

**Date:** June 2016  
**Subject:** Potential contribution MOSO products to a higher BREEAM International certification



The application of MOSO bamboo products may help contribute to a higher [BREEAM](#) International certification following the table below:

BREEAM International credit	Applicable MOSO products
<b>HEA 2 - Indoor Air Quality</b>	All MOSO bamboo products if applied indoor (thus may also apply to Bamboo X-treme decking and cladding when used as indoor terrace or wall finishing)
<b>MAT 1 - Life Cycle Impacts</b>	All solid MOSO bamboo products as assessed in the ISO 14040/44 LCA report by Delft University of Technology (2014/2015) and EN 15804 EPD (2016).
<b>MAT 3 - Responsible Sourcing of Materials</b>	All MOSO bamboo products when requested with FSC® certification
<b>MAT 5 - Designing for Robustness</b>	All MOSO bamboo products in the extra hard “High Density” variation, when applied for extra protection in floors, doors and walls in high traffic areas.
<b>Innovation</b>	All MOSO bamboo products when applied in an innovative application enhancing the environmental performance of a building project.

Note: It is important to understand that BREEAM credits can be earned on building level. This means that application of MOSO bamboo materials can contribute to several credits and as such may also contribute to a higher BREEAM classification of the building project itself. However, this often has to be done in combination with other green building materials to reach the cut off value for the criterion (e.g. for HEA 2 all finishing materials in the building project have to comply with the mentioned emission standards; the MOSO bamboo products comply, but also the other used finishing products from other building material suppliers need to comply in order to acquire this credit).

More information of the possible contribution of MOSO materials on each of the criteria mentioned is provided below, including a copy of the relevant selection of the actual text (in *italics*) from the 2013 BREEAM International criteria document (full text available online through [this link](#); the 2016 version can be found [here](#)).

## HEA 2 - Indoor Air Quality

### Aim

To recognise and encourage a healthy internal environment through the specification and installation of appropriate ventilation, equipment and finishes.

### Applicable credits:

One credit - Volatile organic compound (VOC) emission levels (products)

Relevant product groups	Performance criteria and thresholds
<ul style="list-style-type: none"> <li>- Wood panels (including particle board, fibreboard including MDF, OSB, cement bonded particle board, plywood, solid wood panel and acoustic board)</li> <li>- Timber structures (e.g. glue laminated timber)</li> <li>- Wood flooring e.g. parquet</li> </ul>	<p><b>Option 1 - Performance requirements</b> Formaldehyde E1 level Compliant testing standard(s): EN 717-1:2004 Wood based panels – Determination of formaldehyde release by chamber method.</p> <p><b>Option 2 – Performance requirements</b> Formaldehyde level of 0.1mg/m<sup>3</sup> Compliant testing standard(s): ISO 16000-9 Determination of the emission of VOC from building products and furnishing - Emission chamber method.</p> <p><b>Exemplary performance credits may be awarded if the formaldehyde emission levels have been found to be less or equal to 0.06mg/m<sup>3</sup> air (1 point) or 0.01mg/m<sup>3</sup> air (2 points) in accordance with the approved testing standards.</b></p>



**Comment MOSO:** All MOSO bamboo products (flooring, panels, veneer, beams, decking and cladding) meet the E1 level as specified in EN 717 and in several cases even the far stricter unofficial E0 emissions class, commonly used to indicate that the product has a very low or no detectable emission

(formaldehyde emissions <0,025 mg/m<sup>3</sup>) and/or is produced with No Added Formaldehyde (NAF) glues. Therefore MOSO bamboo materials may be applied without any problem as finishing material in indoor environments and as such can contribute to this credit, and for several MOSO products even for one or two exemplary performance credits (formaldehyde emission levels ≤ 0.06mg/m<sup>3</sup> (1 point) or 0.01mg/m<sup>3</sup> (2 points)). For an overview of all the relevant European (EN) norms where MOSO bamboo products comply with is referred to the technical catalogue, available [here](#). Additionally, for all the MOSO bamboo floors extensive testing reports are available from the Bremer Umwelt Institut for indoor emissions following both EN 717 and ISO 16000-9. The test reports mentioned above are available upon request.

Note: Application of low emission adhesives and lacquers for installation and finishing the MOSO bamboo products in the project are the responsibility of the contractor. However, MOSO can provide an advisory role in suggesting the right low emission products for compliance with HEA 2.

## **MAT 1 - Life Cycle Impacts**

### ***Aim***

*To recognise and encourage the use of robust and appropriate life cycle assessment tools and consequently the specification of construction materials with a low environmental impact (including embodied carbon) over the full life cycle of the building.*

### ***Applicable credits:***

#### *up to six credits*

- *The project uses a life cycle assessment (LCA) tool to measure the life cycle environmental impact of the building elements.*
- *The LCA includes at least the mandatory building elements indicated in the 'Materials assessment scope' section of the BREEAM International Mat 01 calculator (where present in the building).*
- *The mandatory requirements identified in the 'Materials assessment tool, method and data' section of the BREEAM International Mat 01 calculator have been met.*
- *A member of the project team completes the BREEAM International Mat 01 calculator and determines a score based on the robustness of the LCA tool used and the scope of the assessment in terms of elements considered.*

**Comment MOSO:** Delft University of Technology was commissioned in 2014 to develop a cradle to grave Life Cycle Assessment (LCA) including carbon footprint in compliance with ISO 14040/44, the general accepted norm for conducting LCA's. The study was updated and presented during the Climate Conference COP 21 in Paris in 2015<sup>1</sup> and reveals that in terms of eco-costs<sup>2</sup> and global warming potential all solid MOSO bamboo materials have a significantly lower environmental impact (CO2 neutral over full life cycle) compared to commonly used building materials such as FSC certified tropical hardwood, plastics (PVC) and metals (steel, aluminium). Therefore, application of MOSO bamboo materials is expected to contribute to achieving a higher score within the BREEAM International Mat 01 calculator.

Furthermore, in 2016 MOSO released various product-specific type III EPDs (EN 15804) for its solid products range - available through [www.moso.eu/epd](http://www.moso.eu/epd) - providing an additional credit in the BREEAM International 2016 New Construction Scheme.

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<sup>1</sup> P. van der Lugt, J.G. Vogtländer. The Environmental Impact of Industrial Bamboo Products - Life-cycle Assessment and Carbon Sequestration. INBAR Technical Report 35. INBAR, Beijing, China. ISBN: 978-92-95098-89-3 (printed version) and 978-92-95098-90-9 (webversion). Available via [www.moso.eu/lca](http://www.moso.eu/lca).

<sup>2</sup> Prevention based single indicator based on several midpoint impact categories to express the environmental burden of a product or service - for more information please refer to [www.ecocostsvalue.com](http://www.ecocostsvalue.com).

## MAT 3 - Responsible Sourcing of Materials

### **Aim**

*To recognise and encourage the specification of responsibly sourced materials for key building elements.*

### **Applicable credits (max 3):**

#### Legal and sustainable timber procurement

*(...) Written confirmation from the supplier/s that all timber is sourced in compliance with the definition of the Legally harvested and Legally traded – or recognised certification schemes – FSC, PEFC – and their endorsed schemes (e.g. SFI, etc).*



The mark of  
responsible forestry

**Comment MOSO:** Within the BREEAM system, FSC® falls in the highest tier level with respect to system for sustainable sourcing of building materials. Therefore, application of as much FSC certified bamboo as possible can contribute to a higher score for this specific credit. As a company, MOSO is FSC certified (FSC C002063) and several MOSO products are available with FSC certification (FSC 100%), either on request or already on stock (MOSO bamboo panels and veneer, MOSO Bamboo Supreme, MOSO Bamboo Industriale, MOSO Bamboo X-treme, etc). The MOSO FSC Chain of Custody certificate is available on request. For FSC products our invoices contain the required data following the FSC standards, to trace the material back to the source (Chain of Custody).

## MAT 5 - Designing for robustness

### Aim

To recognise and encourage adequate protection of exposed elements of the building and landscape, therefore minimising the frequency of replacement and maximising materials optimisation.

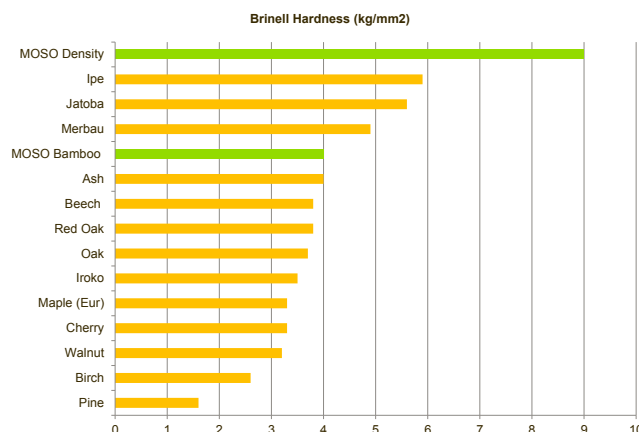
### Applicable credits:

#### One credit:

1. Areas of the building have been identified (both internal and external) where vehicular, trolley and pedestrian movement occur.
2. The design incorporates suitable durability and protection measures or design features/solutions to prevent damage to the vulnerable parts of the building. This must include, but is not necessarily limited to:
  - a. Protection from the effects of high pedestrian traffic in main entrances, Public areas and thoroughfares (corridors, lifts, stairs, doors etc).
  - b. Where relevant, protection against any internal vehicular/trolley movement within 1m of the internal building fabric in storage, delivery, corridor and kitchen areas.
  - c. Protection against, or prevention from, any potential vehicular collision where vehicular parking and manoeuvring occurs within 1m of the external building façade for all car parking areas and within 2m for all delivery areas.

**Comment MOSO:** When executed in the extra hard “High Density” variation, MOSO bamboo materials (flooring, decking, doors, window frames, wall covering, etc) can contribute to protecting high traffic areas in a building, thus reducing the need for replacement and maintenance. Because of its high compression the “High Density” MOSO materials are very dense (up to 1200 kg/m<sup>3</sup>) and extremely hard - with a Brinell value of 9,5 kg/mm<sup>2</sup> even considerably exceeding the hardness of the hardest tropical hardwood species (see also figure below). The testing on the hardness was executed by Wood Research Foundation Netherlands (SHR) following EN 1534, the report is available on request. For an overview of the MOSO products available in the extra hard “High Density” variation, please refer to the [MOSO technical catalogue](#).

Figure: Hardness (Brinell - EN 1534) of MOSO bamboo materials (side/plainpressed and high density)



## **Innovation**

### ***Aim***

*To support innovation within the construction industry through the recognition of sustainability related benefits which are not rewarded by standard BREEAM issues.*

### ***Applicable credits:***

#### ***One credit for approved innovation:***

*Any technology, method or process that can be shown to improve the sustainability performance of a building's design, construction, operation, maintenance or demolition, and which is approved as innovative by BRE Global.*

**Comment MOSO:** Recently, several MOSO bamboo materials have been developed for new applications, where bamboo was never used before, such as in window- and doorframes and cladding. As such they may substitute several commonly used building materials with higher environmental impact, such as certified hardwood, concrete, metals and PVC (for details please refer to the LCA study, see also footnote 1) which could be considered as a sustainable innovation (to be assessed and approved by BRE in a separate procedure by the applicant).

## Indirect Contribution

Besides the BREEAM credits mentioned above, where application of MOSO bamboo products can provide a direct contribution to a higher BREEAM score, there are also several BREEAM credits where application of MOSO bamboo products can provide an indirect contribution:

BREEAM International credit	Indirect contribution MOSO products
<b>MAN 5 - Life cycle cost and service life planning</b>	Application of MOSO bamboo products in the extra hard “High Density” variation (see also MAT 5 credit above) as flooring, wall covering, window frames and doors may, because of the high hardness and wear resistance, contribute to a lower maintenance frequency and subsequent lower life cycle costs. The same applies to Bamboo X-treme decking and cladding; these come by default as “High Density” and combine this with the highest durability possible – class 1 following EN 350 (EN 113 and ENV 807). Test reports by SHR available on request.
<b>HEA 1 - Visual comfort</b>	Application of MOSO bamboo flooring and panels (e.g. for wall covering, table tops, ceilings) in the extra light “natural” colour can provide a positive contribution to meet the required daylight factor.
<b>HEA 5 - Acoustic performance</b>	MOSO bamboo panels are available as acoustic boards, e.g. through MOSO partner Bamboo Acoustics ( <a href="http://www.bambooacoustics.nl">www.bambooacoustics.nl</a> ). As such, when used on walls or ceilings they can help in meeting the required (maximum) sound levels.

### Additional information - evidence

For BREEAM experts a full package with certificates, testing reports, etc. is available to support compliance with the several BREEAM International credits. For this and other information please contact Dr. Pablo van der Lugt, sustainability expert of MOSO International through [sustainability@moso.eu](mailto:sustainability@moso.eu)