

# MODIFIED WOOD GUIDELINES EXTERIOR JOINERY & CLADDING

So, what's the difference between wood that has been modified and standard species timber? Well, the key difference is that modified wood's characteristics have been changed chemically or thermally to enhance the timbers properties for performance with commercial and environmental benefit.

Modified wood is a relatively new 'product', at least on a commercial scale (15 to 20 years). It's popularity has soared over the past decade as an outcome of raw material availability (such as Siberian Larch) and concerns about environmental impacts have resulted in it becoming a mainstay of eco-conscious homeowners and architects. Resulting in chemically & thermally modified timbers being offered into the exterior joinery and cladding markets.

In general, chemically and thermally modified wood can last significantly longer than the same untreated wood species it is produced from, the created product being a durable and sustainable material. Generally, water absorption in regular wood can cause warping, instability and discoloration. Wood becomes instantly more durable after being modified, due to the altered cellular characteristic. Chemical processes improve the density of the wood, whereas thermally treated wood becomes dryer (cerca 7% mc), a little lighter as the density is maintained or lowers slightly and also becomes brittle, all as a result of the thermal cell structure modification.

The density loss that the thermal modification process tends to cause in the timber, can be associated with reduced load strength — up to 30% in some cases. As a result, heat-treated timber is not recommended for structural use.

The characteristic differences between standard species and modified wood is negligible and manufacturing methods can be adjusted to suit accordingly, when it comes to workability. Some types of modified wood may have specific characteristics which call for a better understanding and more careful process handling and installation management. Teknos can offer technical support to help.



Chemically & Thermally modified wood has also been treated in its entirety and right through to its core. This means you can saw it and convert it without these actions adversely affecting the performance characteristics of the wood. And that is, of course, one of the main reasons why modified wood is increasingly used for outdoor applications against the envelope only protection that preservative treatments offer. However, thermally modified wood does have a number of downsides as well. One of them is decreased flexibility. It is said that the dryness of the thermally modified wood can also make it more difficult to obtain a clean saw cut (a sharp blade and cutter is always recommended).

All modified wood can be coated with translucent and opaque systems.

### Chemically Modified - Accoya

Acetylation is the process used to enhance the properties of wood. In simple terms, it 'pickles' the wood, reducing how much water the cells in the wood can absorb. It does this without adding toxic chemicals to the final product, but by boosting the concentration of 'acetyl groups' – which are already found naturally in trees and their wood. More specifically, the process uses acetic anhydride to change hydroxyl groups (which like water) into acetyl groups (which don't like water), resulting in improved performance characteristics without introducing harmful or environmentally unfriendly additives.

Altogether, this means the wood shrinks and swells much less when wet, and is much less susceptible to decay or insect attack. Using this proprietary acetylation process to enhance fast-growing, renewable and sustainably-sourced soft woods into a non-toxic material with qualities to compete with or outperform hardwoods, plastics and metals.

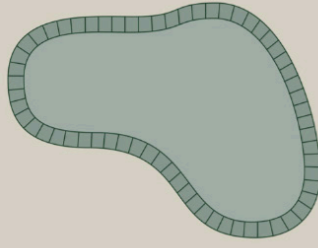
### Chemically Modified - Kebony

Kebony:- is considered a dually-modified wood, which means it's both chemically and thermally modified. That happens through their proprietary process called furfurylation. The Kebony technology modifies wood by forming stable, locked-in furan polymers in the wood cell walls. These increase the dimensional stability, as well as durability and hardness, of the wood. This process is based on impregnation with furfuryl alcohol produced from agricultural crop waste. Kebony thus uses a plant-derived waste product to give enhanced strength and durability to another plant product – namely wood.

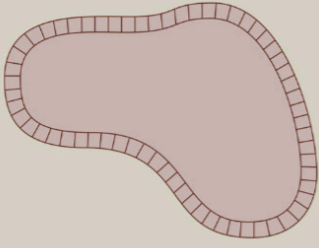
### Thermally modified woods

#### What is Thermal Modification?

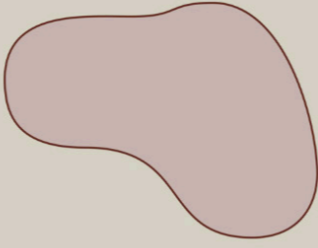
Thermal modification permanently alters the cells of timber, effectively reducing the moisture that is held inside the cells.



**Before Kiln Drying**  
Water is held in the cell walls along with the cell itself.



**After Kiln Drying**  
Some water is still held in the cell walls.



**After Thermal Modification**  
The cell walls collapse and fuse together, permanently reducing the ability of the cell wall to store water.

Thermally modified wood is wood that has been modified by a controlled pyrolysis process of wood being heated to high temperatures, in a (very low) oxygen free atmosphere. This process effects changes to the chemical structures of wood's cell wall components lignin, cellulose and hemicellulose which increases its durability.



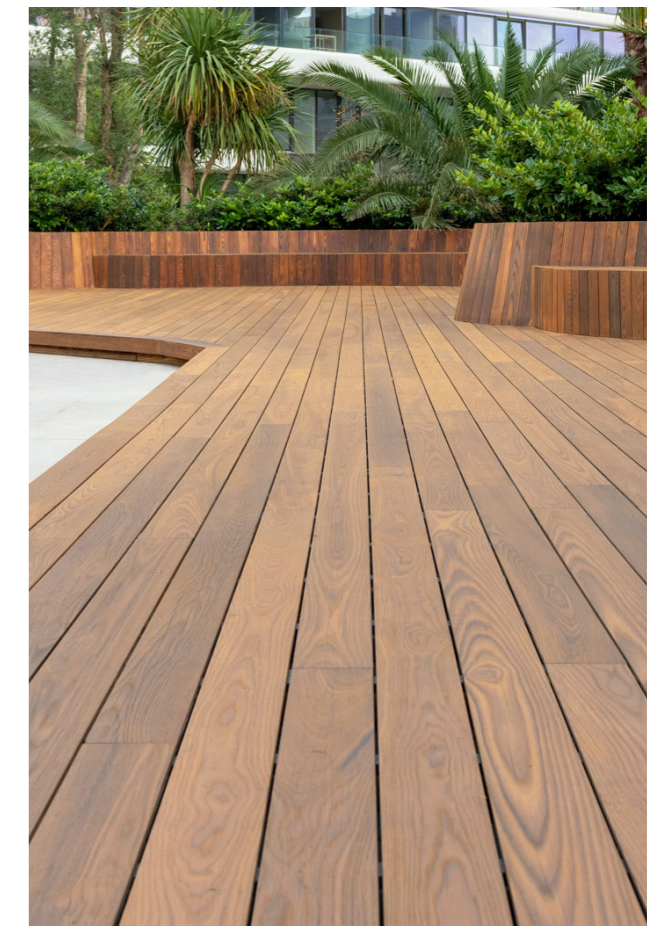
The thermal modification process permanently modifies the cell walls of the wood and results in improved durability of the wood as well as increased dimensional stability. The aim of modified wood is to typically overcome the shortcomings of sustainable temperate & conifer forest standard timber (non-durable). The modification process improves the wood's dimensional stability, decay resistance, reduced water absorption, less expansion/contraction, etc.

The high gradual heat process creates permanent reactions and gives the wood a rich, (deep) brown appearance. All heat treatment processes result in a darker colour than the original, untreated wood. This creates darker brown hues, which can resemble tropical hardwoods. The freshly machined chocolate colour can typically be maintained in exterior applications by finishing the wood with an appropriate coating system (on all sides and ends of the wood).

For the production of modified wood, producers have mainly use fast growing wood species such as pine and spruce wood that mature over a 25 – 30 year period. This comes from sustainably managed forests, which gives thermally modified wood a very high sustainability score. In addition, since most advanced modification processes

are environmentally friendly, they do not interfere with the life cycle of the wood; Wood is a 'carbon sink' that absorbs CO2 from the atmosphere through its life cycle and it can be disposed of in exactly the same way as if it was untreated.

Even more hardy wood such as Ash, Beech & African hardwoods can be thermally treated to produce a very high quality thermally modified wood (Brimestone, Frake, Saplen & Thermory) Current commercial influences and demands all suggest Wood modified products will continue to expand and develop as a market sector within the timber trade industry, and we will see new brands and process methods being created and subsequent products come to market. Teknos wish to be at the forefront of such technological development partnering by providing proven performance coating systems.





### Coatings

High build coating systems can be vulnerable when applied to surfaces that have a lower density and are porous in nature, generally due to their open fibrous structure. The surface characteristics of thermally modified wood are more vulnerable to mechanical and impact damage such as (hail). Origin timber species characteristics also have an influence, and therefore each wood type needs to be individually assessed for coating performance. In general terms, it has been found that thermally modified woods are better matched to a medium to low build coating systems generally associated to cladding & garden structures / furniture. If uncoated the shade of the freshly planned surface will noticeably change rapidly under UV exposure over a few hours / days (not weeks). This is typically much faster than the rates seen on standard species and the chemically modified wood Accoya.



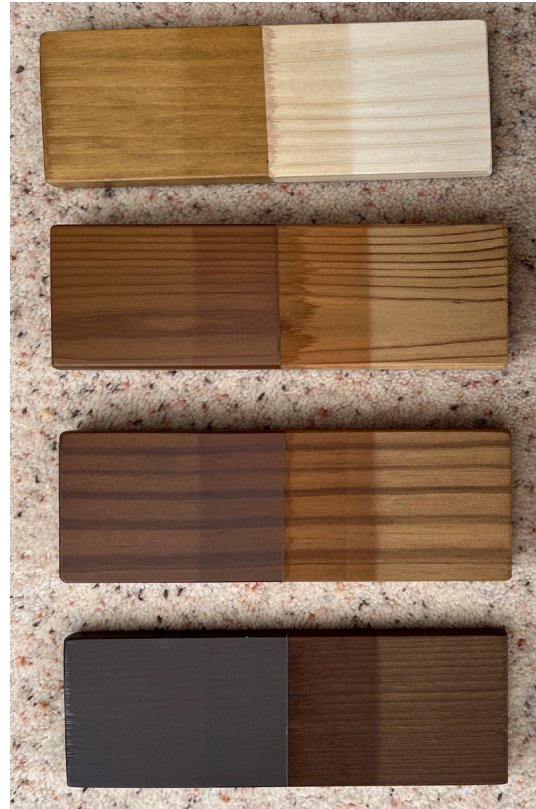
Coating protection is often considered a benefit for appearance and colour, as after some time the uncoated modified wood will automatically get a greyish colour. Discussing your project and colour preferences with us, will help produce the most appropriate coating recommendations for your project.

Like all timber species, the effects of wetting and ultraviolet light exposure still cause heat treated timber to change colour (shade mellowing / bleaching). Typically, this is a rapid process and can trigger during the manufacturing, storage and transportation, as well as on installation. Severity of exposure is another influencing factor.

This becomes particularly important to remember when considering the lighter range of translucent shades.

Another factor would be on a phased build project where goods are supplied in batches over an extended period of time. To set understood expectations for the project, we suggest this is openly discussed with us and appropriate supporting guideline documentation shared.

Natural colour changes do not affect coating adhesion and have no impact on opaque systems.



*Picture above illustrates UV bleaching process (high-build coated and non coated) - Timbers from top to bottom: Accoya, Thermowood Pine, Abodo and Saplen*

**Always refer to the Technical Datasheet for full instructions on how to use Teknos products.**

For further support, contact your local Teknos coating expert or visit [teknos.com](https://www.teknos.com)