Stora Enso ThermoWood®

Benefits and Uses of Stora Enso ThermoWood®
The heat treatment of wood using the patented ThermoWood® process has a permanent effect on the properties of wood. Different process recipes are necessary dependent upon end use of the product and material dimensions. The material is great for products that are affected by hard climatic conditions such as doors, windows, garden products, and exterior claddings. For internal use, the attractive appearance, stability and removal of resin makes the product a good choice for use in saunas, interior panels, furniture and flooring.

Resistance to Decay and Fungal Attack
As a result of the ThermoWood process, significantly improved durability can be obtained when the end product requires greater resistance against fungal attack and decay. Different process recipes are used dependant on the level of durability required.

Dimensional Stability
A major advantage of using Stora Enso ThermoWood is the possibility to improve dimensional stability. It is possible with the suitable process recipe to greatly reduce the amount of deformation in end use. The heat treatment process reduces the equilibrium moisture content by as much as 50%, thus deformation can be considered to improve by a similar amount. Products such as doors, windows and other exterior products where ever-changing levels of humidity is common greatly benefit from greater stability. ThermoWood is a great base for painting and can improve the service life and Maintenance-free period.

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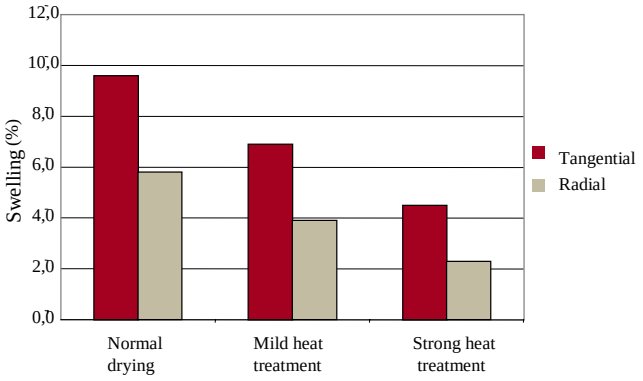
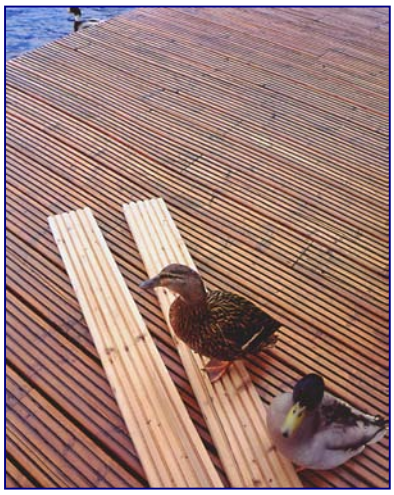
The effect of heat treatment on maximum swelling



Attractive Appearance
As a result of the ThermoWood process, the material obtains a distinctive colour which can be replicated. The colour is quite consistent through the cross section of the material. The higher the temperature used in the intensive heat treatment phase, the darker the appearance. As with all natural products, ThermoWood is not resistant against ultra-violet light. If the colour and appearance is to be maintained, a surface treatment with U-V block should be applied. Without protection, ThermoWood will gradually fade to a grey colour just like tropical hardwoods and other wood species.

Environmentally Friendly
The ThermoWood process only uses steam and heat, and no chemicals or agents are applied to the material during the process. Tests have shown no harmful emissions are apparent when working with the material. Any left over pieces of ThermoWood can be burnt or disposed of into the normal waste system. The raw material that is used in Stora Enso ThermoWood is sourced from renewable resources, the chain of custody is covered under the PEFC certification system.



Surface Treatment
Stora Enso ThermoWood is a good base for surface coating due to its reduced dimensional changes and also the removal of resins that normally stain through the paint after a period of time. It is very important to have a clean surface before coating. Carefully follow the paint producer's instructions for application guidelines. ThermoWood can be coated with oil, water and solvent-based finishes. It has been observed that the material may absorb more priming paint than normal – this, however, ensures better and longer lasting penetration. For external usage, when a standard colour finish is required, normal oil or water based paint products are suitable. If a translucent finish is required, either use an oil or water based lacquer with some pigment included. Wood oil with pigment included can be used as a primer when the final coatings are with water based lacer. Inclusion of the pigment will slow down the effects of ultra-violet radiation. Latex paints should not be used as primer. Always consult the paint producer's instructions for more specific details.

Other Effects
As a result of the ThermoWood process, some reduction in bending strength has been observed. When using treatments over 200˚C a decrease in bending strength can be expected. Efficient selection of raw material, controlling the amount and size of knots can minimise the reduction in bending strength. We recommend Thermowood is NOT used where high bending strength performance is required.
Due to chemical reactions which are still being researched, it is not recommended to apply ThermoWood to deep ground contact; loss in strength properties have been observed.
As a result of the process, ThermoWood gains a distinctive smell – this is not harmful and will disappear naturally over time, or immediately when applying surface treatment.

Working and Handling Precautions
It is recommended to avoid inhalation of the sawdust when cutting or machining the material since the dust can cause breathing irritation – it is recommended to wear a dust mask. When storing the material prior to installation, it is recommended to put it in a dry place on a flat base using sufficient bearers so as to avoid distortion or damage over time.

The Heat Treatment Process
There are five main steps in the production of Stora Enso ThermoWood.
1. Raw material selection and sticking
2. High temperature kiln drying 100-130°C
3. Intensive heat treatment 190-220°C for 2-4 hours (dependent on end product requirements)
4. Cool down and re-moisturising to moisture content between 4-8% (dependent on end product requirements)
5. Packaging, further processing and final quality checking

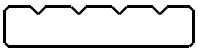
Core Range Product Information

ThermoDeck

Stora Enso Timber produces a standard range of ThermoWood® decking. The material is perfect for using in garden or patio areas, and in addition to its great appearance, it has the added value of giving great stability and durability performance.

Standard Product Range

Dimension	Lengths
27 x 95	3.9, 4.2, 4.8, 5.4m
27 x 120	3.9, 4.2, 4.8, 5.4m
27 x 145	3.9, 4.2, 4.8, 5.4m



Site Preparation
We recommend that similar site preparation be made as when building decking areas with other timber materials. Ensure that the site is level as possible.

ThermoDeck Framework
When building the framework to a solid base like a concrete pad or sand base where no clear spans are needed, ThermoWood sawn material 50x150 can be used. However, if the framework is to be raised above the ground and long spans are required it is recommended to use standard structural construction timber (see "other effects" overleaf). When spacing the joists, it is best not to exceed 450mm between the centres. Normal galvanised nails or screws can be used.

Preparation of the ThermoDeck
If the aim is to maintain the ThermoWood colour for a longer period of time, it is recommended to pre-coat the deck with a translucent paint which contains some pigment, or some alternative paint system which will protect the material from the natural wear of direct sunlight (ultra violet) and daily wear. If the ThermoDeck is not coated the colour will change after some time to a grey weathered look, with some surface fissures appearing. This occurrence is not dangerous and the product's durability is not affected, only the brown appearance is lost. Various paint products are now available to protect against sunlight. Please refer to the section on the surface treatment overleaf. Also follow paint manufacturer's instructions for application and other details. It is only necessary to coat surfaces that are exposed to the natural elements and daily wear.

Fixing the ThermoDeck
Cutting the ThermoDeck should be made using a sharp saw. It is very similar to cutting hardwoods, both hand or electric saws are suitable. If the deck is to be fixed with screws, we recommend that pre-drilling of holes is made; this will prevent the risk of splitting, specially on the ends. It is recommended that rust-free screws are used so as to reduce the risk of rust stain. When fixing with nails, where possible use a compressed air nail gun. If nailing by hand, then drive the nail below the wood surface using a nail punch – try to avoid hitting the wood surface with the hammer. Again, rust free nails are recommended – these should have an oval head. Although ThermoDeck has greatly improved dimensional stability, we recommend that a 3-4mm space is used between each decking board.

ThermoDeck Maintenance
It is recommended to sweep surface dirt from the decking on a regular basis so as to avoid surface mould forming. Also periodic inspection and repair of the paint surface is recommended.

ThermoClad

Stora Enso Timber produces a standard range of ThermoWood cladding. The material is excellent due to its increased stability, therefore reducing the need for regular Maintenance. Its significantly improved durability means far less risk of fungal decay. If insulation values are to be considered, then the material has a reduced level of thermal conductivity, thus making it a better insulator.

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Standard Product Range

Dimension	Lengths
19 x 95 shiplap/T&G	3.9, 4.2, 4.8, 5.4m
19 x 120 shiplap/T&G	3.9, 4.2, 4.8, 5.4m
19 x 142 shiplap/T&G	3.9, 4.2, 4.8, 5.4m

Fixing ThermoClad
Cutting of ThermoClad on site can be made in the same way as standard wood material; tools must be sharp. Due to the dimensional stability of Thermoclad, less space is needed between the boards to allow for movement, however some gap is still recommended. Nailing should be carried out using a compressed air nail gun where possible – best results are gained when using rust-free oval head nails. If nailing by hand, then drive the nail below the wood surface using a nail punch – try to avoid hitting the wood with the hammer. If fixing with screws, it is best to pre-drill holes and use rust-free screws to avoid unwanted stains.

ThermoClad Surface Treatment
Surface treatment will increase the service life of ThermoClad and also maintain a more attractive appearance. ThermoClad is durable without surface treatment, but the appearance will become grey and weathered especially on south-facing walls. It is recommend that a priming base is applied before fixing. Once fixed, final coats can be applied. Various exterior paint systems are available. Please refer to the section on the surface treatment overleaf. Also follow paint manufacturer's instructions for application guidelines. It is only necessary to coat surfaces that will be exposed to the natural elements.

ThermoClad Maintenance
It is recommend to periodically wipe the wall where possible to remove dirt which can lead to surface mould forming. Checking and repair of the paint surface will improve the service life and appearance.

ThermoSauna

ThermoWood Sauna material gives a very attractive alternative to the normal wood species used in saunas. Due to the fact that the large percentage of resin is being removed during the treatment process, problems with leaking pitch is not common. As ThermoWood has reduced thermal conductivity, the material is less prone to getting too hot to sit on.

Standard Product Range

Dimension	Lengths
15 x 95 TGV	3.9, 4.2, 4.8, 5.4m
27 x 95 bench	3.9, 4.2, 4.8, 5.4m
45 x 70 PSE	3.9, 4.2, 4.8, 5.4m
45 x 45 PSE	3.9, 4.2, 4.8, 5.4m

Fixing ThermoSauna Products
Cutting of ThermoWood products on site can be made in the same way as standard wood material; tools must be sharp. When building the bench frames, the recommended space between each bearer should not exceed 45cm, and 45 x 70 PSE should be the minimum dimension when it is to be load bearing. Fixing of the frame can be made using normal screws; pre-drilling of holes is recommended. The fixing of the sauna bench and also panels can be made in the standard way. Care should be taken when fixing the panels with a normal hammer, not to hit the wood surface. A nail punch should be used to drive the nail below the surface.

Maintenance of ThermoSauna Products
It is not necessary to put surface treatment onto the ThermoWood products in the sauna. If special surface protection is required, standard sauna surface treatments can be used. When cleaning the surfaces, it is recommended to use a neutral cleaning agent. It has been found that using cleaning agents with a higher pH value can cause some damage to the material over some time. Periodical checking of the screw fixings and joints are recommended if some movement has occurred.

Notice:
The content of this guide has been formulated through research and practical testing by both Stora Enso Timber and third party organisations, the information should only be used as a guide and is subject to change.

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碳化木將改變您對木材使用的傳統觀念！

原木細緻的紋理，舒服的觸覺，溫暖的感受是令人嚮往的。
她在我們身處的周遭，釋放工作生活上的壓力，緩和我們的情緒，是完美的建築材料。
但是，絕大多數的使用者，總是會抱怨木材的使用壽命，尤其在潮濕多雨的台灣島國氣候。正因為如此，我們對木材真是既愛之且恨之。
碳化木是目前唯一能夠克服上述缺點的全功能環保綠色建材。

在塗裝方面，碳化木與其他所有木料一樣，它並不具有抵抗紫外線的能力。所以在戶外使用的同時，我們必須使用具有 UV 特性的護木漆，避免木料的白灰化及老化。一般而言，現今護木漆的功能已能達到撥水，滲透抒發及抗紫外線的保護功能。
在五金使用方面，它必須依使用用途選擇著釘方式。一般常用的有圓頭釘，平頭螺絲及平頭牙釘，材質至少需為鍍鋅以上等級。
膠合集成材
-乾燥後膠合條件含水量應是最低限度。
-小的微粒接合劑的尺寸可提供更優良的附著條件。
-膠合劑黏性至少應是 8000pas．
-膠縫線應具彈性性能。
-散佈數量:120-150g/m2。
-開放時間:1 到 3 分鐘,增加潤濕含量於木料表面。
-壓縮壓力:0.1-0.5N/mm2

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碳化木基本介紹：

樹種：北歐雲杉;南方松
尺寸及斷面：140mm*38mm*360cm;390cm;420cm
140mm*25mm*390cm;450cm
89mm*38mm*480cm
防腐方式：強制性熱處理碳化原木涵養油脂及組織，可避免腐菌及白蟻侵蝕（相對性比較），不含任何劇毒防腐化學藥劑，並強化原木天然色澤肌理。
功能特性：輕質建築結構材，強度可依斷面膠合增強。可延緩木料延燒時間。
適用範圍：戶外景觀用材，涼亭結構，木座椅，欄杆及扶手系統，外牆板，天花板……等。
室內使用:內牆壁板，裝飾性面材，商業空間視覺性重點強化，天花格柵，音響室吸音壁材（需槽刻加工），室內地板……等。
及任何您害怕於潮濕環境中使用木料的狀況下均可採用碳化木。

強制性熱處理過程
以下是生產 ThermoWood 五個步驟：

1.適合的原料選擇和等級（樹種以及木結的大小深度數量）。
2.持續性高溫度烘乾 100-130℃ 24 小時。
3.陶磁增溫強制性熱處理法 190-220℃(最終產品品質所依據的條件)。
4.冷卻和重新增加含水率約當 48%(最終產品條件所依據)。
5.包裝,更進一步處理和最後的品質復查。

ThermoWood 生產流程能分成三主要的階段：

-階段 1．溫度增加和高溫度燒窯這窯溫被提升在一個快速的速度使用熱和蒸氣到一個層次約 100℃，這溫度被持續地此後增加到 130℃高溫乾燥，此時含水量在木料中幾乎減少到零。

-階段 2．強制性熱處理。在燒窯之內被增加到 185℃至 230℃這溫度層。在這溫度持續加熱 23 個小時。

-階段 3．冷卻和濕氣調節。最後步驟是使用噴水系統降低高溫度。然後，在溫度達到 80-90℃ 重新增加其含水率。

碳化木提供給您的是舒適及優良質感的生活品質，同時更具備環保與

延長使用壽命的新選擇！！

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