accoya®

innovation in wood

DURABLE, STABLE & SUSTAINABLE

THE SASH WINDOW WORKSHOP

INNOVATION IN WOOD

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

Historically, the only way to overcome these challenges was to treat the wood with preservative 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 building 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 matched or exceeded even the best tropical hardwoods, an ideal material would have been found.

Accoya® wood is the solution.

IDEAL FOR WINDOWS, DOORS, CLADDING AND MORE

Accoya® wood is the result of decades of research and development that has brought together a long-established and extensively proven wood modification technique – acetylation – and leading-edge patented technology to create a high performance wood, ideal for outdoor use and challenging applications.

Accoya® wood has properties that match or exceed those of the best tropical hardwoods, yet is manufactured from sustainable sourced wood.

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 and man-made materials.

Accoya® is the future of wood.

ENABLING NATURE WITH HIGH TECHNOLOGY

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 versus the unpredictablity of other choices

When Accoya® wood 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

KEY FEATURES

DIMENSIONALLY STABLE

- Swelling and shrinkage reduced by 75% or more
- Doors and windows open effortlessly year round
- Reduced maintenance costs

OUTSTANDING DURABILITY

- Lasting 50 years above ground, 25 years in ground/freshwater
- Class 1 durability, surpassing even teak
- Virtually rot proof
- 70 year minimum service life stated by TRADA

PERFECT FOR COATING

- Improved stability means coatings last up to two times longer
- Easier to coat, less preparation and sanding required

Accoya® wood is produced from sustainably sourced, fast growing wood and manufactured using Accsys' proprietary patented modification process from surface to core.

BAREFOOT FRIENDLY

- Low thermal gain
- Barefoot Friendly
- Ideal for all decking situations in extreme temperatures

NATURALLY INSULATING

- Offers improved insulation in comparison with commonly used hardwood and softwood species
- Ideal for applications where energy conservation is important

EXCELLENT MACHINABILITY

- Easy to machine and process
- No special tools are required

INSECT BARRIER

- Indigestible to a wide range of insects, including termites
- Greatly reduced vulnerability

CONSISTANT QUALITY THROUGHOUT

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

NATURALLY BEAUTIFUL WOOD

- Process does not compromise the wood's natural beauty

FROM SUSTAINABLE SOURCES

- From FSC, PEFC and other regionally certified woods
- Naturally renewable

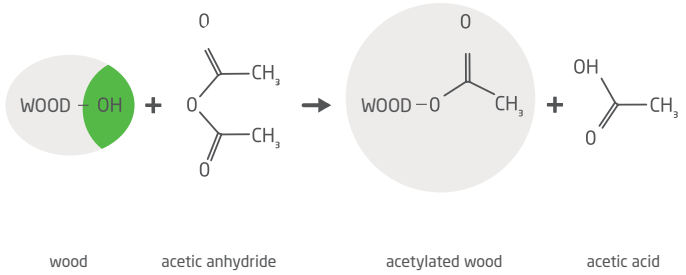
RETAINED STRENGTH & HARDNESS

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

NON-TOXIC & RECYCLABLE

- Protects the environmentfrom the harmful effects of common treatments
- May be safely reused, recycled and incinerated

ENABLING NATURE NATURALLY



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

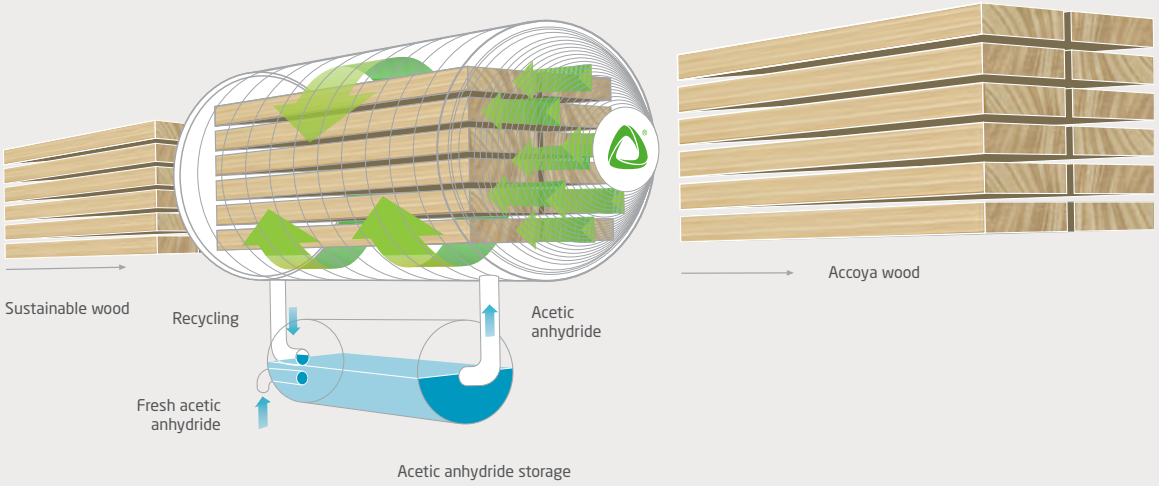
The physical properties of any material are determined by its chemical structure. Wood contains an abundance of chemical groups called "free hydroxyls". Free hydroxyl groups absorb and release water according to changes in the climatic conditions to which the wood is exposed. This is the main reason 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 (vinegar when in dilute form). 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 are already naturally present in all wood species. 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.

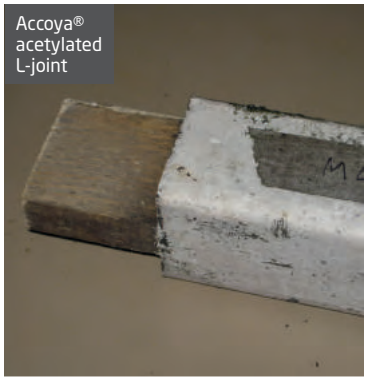
The effect of altering the wood's chemical structure, as opposed to merely altering its chemical content, is to create an end product that is dramatically superior to its source species. Accoya® wood is modified right through the cross section whereas, by contrast, virtually all other treatments merely insert chemicals (such as oils, ammonia or metal compounds) into the wood, improving durability, to a degree, 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 more 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.



ACETYLATED L-JOINTS OUTPERFORM ASA AND UNTREATED L-JOINTS AFTER 15 YEARS*

The BRE (Building Research Establishment) is an independent institute based in Watford, UK. In durability field testing to European Norm (EN) 330:1993 - which parallels America Wood-Preservers' Association (AWPA) E9 - simple mortice and tenon joints (L-joints) are assembled, coated and placed outside, with the coating over the joint deliberately broken to allow typical water ingress. This test represents a worst case scenario for joinery products and requires the coated wood to be exposed to normal environmental factors.

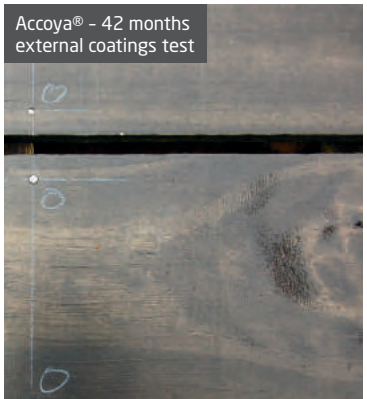
In February 1998, L-joints were installed at the BRE Garston field exposure site (Watford, UK) facing the prevailing south westerly weather on an elevated test rig. The test remains in progress with inspections at regular intervals. The durability class 1 acetylated wood condition is unchanged and continues to look good, while the unmodified wood has degraded completely after 7 years of exposure.

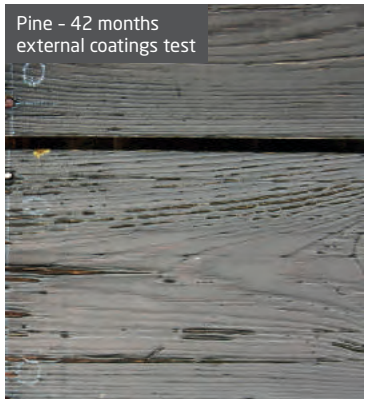
The BRE reported: "In simulated accelerated joinery field trials that represent a worst case scenario joinery product by enabling moisture ingress into the joint pine, sapwood wood L-joints acetylated to a slightly lower modification level than Accoya, after 15 years exposure in the UK are performing very well."

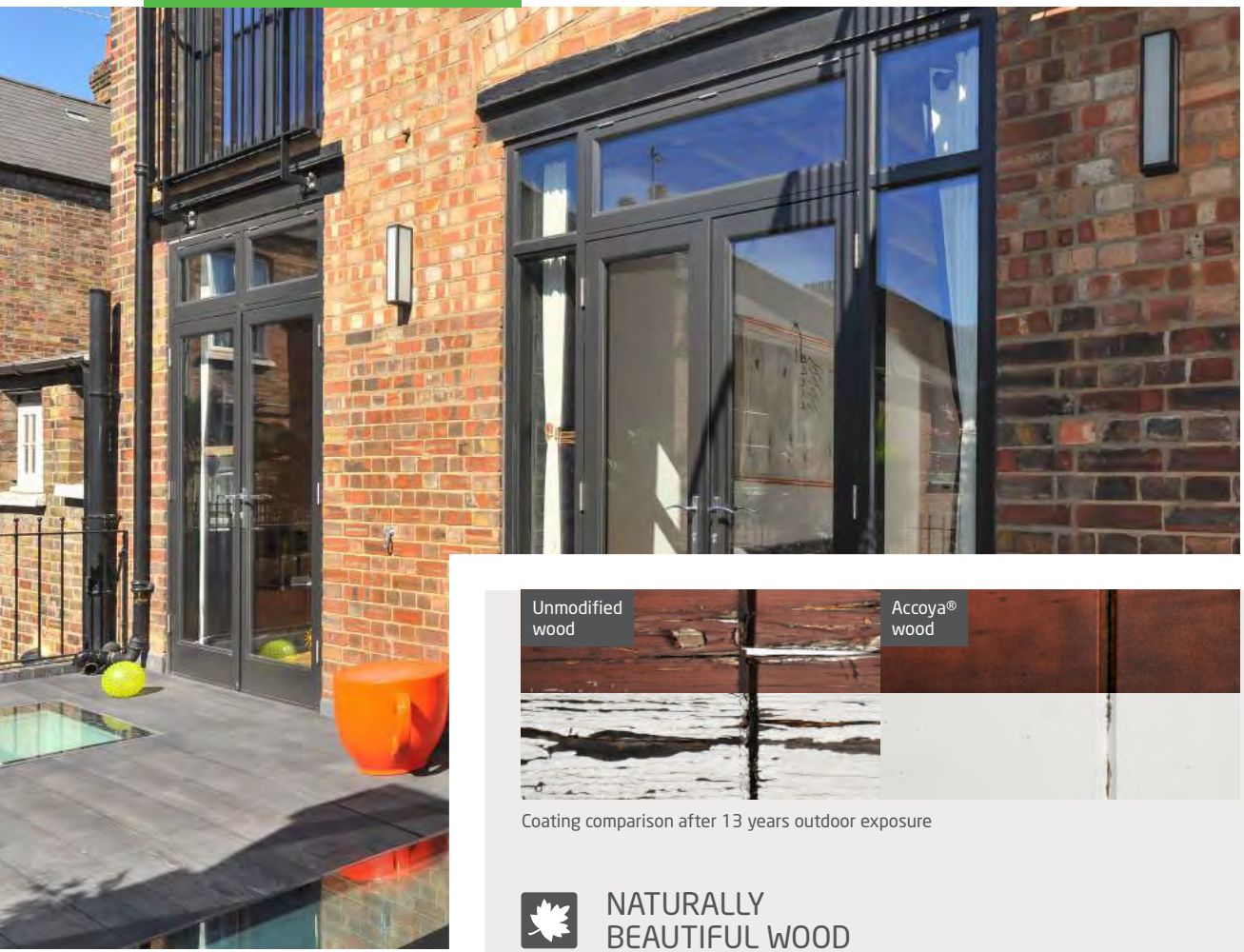
*test report dated 2013

EXCELLENT COATINGS PERFORMANCE TESTED BY BM TRADA

The translucent stain finish was seen to have remained fully intact over the 42 month outdoor exposure period on all the boards with no visible failures in evidence apart from where the coating had been broken by an end-fissuring. No evidence of any peeling of the stain coating was seen along fissures where they occurred. No evidence of mould colonisation was observed on any of the boards. Other competing cladding material coatings failed in the same tests with severe issues.







TRIED AND TESTED

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.

Accoya® wood has been thoroughly tested for performance characteristics such as dimensional stability, durability, 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.

Coating comparison after 13 years outdoor exposure

Durability tests

NATURALLY BEAUTIFUL WOOD

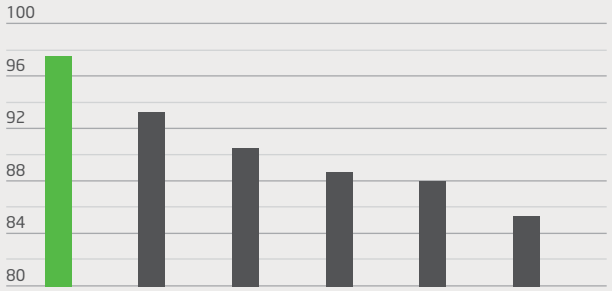
Accoya wood retains its natural colour after acetylation demonstrating that the natural beauty of the wood lasts longer in exposed conditions. This, coupled with Accoya® wood's improved dimensional stability and excellent thermal properties, means that wooden windows, doors and cladding/siding can once again compete effectively with artificial alternatives.

OUTSTANDING DURABILITY

Accoya® wood's durability is Class 1, matching and even exceeding the performance of nature's most durable woods. Scion, formerly known as the New Zealand Forest Research Institute, has published a report which concludes that Accoya® wood is more durable than four of the most naturally durable species. After six years of exposure in accelerated decay chambers and exterior ground contact tests, Accoya® wood was in much better condition than the cypress, cedar, kwila and teak when tested to the same rigorous standards. Radiata pine with copper chrome arsenate (CCA) treatment to the H3.2 and H4 New Zealand industry specifications for ground contact was also notably outperformed by Accoya® wood.

DIMENSIONAL STABILITY

[%]

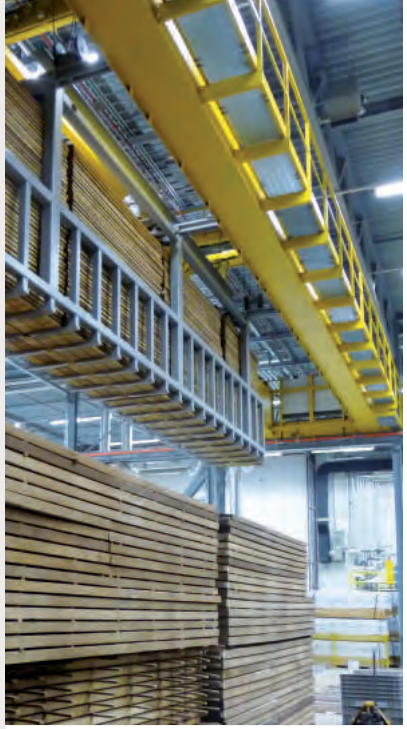


DIMENSIONAL STABILITY					
97,7	93,5	90,5	88,6	88,0	85,4
TANGENTIAL SHRINKAGE					
1,5	4,2	6,0	7,3	7,7	8,0
RADIAL SHRINKAGE					
0,8	2,2	3,3	3,8	4,0	6,1
VOLUME SHRINKAGE					
2,3	6,5	9,5	11,4	12,0	14,6

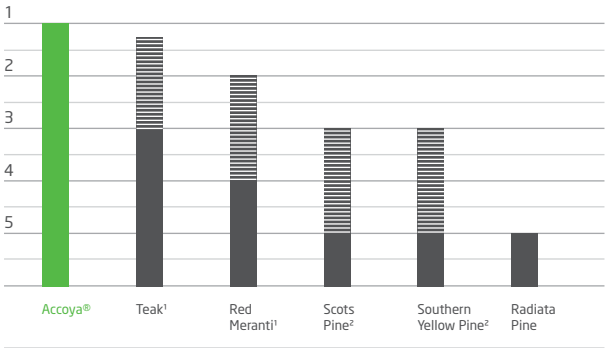
N.B. This graph shows the dimensional stability (volume metric) from fully soaked to oven dry (the most extreme laboratory test). Where a material is unaffected by moisture changes the dimensional stability would be 100%. The table above does not show changes due to temperature conditions (wood is very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

DIMENSIONALLY STABLE

Accoya® wood offers dimensional stability (resistance to swelling and shrinkage) in both radial and tangential directions. Tests have shown up to 80% reduction in swelling caused by moisture uptake, 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.



DURABILITY COMPARISON



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

¹ Range caused by variability of species.
² Range caused by difference between heartwood and sapwood.

Denotes potential durability

WOOD SPECIES	DURABILITY CLASS¹ [1=highest]	JANKA HARDNESS² [N/mm²]	BENDING STRENGTH² [N/mm²]	RADIAL SHRINKAGE [60-90% RH]	TANGENTIAL SHRINKAGE [60-90% RH]
Accoya® wood	1	3950	80	0.4	0.7
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
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 based on a radiata pine source material.

¹ 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.
² Janka Hardness and Bending Strength are based on wood conditioned at 65% RH and 20°C. Values are heavily influenced by local growth conditions.

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 leading independent institutes 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 more dimensionally stable than the best tropical hardwoods. It may be finished with opaque coatings, or for those who enjoy the natural beauty of wood, finished with transparent coatings. 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. Accoya® gives a wide range of coatings choices for unprecedented choice without compromising performance.

PORCH AND EXTERIOR FLOORING

Accoya® allows solid wood flooring in environments previously unthinkable such as wet areas and over-radiant heating without risk of excessive distortion.

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, even in salt water splash zones.

OUTDOOR FURNITURE & EQUIPMENT

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

BRIDGES & CIVIL WORKS

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 instead of manmade products, safe in the knowledge that their creations will be sustainable and 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 preservative chemicals, and non-renewable carbon-intensive materials such as plastics, steel and concrete.

- The Accoya® wood patented modification process 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, resulting in lower maintenance frequency and therefore less coating 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® 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

ACCOYA®
ACCREDITATIONS

C2C

Accoya® wood is one of the very few building products to have acquired Cradle to Cradle SM Certification on the elusive C2C Gold Level. Cradle to Cradle (C2C) provides a means to tangibly and credibly measure achievement in environmentally-intelligent design including the use of environmentally safe and healthy materials and instituting strategies for social responsibility.

FSC

Of the various schemes for sustainable forestry available, the Forest Stewardship Council (FSC®) is regarded as the leading and most comprehensive certification program available. This program not only focus on benign environmental performance but also safeguard social interests for all stakeholders involved.

www.accoya.com

www.sashwindow.com

ACCSYS GROUP

THE SASH WINDOW WORKSHOP

4 Kiln Lane,
Bracknell
Berkshire, RG12 1NA
T: 01344 868668
F: 01344 868858
E: info@sashwindow.com