



UNDERSTANDING FIRE RATINGS FOR WALL AND CEILING LININGS

Specifying Natural Timber Panels for Beauty, Performance and Compliance

Penguin Parade Visitor Centre. Phillip Island, Victoria. Terroir Architects. Photography by Peter Bennetts.

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INTRODUCTION

Architects want to specify natural, unique and beautiful products into their projects. Timber building products have long been preferred for their contemporary and timeless aesthetic, but they also offer a range of other benefits for building projects – from reliable performance and durability to elevated environmental and sustainability outcomes.

In the aftermath of the Grenfell and Lacrosse tower fires, the focus of the National Construction Code (NCC) has been on implementing a stricter regime for fire safety in building design and construction. This has had the effect of restricting the use of some timber materials for certain building applications, specifically the use of timber veneer panels and plywood as wall and ceiling linings.

With some nervousness surrounding the specification of fire-rated products, some architects, designers and specifiers are taking a cautious approach and over-specifying to ensure compliance. However, over-specification, or not properly understanding the NCC requirements with respect to fire, can lead to less choices, higher costs and compromises in aesthetics and performance.

Achieving compliance should not come at the cost of the beauty and performance that real wood options can offer. A thorough understanding of fire ratings, the relevant performance requirements, and available material options as well as detailed planning early in the design process will help avoid these pitfalls when specifying wall and ceiling materials.

“With the exception of fire isolated exits, fire control rooms and the internal linings of external walls, Group 2 products are sufficient for use as wall and ceiling linings in all areas of Class 2 to Class 9 buildings when sprinklers are installed, and most areas when they are not.”





REQUIREMENTS FOR WALL AND CEILING LININGS

Fire Hazard Properties

The fire hazard properties of wall and ceiling linings within Class 2 to 9 buildings must comply with Specification C1.10 of the NCC. The fire hazard properties of different materials are classified as Material Group Numbers, which come in a range from Group 1 to Group 4. The lower the Group Number, the better the material performs in a fire.

The Group Number classification for building materials is determined in accordance with AS 5637.1:2015 Wall & Ceiling Fire Hazard Properties, which provides the fire testing regime for walls and ceilings, particularly around multi-layered and perforated products. A Group Number is achieved based on testing under AS ISO 9705:2003 (R2016) (room burn test), AS/NZS 3837:1998 or ISO 5660.1 (small-scale cone calorimetry test).

Building Classes

The Group Number required for a building element is dependent on the building class. Class 2 to Class 9 buildings cover a wide range of building types, which are summarised below:

Building Class	Description
2	A building containing two or more sole-occupancy units each being a separate dwelling.
3	A residential place for long term or transient living for a number of unrelated persons (e.g. boarding house, hostels, etc.).
4	A dwelling in a building that is Class 5, 6, 7, 8 or 9 if it is the only dwelling in the building.
5	An office building used for professional or commercial purposes, excluding buildings of Class 6, 7, 8 or 9.
6	A shop or other building for the sale of goods by retail or the supply of services direct to the public (e.g. cafe, restaurant, kiosk, hairdresser, etc.).
7	A building which is a carpark (7a) or a building for the storage and display of goods or produce for sale by wholesale (7b).
8	A laboratory, or a manufacturing plant.
9	A building of a public nature such as health care or aged care buildings.

Matching Up Group Number and Building Class

Table 3 in Specification C1.10 (reproduced below) specifies the material groups that are permitted for a specific building class (sprinklered and/or unsprinklered). With the exception of fire isolated exits, fire control rooms and the internal linings of external walls, Group 2 products are sufficient for use as wall and ceiling linings in all areas of Class 2 to Class 9 buildings when sprinklers are installed, and most areas when they are not.

Table 3 Wall and ceiling lining materials (material groups permitted)

Class of building	Fire-isolated exits and fire control rooms	Public corridors	Specific areas	Other areas
Class 2 or 3, Unsprinklered Excluding accommodation for the aged, people with disabilities, and children	Walls: 1 Ceilings: 1	Walls: 1, 2 Ceilings: 1, 2	Walls: 1, 2, 3 Ceilings: 1, 2, 3	Walls: 1, 2, 3 Ceilings: 1, 2, 3
Class 2 or 3, Sprinklered Excluding accommodation for the aged, people with disabilities, and children	Walls: 1 Ceilings: 1	Walls: 1, 2, 3 Ceilings: 1, 2, 3	Walls: 1, 2, 3 Ceilings: 1, 2, 3	Walls: 1, 2, 3 Ceilings: 1, 2, 3
Class 3 or 9a, Unsprinklered Accommodation for the aged, people with a disability, children and health-care buildings	Walls: 1 Ceilings: 1	Walls: 1 Ceilings: 1	Walls: 1, 2 Ceilings: 1, 2	Walls: 1, 2, 3 Ceilings: 1, 2, 3
Class 3 or 9a, Sprinklered Accommodation for the aged, people with a disability, children and health-care buildings	Walls: 1 Ceilings: 1	Walls: 1, 2 Ceilings: 1, 2	Walls: 1, 2, 3 Ceilings: 1, 2, 3	Walls: 1, 2, 3 Ceilings: 1, 2, 3
Class 5, 6, 7, 8 or 9b schools, Unsprinklered	Walls: 1 Ceilings: 1	Walls: 1, 2 Ceilings: 1, 2	Walls: 1, 2, 3 Ceilings: 1, 2	Walls: 1, 2, 3 Ceilings: 1, 2, 3
Class 5, 6, 7, 8 or 9b schools, Sprinklered	Walls: 1 Ceilings: 1	Walls: 1, 2, 3 Ceilings: 1, 2, 3	Walls: 1, 2, 3 Ceilings: 1, 2, 3	Walls: 1, 2, 3 Ceilings: 1, 2, 3
Class 9b other than schools, Unsprinklered	Walls: 1 Ceilings: 1	Walls: 1 Ceilings: 1	Walls: 1, 2 Ceilings: 1, 2	Walls: 1, 2, 3 Ceilings: 1, 2, 3
Class 9b other than schools, Sprinklered	Walls: 1 Ceilings: 1	Walls: 1, 2 Ceilings: 1, 2	Walls: 1, 2, 3 Ceilings: 1, 2, 3	Walls: 1, 2, 3 Ceilings: 1, 2, 3
Class 9c, Sprinklered	Walls: 1 Ceilings: 1	Walls: 1, 2 Ceilings: 1, 2	Walls: 1, 2, 3 Ceilings: 1, 2, 3	Walls: 1, 2, 3 Ceilings: 1, 2, 3

Note that from 1 May 2019, the NCC 2019 made fire sprinkler protection mandatory for buildings with a rise in storeys of 4 or more and an effective height of not more than 25 metres.¹ This change makes Group 2 materials a more viable option given the added fire safety measures.

REQUIREMENTS FOR WALL AND CEILING LININGS

Design Considerations

In general terms, Group 3 materials are timber products, Group 2 materials are predominantly fire retardant timber, and Group 1 materials are non-combustible or near non-combustible.² An undisputed Group 1 material, for example, is fibre cement, a composite material that is made up of sand, cement and cellulose fibres.

In some cases, specifiers are specifying Group 1 materials, when Group 2 or 3 materials are sufficient to meet regulatory requirements, but of course, when dealing with interiors, complying to these requirements is just one of many considerations that specifiers should be making. Other relevant considerations include costs, aesthetics, acoustics, design versatility and durability.

The key is choosing the right product for the proposed application. Ultimately, the key question is whether the finished product will meet or surpass expectations. A careful assessment of product design and performance will provide confidence in the eventual outcome. The relevant considerations are explored below.

Installation Cost. Compliance with Group 1 requirements can be achieved with non-wood products. Non-wood product options are often heavier, such as fibre cement as mentioned above. The materials used in heavyweight systems as well as the equipment and labor required for installation are typically more expensive than lighter weight equivalents. This additional cost comes from the numerous installation challenges associated with heavier building products, including the difficulty in cutting such materials on site.

Accordingly, provided they meet the Group Number requirements of the proposed application, fire retardant timber presents itself as a cost-efficient option. It is lightweight, easy and safe to cut on site, and leading products are available with easy-to-use fixing systems to reduce installation time. Products that are pre-finished also eliminate the risk of being finished with cheaper, low-quality or unsuitable products during construction.

Other practical cost considerations include whether the product provides value for money and whether it is easily sourced and widely available from quality suppliers.

Aesthetics. A natural, real wood appearance is highly sought after in modern design as it imbues spaces with organic warmth and appeal. It is difficult to achieve the same effect with non-wood or imitation wood products. While some materials try to mimic the appearance of

wood using digital prints or other synthetic products, the results lack authenticity due to replication of the same patterns on the material's surface and are without the natural luster, characteristics and feel of real timber.

There is also much research being undertaken on the health and wellbeing benefits of exposure to timber in design.

Acoustic Performance. Group 1 heavyweight systems may provide ample fire resistance, but may fall short in other critical performance categories. One such area is acoustic performance. Heavier systems like fibre cement do not stop impact noise such as the sound of steps on tiles and floorboards.

When selecting a wall and ceiling lining, consider where there are acoustic options available. Perforated wall panels are typically used for acoustic purposes. However, when a product that has been tested as a flat (non-perforated) panel is perforated or modified in any way, the original fire rating may no longer be valid. Some manufacturers offer perforated options that are permitted without voiding the Group Number.

Environmental Impact. Real wood products deliver an authentic, real timber aesthetic, but the natural qualities of wood go beyond look and feel. Wood is environmentally friendly and is not harmful to humans. Look for wall and ceiling products that are non-toxic (labelled "E0", referring to the amount of formaldehyde emissions a product releases after manufacture). Products that are certified under a Chain of Custody scheme, such as Programme for the Endorsement of Forest Certification (PEFC) or Forest Stewardship Council® (FSC®), provide assurance that the product has been responsibly sourced.

Versatility. Consider whether the product is available in a range of colours, finishes and thicknesses. This will enable greater flexibility in design, and make it possible to deliver a consistent aesthetic throughout the interior environment. Leading products offer perforated and non-perforated options depending on the application for greater versatility.

Durability. Consider whether the product is durable and uses high quality finishes. Some fire-rated solutions rely on intumescent paints and lacquers, which can impact on appearance and durability (discussed further below). Depending on the application context, impact resistance and general resistance to wear and tear are also high priority.



Ravenswood School for Girls. Sydney, New South Wales. BVN Architecture. Photography by Paramount Studios.

ASSESS YOUR OPTIONS

Whether it be Group 1, Group 2 or Group 3, choosing the right material for wall and ceiling linings requires balancing compliance with the above design considerations. Be aware of the pitfalls of some products – assessing your application and the strengths and weaknesses of the available options will allow you to choose the best product for the intended purpose.

Group 1 materials such as fibre cement and magnesium oxide boards may provide Group 1 certification without meeting many other performance or design criteria. For example, fibre cement may be durable and long-lasting, but its lack of useability and issues with installation make it an impractical choice for many building projects.

Group 1 can also be achieved with some intumescent paints or lacquers, but they are not without their own issues. Intumescent paints often end up being expensive to maintain and negatively impact appearance and durability. The initial cost outlay for lacquers and their application can be high. Drying times for intumescent lacquers are long, meaning many panels are often finished onsite, once panels are installed, which can cause multiple issues such as failing to lacquer the back and edges of the panel thereby affecting durability. Those lacquering panels must be accredited which can add additional cost. Moreover, the lacquers are not hard wearing and can be easily scratched off, and require ongoing maintenance. They must also be regularly monitored via the building's fire compliance check procedures. In addition to the often problematic application methods and maintenance,

the materials surrounding the use of intumescent paint need to be carefully detailed to allow the space for expansion when the paint is activated.

Fire-rated MDF (FR MDF) may be considered, with some raw FR MDFs available certified as Group 2. While affordable and easy to supply, FR MDFs are not as hard wearing or impact resistant as alternative solutions. FR MDF panels without a decorative face are not a viable option for projects where aesthetics is a key requirement.

Veneered FR MDF panels are available, but there are limitations in veneer species that can be applied to the core MDF panel, and some risk and uncertainty about which veneers are permitted, and which are not. There are also cases of veneers being substituted during the construction process, which, intentional or not, puts projects at risk of non-compliance. Veneered FR MDF panels also do not offer a perforated Group 2 option.

Certified-Group 2 plywood panels can also be used as a fire-rated solution for walls and ceilings, offering lightweight, strength and easy-to-machine characteristics. However, some raw and oversized products can create issues if builders are unfamiliar with the product, and how to work best with it. Cutting on-site, failure to lacquer the back and edges of panels, and the use of low quality coatings can lead to efficiency issues during installation and a risk that the product may be unintentionally modified in a way that voids the fire rating of the product. Identifying a pre-finished panel solves some of these issues and mitigates risk by providing a properly lacquered product.

Fireply X[®]

Combining Group 2 Fire Resistance, Aesthetics and Acoustics

The latest development in the well-established Fireply[®] range, Matilda Veneer's Fireply X[®] is an innovative range of pre-finished, ready-to-install plywood panels, combining advanced fire resistance, aesthetics and acoustics for decorative walls and ceilings. Fireply X[®] is Fire Hazard Group 2-Certified and is compliant for use in almost all areas of Class 2-9 buildings as defined by the NCC. Perforated options are available offering a much-needed solution for projects where acoustics, aesthetics and fire safety compliance are all non-negotiable.

Fireply X[®] does not rely on its surface finishing to provide resistance to fire. The product is treated by veneer impregnation prior to plywood production, making the whole product fire retardant, not just the exterior. Any trimming on site can be done without fear of negatively effecting or voiding the product's fire rating. Panels are supplied cut-to-size at either 2400x1200mm or 2390x1190mm (to allow for express joints) to reduce cutting on site and allowing for quick and simple installation without the risk of non-compliance or voiding warranties.

Key Features

- Available prefinished in a range of perforated and non-perforated options, in eight on-trend colours (stains).
- All options are certified as Fire Hazard Group Number 2 using AS ISO 9705:2003 (R2016) in accordance with AS 5637.1:2015.
- Perforated options tested by CSIRO for acoustic performance with NRCs up to 0.85
- Treated by veneer impregnation prior to plywood production and does not rely on intumescent paint or lacquer to provide resistance to fire.
- Lightweight, stable and cut-to-size for quick and easy installation.
- Low formaldehyde emissions (E0) – raw board only.
- 100% PEFC Certified.
- Express joints (up to 10mm) permitted.
- Two-pack polyurethane coating and staining system, including UV inhibitors as standard. Back and edges of panels are sealed to ensure proper finishing and protection of the installed panels.

About Matilda Veneer

Matilda Veneer is Australia's leading manufacturer of timber veneer. Matilda Veneer is renowned for sourcing and manufacturing natural, unique and beautiful veneers for architectural specification from Australia and around the world.

In addition to a huge selection of natural and enhanced timber veneers, Matilda Veneer proudly manufactures and distributes a range of high quality, unique and architectural plywood products headlined by Fireply X[®], Matilda Fireply[®] and Hoop Pine and Birch plywood featuring high quality edge detail as standard.

“A natural, real wood appearance is highly sought after in modern design as it imbues spaces with organic warmth and appeal.”

REFERENCES

- ¹ Bicknell, Tom. "New residential fire sprinkler requirements in NCC 2019." ABCB. <https://www.abcb.gov.au/Connect/Articles/2019/05/28/New-residential-fire-sprinkler-requirements-in-NCC-2019> (accessed 28 March 2021).
- ² Forest and Wood Products Australia Ltd. "Fire Hazard Properties C1.10 Wall and Ceiling Linings." Wood Solutions. <https://www.woodsolutions.com.au/articles/fire-hazard-properties-c110-wall-and-ceiling-linings> (accessed 28 March 2021).

All information provided correct as of March 2023



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