft rot: EN113: Class 0
  - 4 Exterior in ground contact and/or fresh water: As above + Soft rot: EN113: Class 0

### FireSafety

- **EN13501-1**
  - Use Class: Service situation: Biological agents: Used test standard: Test result
  - 1 Interior, covered: Wood boring beetles: EN113: Class 0
  - 2 Interior or covered: As above + Disfiguring fungi: EN113: Class 0
  - 3 Exterior above ground: As above + Soft rot: EN113: Class 0
  - 4 Exterior in ground contact and/or fresh water: As above + Soft rot: EN113: Class 0

### Brinell Hardness

- **EN1063**
  - Use Class: Service situation: Biological agents: Used test standard: Test result
  - 1 Interior, covered: Wood boring beetles: EN113: Class 0
  - 2 Interior or covered: As above + Disfiguring fungi: EN113: Class 0
  - 3 Exterior above ground: As above + Soft rot: EN113: Class 0
  - 4 Exterior in ground contact and/or fresh water: As above + Soft rot: EN113: Class 0

### Carbon Footprint

- **ISO 14040/44**
  - Use Class: Service situation: Biological agents: Used test standard: Test result
  - 1 Interior, covered: Wood boring beetles: EN113: Class 0
  - 2 Interior or covered: As above + Disfiguring fungi: EN113: Class 0
  - 3 Exterior above ground: As above + Soft rot: EN113: Class 0
  - 4 Exterior in ground contact and/or fresh water: As above + Soft rot: EN113: Class 0

### Summary

- **MOSO Bamboo X-treme**
  - Use Class: Service situation: Biological agents: Used test standard: Test result
  - 1 Interior, covered: Wood boring beetles: EN113: Class 0
  - 2 Interior or covered: As above + Disfiguring fungi: EN113: Class 0
  - 3 Exterior above ground: As above + Soft rot: EN113: Class 0
  - 4 Exterior in ground contact and/or fresh water: As above + Soft rot: EN113: Class 0
appearance and colour
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 water based 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.

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 Bamboo X-treme is to be used around swimming pool areas, the following has to be taken into account: Bamboo X-treme is a natural (wood like) product and can therefore not be referred to as a “bare foot” product.

As with any wooden product used outdoors, there is always a risk of formation of splinters, however splinters from 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.

use of the flat side
When using the flat side of the board as surface side please note that surface deformation (under influence of climatical changes) will be significantly more visible compared to the ribbed side. Deformation of the surface is not considered to be a defect of the material.

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 climate periods. Dimensional change or cupping of the boards can occur after installation. These phenomena are normal for most hardwood species and Bamboo X-treme.

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

user information

Jumbo Headoffice (2.500m²)
Rotterdam, the Netherlands
since 2008 over 1.500.000m² installed in more than 40 countries

Vabali Spa (2.350m²)
Berlin, Germany
see the ease of installation, cleaning and maintenance of Bamboo X-treme on: www.moso.eu/youtube