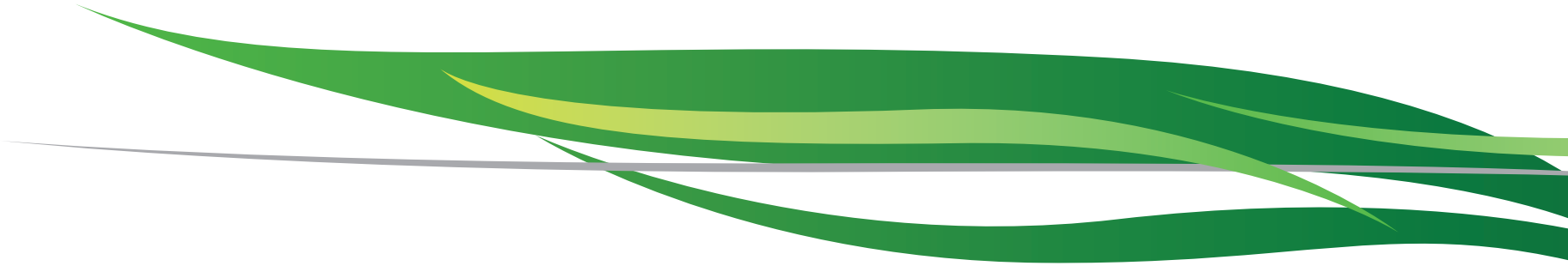


the world's leading high technology wood

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accoya ®



## welcome to the future of wood

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The possibilities wood offers can be seen wherever we look: as furniture, decoration, fuel, musical instruments, structures - wood is a material that is aesthetically pleasing, endlessly practical and our only naturally renewable building material. However, as an organic material that is sensitive to its surroundings, wood presents natural challenges when used for certain applications.

Historically, the only way to overcome these challenges was to treat the wood with the application of chemicals or to choose tropical hardwoods from rapidly diminishing forests - offering only partial solutions to the natural challenges that are faced when using wood as a construction material.

If an alternative existed which offered all of the best characteristics of wood, was sourced from sustainable forests, had zero toxicity and provided dimensional stability and durability that exceeded even the best tropical hardwoods, a perfect material would have been found.

Accoya® is the solution.



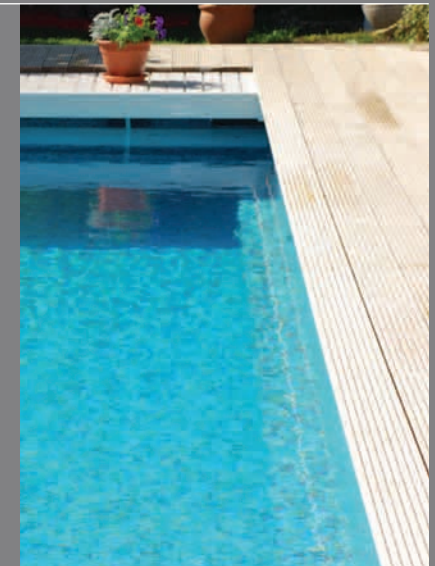
# welcome to Accoya®... the world's leading high technology wood

Accoya® wood is the result of more than 80 years' research and development that has brought together a long-established and extensively proven wood modification technique - acetylation - and leading-edge proprietary technology to create a high performance wood.

Accoya® wood has properties that match those of the best tropical hardwoods, yet is manufactured using a non-toxic process and wood from sustainable sources.

Already the material of choice for a wide range of demanding outdoor applications, Accoya® wood can be used for virtually anything from windows to doors, decking to cladding, bridges to boats and even for applications that are presently only feasible with non-sustainable materials.

Accoya® is the future of wood.





## Accoya® – enabling nature - naturally

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Accoya® wood is modified all the way through, not just at the surface like traditional envelope treatments. This modification technique has two key advantages:

- Using an array of sophisticated and proven analytical techniques, the producers of Accoya® wood ensure that every batch is of consistent quality and reaches the highest possible level in durability and dimensional stability
- When Accoya® is cut or jointed there are no exposed non-acetylated surfaces in any dimension. This completely negates the need to apply additional chemical preservatives on-site, as is necessary with unmodified or envelope-treated woods

# the performance benefits

## DIMENSIONAL STABILITY



- Swelling and shrinkage reduced by 75% or more
- Doors and windows open effortlessly year round
- Paints and varnishes last 3 or 4 times longer, greatly reducing maintenance costs

## CLASS 1 DURABILITY



- The most durable wood possible
- More durable than teak
- Perfect for outdoor use

## LONG LASTING



- Lasting at least 50 years above ground and 25 years in ground

## MOULD AND INSECT BARRIER



- Accoya® wood is indigestible to insects and micro-organisms and is therefore more resistant to decay
- Resistance to wood-destroying fungi is dramatically increased
- Accoya® wood is virtually rot-proof

## PERFECT FOR COATING



- Easier to coat: less preparation and sanding between coatings required
- Improved dimensional stability and UV resistance improves the life of coatings
- Perfect for transparent, translucent and opaque coatings

## NATURALLY BEAUTIFUL WOOD



- The process does not compromise the wood's natural beauty

## NATURALLY INSULATING



- Accoya® wood offers improved thermal insulation in comparison with commonly used wood species
- Accoya® wood is ideal for applications where energy conservation is important

## NON-TOXIC



- Accoya® wood is non-toxic, protecting the environment from the harmful effects of poisons in treatments leaching into the earth
- Accoya® wood may be safely reused and recycled

## FROM SUSTAINABLE SOURCES



- Sustainably sourced, including from FSC, PEFC and other regionally certified woods
- Naturally renewable

## UV RESISTANT



- Accoya® wood has superior resistance to UV degradation when translucent coated and its natural appearance lasts longer
- Accoya® wood is the ultimate substrate and coating life is increased

## RETAINED STRENGTH & HARDNESS



- The process does not compromise the wood's strength
- Hardness is increased
- High strength to weight ratio, making it suitable for challenging applications

## 100% RECYCLABLE



- Fully reusable and recyclable
- Reuse is recommended but Accoya® wood may be safely incinerated for bio-energy or composted

## CONSISTENT QUALITY THROUGHOUT



- Consistent, measurable modification quality from surface to core
- No need to apply chemical preservatives when cut or planed

## MACHINABILITY



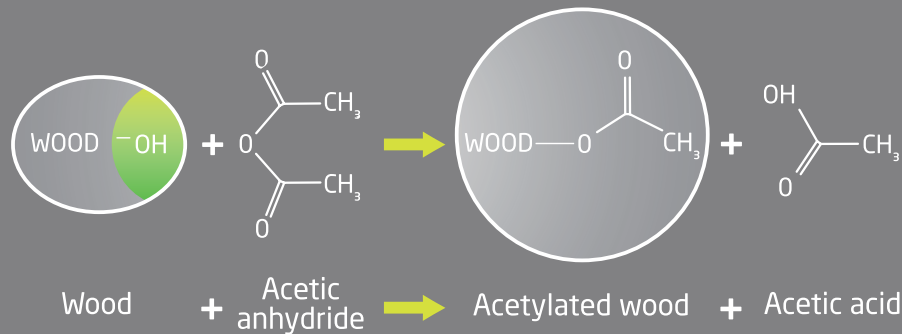
- Accoya® wood is easy to machine and process manually, creating no challenges for product manufacturers and end users

## CONSISTENT SUPPLY



- Produced from abundantly available, fast-growing sources species such as Radiata Pine

# enabling nature with high technology



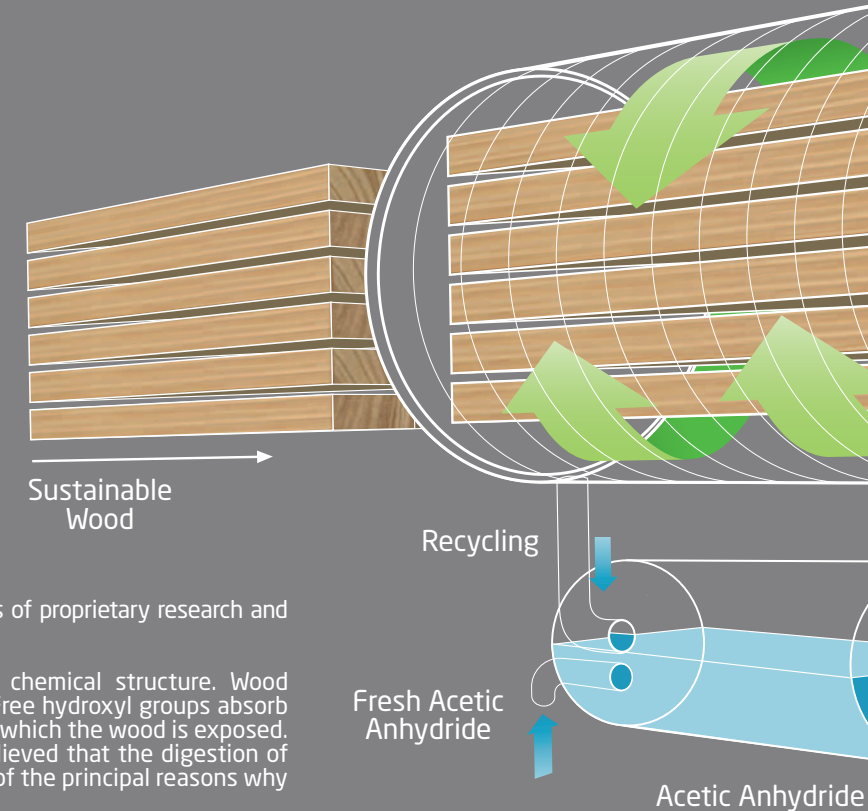
Wood acetylation is a process that has been studied by scientists around the world for more than 80 years.

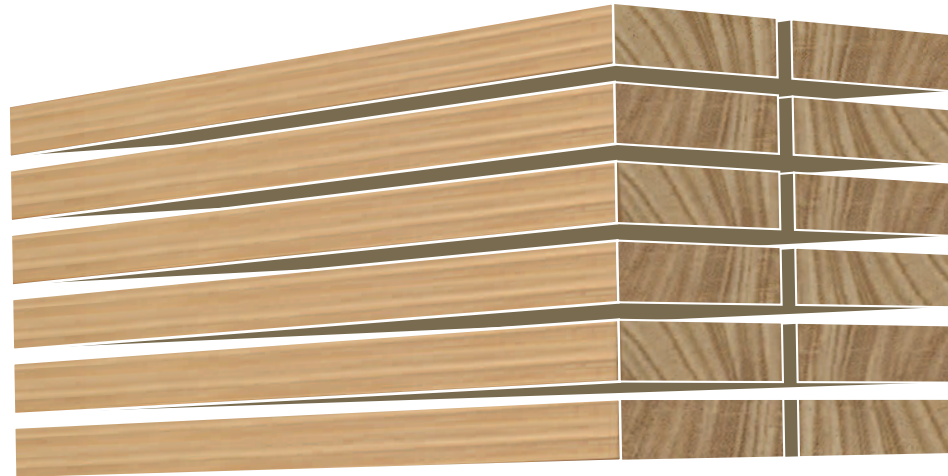
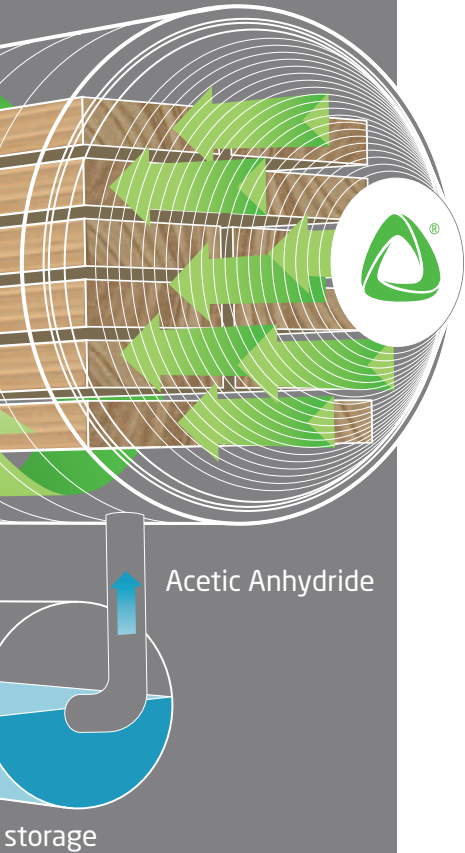
This method of improving wood has been proven to deliver such superior performance that it has long been used as the “gold standard” against which other methods are measured.

The Accoya® wood production process combines this work with years of proprietary research and investment to deliver consistent results on a commercial scale.

The physical properties of any material are determined by its chemical structure. Wood contains an abundance of chemical groups called “free hydroxyls”. Free hydroxyl groups absorb and release water according to changes in the climatic conditions to which the wood is exposed. This is the main reason why wood swells and shrinks. It is also believed that the digestion of wood by enzymes initiates at the free hydroxyl sites - which is one of the principal reasons why wood is prone to decay.

Acetylation effectively changes the free hydroxyls within the wood into acetyl groups. This is done by reacting the wood with acetic anhydride, which comes from acetic acid. When the free hydroxyl group is transformed to an acetyl group, the ability of the wood to absorb water is greatly reduced, rendering the wood more dimensionally stable and extremely durable.





natural science

Acetyl groups, which simply comprise oxygen, hydrogen and carbon, are already naturally present in all wood species - as well as in humans and other mammals. This means that the manufacturing process adds nothing into the wood that does not already naturally occur within it. The end product, Accoya® wood, does not add toxins to the environment.

The effect of altering the wood's chemical structure, as opposed to merely altering its chemical content, is to create an end product that is dramatically superior to its source species. Accoya® wood is modified right through the cross section whereas, by contrast, virtually all other treatments merely insert chemicals (such as oils, ammonia or metal compounds) into the wood, improving durability but not dimensional stability.

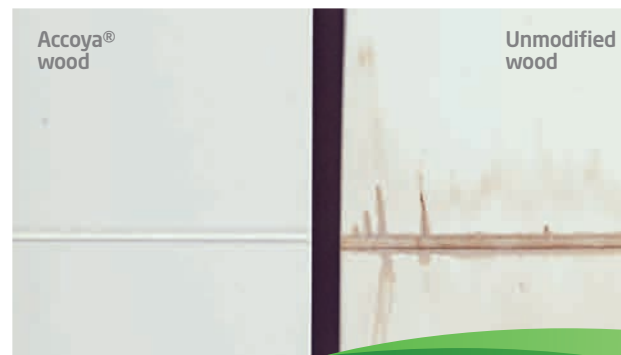




## longer lasting coatings

Accoya® wood is the ultimate substrate, and its lower maintenance requirements add to its cost effectiveness and environmental credentials. Coatings may be transparent, translucent or opaque, allowing for adventurous colour schemes that will endure.

All major coatings systems can be used on Accoya® wood, with significantly improved performance, due to the wood's outstanding dimensional stability and resistance to UV degradation. Extensive tests have shown that the natural beauty of Accoya® wood lasts longer, even in the most severe weather conditions.



Extensive laboratory and field testing by leading institutes around the world (including in New Zealand, USA, UK, Sweden, Malaysia, Indonesia, Russia, the Netherlands, Germany and Japan) has shown the performance of acetylated wood to be extremely reliable.

# tried and tested

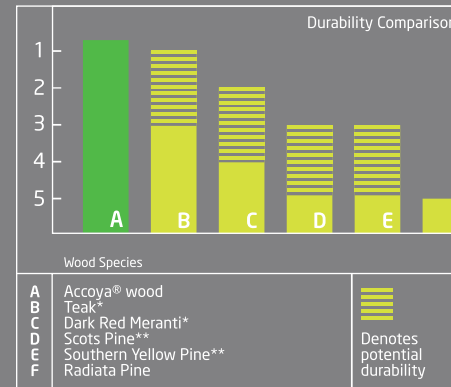
Accoya® has been thoroughly tested for dimensional stability, durability, UV resistance, paint retention and in-ground conditions to ensure optimal performance. Indeed, it is so reliable that for many years it has been and continues to be used by scientists as the benchmark against which other treatments and modification techniques are measured.

Wood species	Durability/ Class † (1 = highest)	Janka Hardness †† N/mm²	Bending Strength †† N/mm²	Radial Shrinkage between 60-90% RH	Tangential Shrinkage between 60-90% RH
<b>Accoya® wood<sup>1</sup></b>	<b>1</b>	<b>3950</b>	<b>80</b>	<b>0.4</b>	<b>0.7</b>
Radiata Pine	5	3850	80	1.2	2.2
Scots Pine	3/4	2900	80	1.0	2.4
Beech (not steamed)	5	7100	115	1.2	2.5
<b>Accoya® wood<sup>2</sup></b>	<b>1</b>	<b>6950</b>	<b>115</b>	<b>0.7</b>	<b>1.1</b>
Western Red Cedar	2	1450	55	0.5	1.2
Meranti (DRM)	2/3	4300	90	0.9	1.8
Sapele Mahogany	3	6700	105	0.9	1.2
Ponderosa Pine	3/4	3000	80	1.1	2.1

Comparison of the technical specifications of different wood species and Accoya® using various source species. Accoya® wood<sup>1</sup> based on a typical pine source material; Accoya® wood<sup>2</sup> based on beech source material.

† Based upon classification by EN350. Durability Class 1 corresponds to a 60-year service life in applications such as windows, doors, balconies and cladding in the British Standard recommendation BS8417.

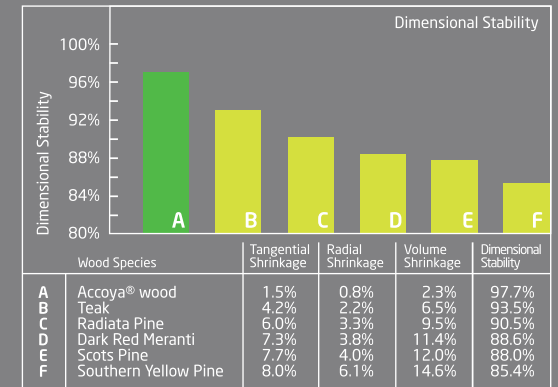
†† Janka Hardness and Bending Strength are based on wood conditioned at 65% RH and 20°C. Values are heavily influenced by local growth conditions.



EN350-2. Classification Tests: EN113, EN252, ENV807

\* Range caused by variability of species.

\*\* Range caused by difference between Heartwood and Sapwood.



N.B. This graph shows the dimensional stability (volume metric) from fully soaked to oven dry (the most extreme laboratory test), where a material is unaffected by moisture changes the dimensional stability would be 100%. This table does not show changes due to temperature conditions (wood is very stable). The main table on this page shows the shrinkage in more normal weather conditions (with simulated humidity varying between 60 and 90%).

## naturally beautiful wood

Accoya® wood has superior resistance to UV degradation, with extensive tests demonstrating that the natural beauty of the wood lasts longer in exposed conditions. This, coupled with Accoya® wood's improved dimensional stability and excellent thermal properties, means that wooden windows, doors and siding can once again compete effectively with artificial alternatives.

Opaque coated acetylated (top) and unacetylated Scots pine after 5½ years outdoor test



## dimensional stability

Accoya® wood offers dimensional stability (resistance to swelling and shrinkage) in both radial and tangential directions.

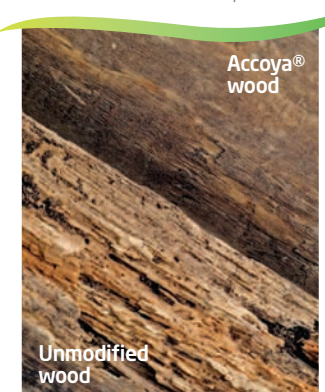
Tests have shown a reduction in swelling caused by moisture uptake of 70 to 80%, depending on the source species and conditions. From oven dry to water saturated conditions, the swelling and shrinkage of acetylated wood is only minimal and, in fact, better than tropical hardwoods. Dimensional variability resulting from thermal changes (ambient or radiant temperature variations) is, like most woods, minimal.

## class 1 durability

Accoya® wood's durability is Class 1, matching and even exceeding the performance of nature's most durable woods. Durability is assessed by measuring weight loss over time in exposed conditions. Acetylation has been shown to significantly improve resistance to brown rot, white rot and soft rot, with the percentage reduction in original mass being negligible compared to unmodified wood.

One of Accoya® wood's main advantages is that its key properties can be analysed by standardised scientific measurements after modification, enabling its durability to be guaranteed.

Garden post: rot test



# this is the future of wood...

Accoya® wood has been tested over prolonged periods in all types of weathering conditions - above ground, below ground and even in water - and has been proven to withstand even the toughest of external environments. Not only is its durability proven, but it has also been shown to retain its appearance, requiring much less frequent maintenance than other wood species. This gives added reassurance to the manufacturers, architects, specifiers, builders and property owners who have chosen Accoya® wood for a diverse range of projects. Accoya® wood is also being tested for additional uses by partners worldwide.

## window frames, doors & shutters

Accoya® wood is the material of choice for these products as it has low thermal conductivity and is more durable and dimensionally stable than the best tropical hardwoods. It may be opaque coated or, for those who enjoy the natural look of wood, transparent coated. Accoya® wood's low maintenance requirements add to its cost effectiveness and environmental credentials.

## cladding, siding & façades

Accoya® wood is suitable for cladding, siding and façades where aesthetics, less frequent maintenance, dimensional stability and durability are key factors.

## decking & marinas

In specifying decking, jetties and pontoons, beauty, strength and all-weather performance are important. A material that will not cup, bow, warp, split, swell or be affected by fungi, water uptake or rot is desirable. It is also crucial that the wood is non-toxic and therefore totally safe for people and animals. Accoya® meets these requirements.

## outdoor furniture & equipment

Accoya® wood is perfectly suited to tables, chairs, tree houses, play frames, planters and landscaping timbers as it is non-toxic and able to withstand the rigors of different weather conditions.

## bridges & canals

With its high strength to weight ratio and overall superior performance, Accoya® allows wood to be used in demanding applications such as heavy traffic road bridges. Certain environments are particularly punishing and few are harsher than canal banks where wood is used to hold back the earth, exposing it to water, microbe rich soil and - most obviously at the waterline - air. Accoya® wood offers unparalleled performance in this application, replacing tropical hardwood.

## imagination unlimited

Accoya® wood is already being used for many new and exciting applications. It opens up all kinds of creative possibilities and is inspiring architects and designers to look at new and different ways of using wood, safe in the knowledge that their creations will be long lasting. Wherever you can imagine wood, imagine Accoya® wood.



## ...this is Accoya®

By significantly enhancing the durability and dimensional stability of fast-growing and abundantly available certified wood species, Accoya® wood provides compelling environmental advantages over slow-growing hardwoods (which are often unsustainably sourced), woods treated with toxic chemicals, and non-renewable carbon-intensive materials such as plastics, steel and concrete.

- The Accoya® wood modification process is non-toxic and adds nothing to the wood that does not already naturally occur in it
- Class 1 durability - facilitating a longer lifespan, improved carbon sequestration potential and lower lifetime material consumption versus other materials
- Outstanding dimensional stability and improved hardness, resulting in lower maintenance frequency and therefore less coating used over the lifetime of the product
- Superior thermal insulation, providing energy conservation advantages when used for applications such as windows and doors
- All Accoya® wood is produced from well managed sustainable sources including FSC, PEFC and other regionally certified woods
- Low carbon footprint: Accoya® wood is an environmentally compatible substitute for carbon intensive materials
- Environmentally compatible: 100% recyclable and reusable, naturally renewable
- Rapidly renewable materials: use of abundantly available and fast-growing source species



All Accoya® wood is produced from well managed sustainable sources, including FSC, PEFC and other regionally certified woods.

Accoya®... enabling nature.



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