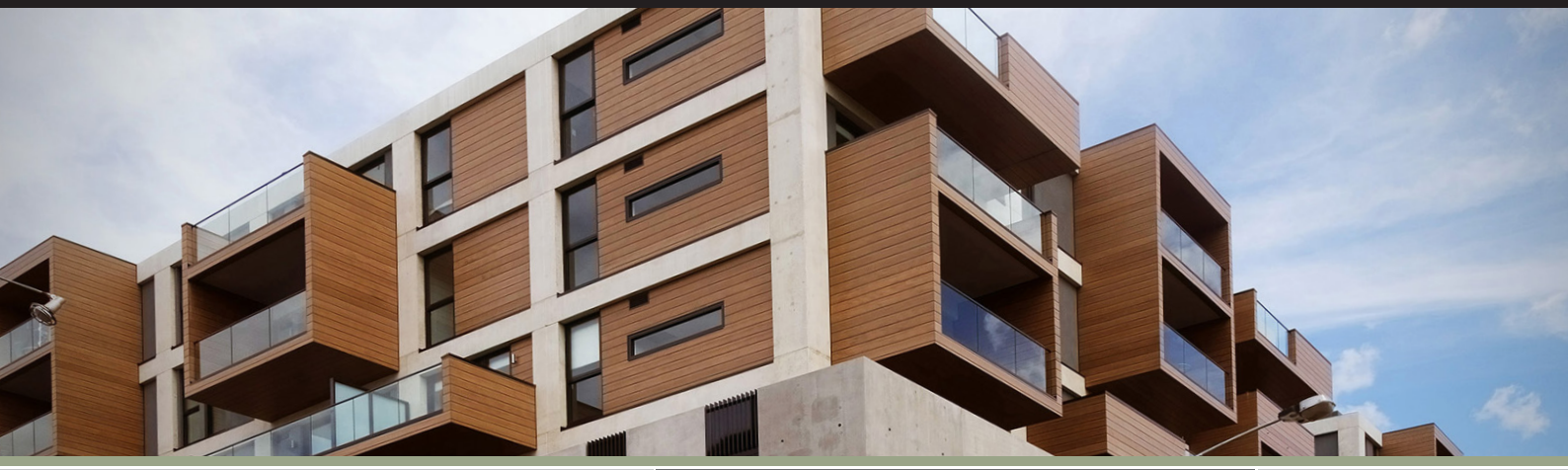
Do internal and external architectural timber products meet fire performance requirements?



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Introduction

Wood's climb to the top of the building and construction materials food chain has been steady and unceasing, with the material gaining new ground in the last few years as engineered timber buildings enter the mainstream.[1] But one of the most popular architectural specifications in Australia that continue even today is composite timber, which is recycled wood and polymer extruded to be shaped like traditional timber products.

Featuring a natural wood grain aesthetic, composite timber is often specified in place of solid timber because it has better water, termite and algae or fungal resistance, and does not split, rot, peel or stain easily. These recyclable architectural timber alternatives also have a high strength to weight ratio, long life span, and the best are often formulated for high UV exposure, making them suitable for both outdoor and indoor applications.[2]

While composite timber will never achieve the environmental certifications of natural timber, some manufacturers do ensure their products have a low carbon footprint and are eco-friendly.

But while it is highly favoured by architects and designers for its natural warmth and beauty, as well as its durable, low maintenance properties, architectural timber still carries with it a stigma that makes some specifiers, builders and engineers hesitate, before reaching out to another material.

This stigma is around composite timber's fire performance, which many believe to be weak because of the presence of highly flammable plastics. The recent Lacrosse Apartments fire in Melbourne's Docklands, which was found by the Metropolitan Fire Brigade (MFB) to have been fuelled by the building's aluminium composite panel[3], has also fanned the flame of fear over specifying all types of composite products.

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Composite timber? No thanks, it's not 'fire safe'…is it?

The confusion within the building and construction industry over whether composite timber meets the strict fire requirements of the Building Code of Australia (BCA) or National Construction Code (NCC) can be traced to three related root issues.

Firstly, there is a fundamental misunderstanding that timber is an unpredictable unsafe material. According to the Engineered Wood Products Association of Australasia (EWPAA), heating wood above 280°C causes thermochemical decomposition, converting it to gases, tar and charcoal. While the gases released will "flame vigorously" at temperatures above 280°C, charcoal actually requires temperatures of about 500°C for its consumption.

This means that in the event of a fire, the build-up of char actually protects the unburnt wood from rapid pyrolysis, and the unburnt timber "results in the timber close to the char edge being unaffected by the fire".[4] Rather than quickening the spread of a fire, timber - which is combustible - is in fact also a good insulator and burns in a predictable fashion.

Related to this misunderstanding are concerns about the levels of plastic content in composite timber. While there is no denying that the types of plastics typically utilised in the production of wood-plastic composites have higher fire hazard properties than wood alone, there are more options on the market today that offer higher compositions of recycled wood. Taking Innowood as an example again, its extremely low VOC ranges are made from 70 per cent of wood waste.

However, these differences in composite timber technologies become less pronounced, and more confusing, when design teams approach a huge and highly competitive library of composite products. Just within the timber aisle, choices range from wood-plastic composites to capped composites – products capped with a fully protective polymer shell.[5] Rather than helping architects and building designers make the right selection, this wide variety often prevents specifiers from truly understanding the distinctions.

To exacerbate matters, some companies may even offer PVC options that are not made from wood at all, but which they group together with other composite timber products.

The third and biggest challenge facing the industry when it comes to specifying fire-safe architectural timber is existing building codes. Although extensive in its coverage of fire protection regulations,[6] the BCA lacks clarity in specifying exactly which test or tests need to be fulfilled for any particular product. One example of this gap is the 2015 Lacrosse Apartments fire. According to L U Simon Managing Director Peter Devitt, the Alucobest aluminium composite cladding had complied with Australian Standard tests for ignitability, spread of flame, heat and smoke. A Charter Hall spokesperson also told The Australian Financial Review that all the necessary certifications were provided for the project at its completion.[7] However, the Alucobest cladding did not pass the test for combustibility back in 2010 when the building was commissioned.[8]

This particular finding has misled many architects, designers, certifiers and fire engineers into believing that composite timber needs to conform to the same 'non-combustible' test (as stipulated in AS 1530.1) as that of Composite Aluminium Compressed Sandwich Panels to be deemed 'fire safe'.

However the results of AS 1530.1 does not, in fact, show the actual behavior of a composite timber product during a fire, as it only produces a pass or fail result. Given that any material which has organic material will spark or ignite, any composite timber product with recycled timber content will fail under the combustibility test, even if it actually performs well during a fire.

Unsurprisingly, the lack of specificity within the building code about the exact test for a particular composite product has caused confusion among stakeholders of all stages of the design process – from clients, architects and designers, to builders, certifiers, consultants and fire engineers – all of whom are unable to agree what the accurate fire performance requirements actually are.

This problem is further compounded when some composite timber suppliers and manufacturers inaccurately use the "non-combustible" label when marketing a range, even though their products might not have been subjected to the AS 1530.1 test. Of course, there may also be instances when a product does not even meet the required standards, but passes a design and build team by due to the lack of proper documentation.[9]

Coupled with bad past experiences, the lack of clarity and understanding around particular fire standards, or the miseducation of a product's true fire performance, has created an atmosphere of hesitation when specifying composite timber. In some cases, design and build teams have even changed their specifications in the last minute for a comfortably safer option as fires, though relatively low probability events, can have fatal and devastating consequences.

No compromises

While restricting the use of timber in both internal or external applications might help create peace of mind, this materials swap can mean the final results deviate from the original design intent and merit. Timber products, often chosen to define a specific feel, aesthetic and warmth, are not easily replaced without changing the character of a building or space.

To strike the right balance of choosing a product that adheres to strict fire requirements without compromising on aesthetics, maintenance, and durability, architects, designers and specifiers just need to ask the right questions.

The main factor to look out for is, of course, whether a product meets the latest codes and standards. It is advisable to select composite timber products that undergo continual fire retardant and self-extinguishing testing, confirmed by updated and accurate fire testing certificates by NATA-certified laboratories. Innowood Composite Timber, for instance, is subjected to regular testing by the CSIRO to AS/NZ 1530.3. This ensures that its proven properties of being self-extinguishing and not supporting spread of flame or further combustion, are always current and valid.

Asking for proper documentation is also crucial. All testing results and certificates should show compliance to Australian Standards and full product specifications, including fire details.

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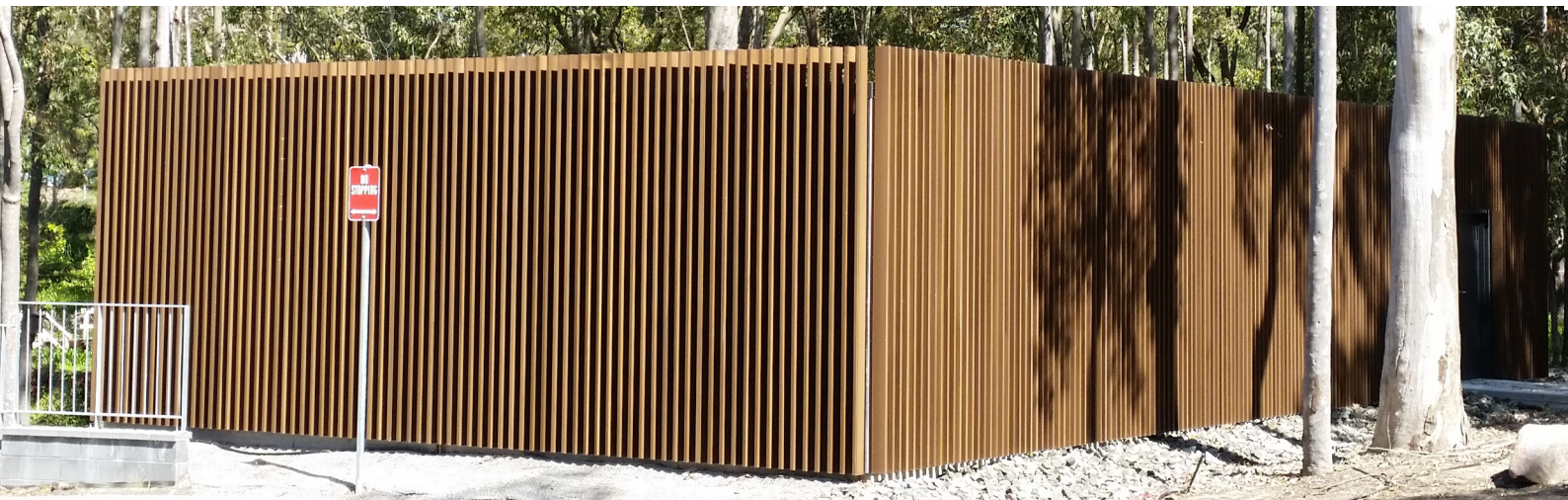
For composite timber products, the relevant standards that show how a material or product will behave during a fire are:

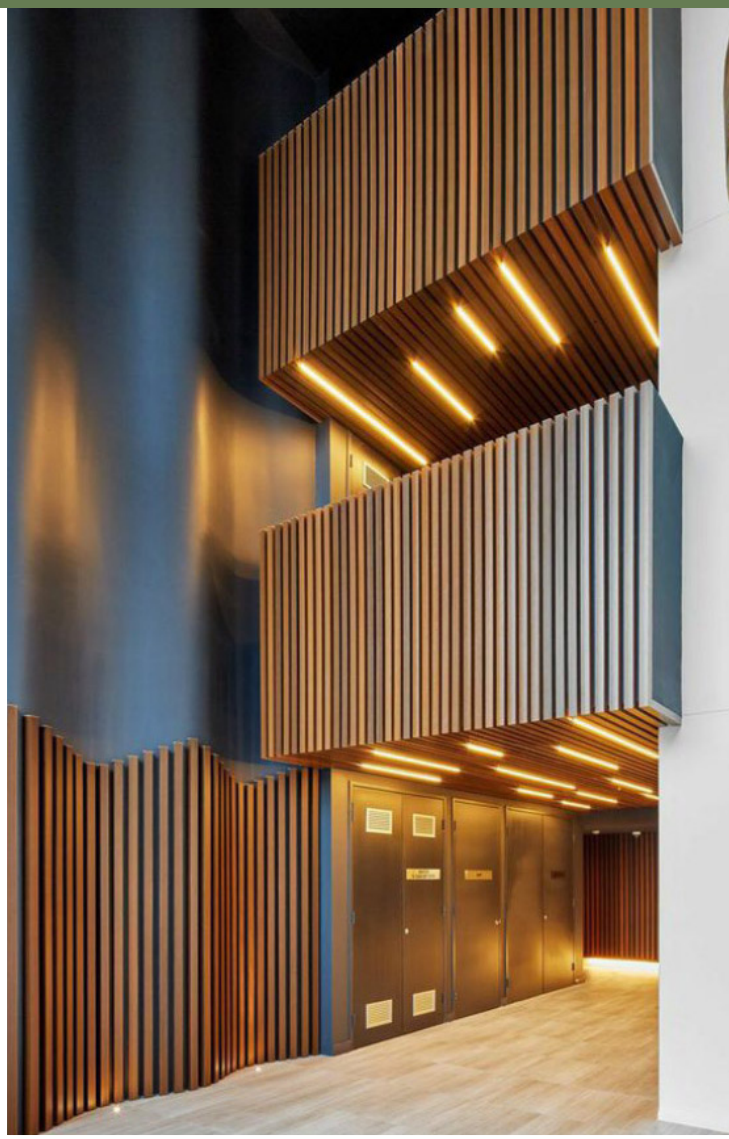
- AS1530.3 (Early Fire Hazard Test), which gives indices of assessment broken down into ignitability, flame propagation, heat release and smoke release.

- AS/NZS 3837:1998. Dubbed the Cone Calorimeter test, this test is required for materials used in wall and ceiling linings, and at 50kW/m^2 (Heat and Smoke Release Rate), classifies materials into a Group Rating between 1 and 4 which correlates to applications within the BCA and NCC. For the widest applications, the NCC requires the most stringent rating, a Group 1 classification, to be achieved. A Group 4 rating does not meet the fire protection requirements for lining materials for walls and ceilings.[10]

- AS 3959:2009 (Construction of Buildings in Bushfire Prone Areas), which determines the Bushfire Attack Level or BAL rating of a product. A product's BAL rating is used to classify the suitability and acceptability of materials within a BAL exposure rate. For instance, products that meet BAL-29 can be used in areas where attack by burning debris is significant, and radiant heat levels can threaten building integrity.[11]

Another key element to factor in when choosing where to source your composite timber product is if suppliers are up to date with the latest building code changes. A case in point is Innowood, which consistently works with testing departments to understand the results and requirements of their composite timber products. The company also offers ongoing training for staff so they are well-equipped to support customers, and holds focused education events and consultations, including those specific to fire-related requirements, for the industry. This continual up-skilling and education will get rid of any doubts design teams might have about a composite timber product's true fire performance.





Conclusion

Fire safety is highly regulated in Australia's building industry, but meeting existing fire performance requirements does not mean having to sacrifice the use of internal and external architectural timber products. The constant example used throughout this paper is Innowood Composite Timber, a highly-tested high performance product that also achieves up to a Group 1 rating for AS/NZS 3837, or up to BAL-29 rating for AS 3959:2009, while being 'customisable' to suit unique applications.

Looking and feeling like natural timber, and based on traditional timber fixing methods, Innowood Composite Timber goes to show that fire safety and aesthetics can go hand-in-hand, allowing teams to do justice to building occupants by providing a warm, but safe environment.

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