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Dear Mr Alexander,

Re: Extending the service life of Accoya® window joinery to over 60-years.

This Technical Letter summarises the findings from TRADA Technology's review of independent test data that relates to the service life of Accoya® when used as window joinery in Europe. The information reviewed is presented at the end of this letter.

The work undertaken on your behalf is a review of the technical content and not the results of any specific testing which we undertook. This letter has assumed the following:-

- That Accoya® used for the manufacture of the joinery has been manufactured from radiata pine modified through Accsys Technologies acetylation process to achieve a WPG of at least 20%, and that an independently-audited factory production control process is in place for its manufacture.
- The joinery has been finished using a standard joinery coating that has been evaluated for compatibility by the coating supplier and that this is maintained in a good condition over the service life of the joinery.
- That any end grain exposed to wetting has been end sealed and the window joinery is designed to shed rainwater in service.
- That the term 'window joinery' used throughout this Technical Letter can also apply to glazed doors.

TRADA Technology understands that Accsys Technologies is seeking to demonstrate that suitably designed, coated and maintained Accoya® window joinery can achieve a service life in excess of 60-years when used in Europe.

TRADA Technology believes that Accoya® window joinery can achieve a service life of 70 years in Europe for the following reasons:-

○ **Accoya® is Very Durable**

Durability in the context of this Technical Letter may be defined as the resistance of wood to attack by wood destroying organisms. TRADA Technology recognises fungi as the most important pests of window joinery in service.

Table 3, in BS 8417: 2011 *Preservation of wood – Code of Practice* provides recommendations for the minimum natural durability of timber species used to manufacture timber components to achieve a range of service life in a number of applications. For external joinery in Use Class 3 (coated), a Desired Service life of 60 years can be achieved using wood that is classified as Durable (i.e. Durability Class 2 (EN 350-2: 1994 *Durability of wood and wood-based products – Natural Durability of solid wood*)).

It should be noted that no European test standard/s currently exist to provide a method to assign a Durability Class to a modified wood. For that reason, independent test laboratories have used the standards developed for testing the natural durability of wood species and the efficacy of wood preservatives to assess the relative Accoya® performance.

Based on the evidence presented in a series of independent test reports that we have reviewed, TTL can confirm that the data is consistent with Accoya[®] being classified as Very Durable (i.e. Durability Class 1). This is the highest Durability Class that can be assigned to timber.

This Durability Class has been assigned based on findings from both laboratory and field tests. In-ground tests provide a measure of the performance of timbers in Use Class 4 (UC 4) an environment that presents a 'higher hazard' to timber since it provides conditions more conducive for fungal decay to develop than in window joinery which is exposed under Use Class 3.

Independent in-ground testing (i.e. field stake tests and fungal cellar tests) data reviewed by TTL showed that Accoya[®] outperforms wood treated with a reference wood preservative (i.e. CCA (Copper Chromium Arsenic) at retentions for use in ground contact (UC 4), and heartwoods of timber species considered to range from Very Durable to Moderately Durable. These species were teak, Western red cedar, macrocarpa and Angelim Vermelho).

Although 60-years is the longest Desired Service life for any timber set out in Table 3. of BS 8417: 2011, TRADA Technology believe that the service life of a joinery component made from a Very Durable timber may be expected to achieve at least a further 10 years (16% longer than the Desired service life set out in the standard) through the application and maintenance of a suitable coating and through good design. The reasons for this are set out below.

- **Application and maintenance of a suitable coating**

Although a properly applied and maintained wood coating does not increase the durability of a substrate, it does protect the underlying wood from wetting up when exposed to rainfall and will provide additional protection to joinery.

This is important since wood moisture contents in excess of 20% are required for wood to decay. Since exposed end grain is more permeable to water than other surfaces, it is a 'route' by which water can be taken up by joinery components. The use of an end-grain sealant will protect wood adjacent to end grain from wetting up.

TRADA Technology understands that a suitable end-grain sealant is applied in the factory and before the joinery is coated to all end grain of Accoya[®] joinery that will be at risk of being exposed to wetting in service.

Table 3 of BS 8417: 2011 differentiates between coated and uncoated Use Class 3 components. Table 3 shows that a less durable timber species will provide a longer Desired Service life if a coating has been applied to it.

By way of example, a Very Durable (i.e. Durability Class 1) timber can provide a 60-year Desired Service life when used uncoated, whereas an identical service life can be achieved using a Durable (i.e. Durability Class 2) timber when used coated.

Since Accoya[®] is classified as Very Durable (i.e. Durability Class 1), then TRADA Technology considers that the application of an appropriate coating to Accoya[®] window joinery together with end-grain sealing will further extend its service life beyond 60-years.

In addition, TRADA Technology recognises that movement in Accoya[®] is significantly less than 'low movement' timbers. This improved stability of Accoya[®] leads to improved performance of wood coatings applied to it. For this reason, the performance of the coating is significantly improved which confers greater protection to the underlying wood over the life of

the joinery. It will also reduce the opening up of joints that in turn lower the risk of ingress of water into these, thereby reducing risk from wood decay.

○ **Good design and detailing**

The service life of any window joinery will depend on how it has been designed, detailed and installed.

BS 8417:2011 states that 'prediction of service life is not precise' and 'desired service lives are indicative rather than a guarantee of performance, and are based on an assumption of good design and maintenance. In addition they relate solely to the resistance of the wood to biodeterioration'.

TRADA Technology Ltd believes that the following details will increase the service life of window joinery and we understand that these are practised by joinery manufacturers using Accoya[®]:-

- Profiling joinery to shed water away from the building through the use of an appropriate slope/gradient on any horizontal members with a pitch of not less than 1:8
- Rounding arrises to a radius of at least 3mm to improve performance of coatings.

In conclusion, TRADA Technology believes that a service life in excess of 60 years, and at least 70 years can be achieved for window joinery manufactured from Accoya[®] provided:-

- Exposed end grain is sealed using an appropriate sealant before entering service.
- It is coated using an appropriate wood coating and that this is maintained in a good condition over the life of the joinery.
- Windows are designed to shed water and allow for improved coatings performance.

We trust you find this information helpful.

Issued by:



Dr Andrew Pitman
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Under the authority of:



Philip O'Leary
**Section Leader – Timber
Technology Investigations**

References Reviewed

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