

BENEATH THE SURFACE: SPECIFYING INTERIOR LININGS TO MEET THE REQUIREMENTS OF MODERN BUILDINGS

BOTTLE SHOP



INTRODUCTION

Australia's design and construction industry is growing at an accelerated rate. Based on reports from construction services provider BCI, the industry is predicted to expand by 8.2% in the coming year.¹

This growth has resulted in over \$50 million worth of completed work in the first quarter of 2018, but with increased demands for quality, speed and efficiency, the challenge for design and construction professionals is to find materials and products that set them apart from the competition.

Solutions that deliver fast, efficient and cost-effective construction, along with high standards of quality and performance, are needed to stay competitive and enable compliance with Australia's strict and comprehensive

regulatory landscape. In today's environment, all aspects of specification must place an unerring focus on compliance with Australia's complex interplay of standards, regulations, law, and certification schemes.

This applies to the specification of construction systems such as internal surfaces, a category that includes wall and ceiling linings. In this whitepaper, we take a closer look at interior linings, with a particular focus on the key performance requirements of modern residential and commercial building applications.

We also cast a critical eye on traditional interior linings and their shortcomings in meeting these requirements, before identifying innovative, high performance alternatives that are compliant with Australian regulation.

UNDERSTANDING INTERIOR LININGS

When a building is at the stage of construction at which it can no longer be penetrated by the elements, internal spaces can be fitted with internal ceiling and wall linings. An "interior lining" is material installed in a wall or ceiling component that is exposed to the internal, occupied space of a building.²

The term excludes any wall or ceiling components that are left exposed - these are considered "external lining" - such as insulation or rigid bracing, where no further material is applied on top of it.

The range of materials used for interior linings is broad and the material chosen for a residential or commercial building is highly dependent on the desired aesthetic and performance and functional requirements. In Australia, the most commonly used interior linings are:

- Plasterboard, which is also known as drywall or gypsum board. This is made by sandwiching a layer of calcium sulfate

dihydrate (gypsum) between two thick sheets of facer and backer paper.³ Available in various sizes and thickness, it also has a malleable surface which makes fixing to other products easy and facilitates alterations.⁴ Joints, gaps and holes can be easily filled with gypsum putty or taped and plastered.⁵

- Timber boards are an alternative to plasterboard but are more costly and difficult to install.⁶ Timber boards are horizontal planks made out of natural timber or wood plastic composite (that is, wood fibres mixed with a plastic resin). Available in a variety of timbers and finishes, these planks are overlapped or abutted against one another to give a continuous surface.

- Timber panels are typically a pre-finished sheet product made to resemble natural boards and comprised of either natural timber or timber veneer on a medium-density fibreboard substrate. Plywood is becoming a popular alternative as its design versatility lends itself to a modern aesthetic and it is relatively cost efficient.





KEY PERFORMANCE REQUIREMENTS FOR INTERIOR LININGS

As with any construction component, interior linings must comply with performance requirements set out by the National Construction Code (NCC). This includes fire, thermal, acoustic and moisture resistance as discussed below.

FIRE RESISTANCE

The fire performance requirements applicable to interior lining are contained in Volume One of the NCC, specifically the Building Code of Australia (BCA). Part A3 of the BCA categorises buildings from “Class 1” through to “Class 10” according to use and the number of storeys.⁷

Specification C1.10 of the BCA sets out the Deemed to Satisfy requirements pertaining to fire hazard properties of linings, materials and assemblies. The required level of fire resistance of a material is assessed via specified fire testing protocols on a scale of Group 1 through to Group 4.

For a limited number of applications, the NCC requires a Group 1 classification, which reflects the most fire resistance on the scale. Materials classified in Group 4 are the least fire resistant, and are typically not acceptable in any circumstances.⁸

For most applications, a Group 2 or Group 3 classification is permitted.⁹ For example, the following building classifications require wall and ceiling linings to achieve at least a Group 3 classification: Class 5 – office buildings; Classes 2 and 4 – apartments; Class 6 – shops; and Class 9a – healthcare buildings.

THERMAL RESISTANCE

Thermal resistance refers to the measure of the level of resistance a material has to the transfer of heat across its surface, which is expressed as an “R-Value”.¹⁰ The R-Value reflects a material's

effectiveness as an insulator; a high R-value indicates a high level of effectiveness. Minimum R-value requirements are specified under the BCA.¹¹

R-value is affected by a number of factors, such as the material's thermal mass properties, the thickness of the material and the method of construction. R-value is proportionate to material thickness.¹² Thicker materials will typically have more effective insulation capabilities, though density and thermal mass are also factors.¹³

While higher R-values are primarily achieved through insulation and a multi-layered construction system, that includes structural and cladding materials,¹⁴ interior linings can also play a significant role in thermal control. It is recommended that designers and specifiers choose linings with the highest possible R-value.

RESISTANCE TO MOISTURE

It is critical to specify lining materials that can resist moisture-related damage. Moisture is an ongoing problem in buildings and can be introduced into building interiors via exposure during the construction process, roof or pipe leakage and extreme weather events or natural disasters.¹⁵

Excess condensation is also a significant contributor, potentially leading to hidden fungus and mould growth, as well as corrosion. In some cases, moisture damage can compromise a building's structural integrity, resulting in swelling, buckling, and collapse.

SHORTCOMINGS OF TRADITIONAL LININGS

Traditional linings such as plasterboard and timber panels and boards have a number of shortcomings with respect to the key performance requirements discussed earlier.



PLASTERBOARD

The main shortcoming of plasterboard relates to its durability, especially in cases of moisture exposure. Very light by nature, plasterboard deteriorates easily, particularly if objects are incorrectly installed on the surface without any support.¹⁶

Plasterboard cannot be used in wet areas without a fibre cement sheet, and is prone to flaking and collapsing if moisture exposure is not treated or if an effective moisture barrier has not been applied.¹⁷ Plasterboard may also sag over time.

In a 2017 report by the Western Australian Building Commission, it was noted that between December 2014 and November 2015, the Department of Commerce received 129 queries regarding the collapse of plasterboard ceilings.¹⁸ Factors such as excessively humid weather, poor maintenance, or bad installation practices contribute to these types of plasterboard failures.

Plasterboard also has limitations in the area of thermal performance. Given its relatively low R-value in comparison to

other materials,¹⁹ plasterboard does not offer any insulation properties. To improve thermal performance, other insulation materials must be added.

TIMBER PANELS AND BOARDS

From a design perspective, timber panels and boards do not have the same level of versatility as other modern solutions given the finite number of finishes and wood types.

The ongoing maintenance and treatment required by natural timber can also be costly and inconvenient to end-users. This includes surface treatment and oiling to ensure the wood maintains its appearance and functional properties.

Where not adequately protected, natural timber can be prone to moisture damage that can result in swelling and deformation of the panels. Depending on the type of timber and how it is treated, natural timber solutions may also warp, swell and shrink under excess warmth.²⁰ There is a wide variety of fire resistance capabilities depending on wood species and thickness.

MDF WALL AND CEILING LININGS: A DESIGN SOLUTION

As an alternative to conventional interior lining materials, medium density fibreboard (MDF) wall and ceiling linings excel in the key performance areas discussed earlier while also delivering design versatility and ease of use. MDF is an engineered wood-based sheet material that is produced by bonding wood fibres together with a synthetic resin.²¹ Extremely versatile and low cost, MDF has become a viable alternative to timber and plasterboard in a wide range of applications.

There is a common misconception that MDF can pose a health risk due to formaldehyde emissions and the release of dust and other hazardous particles into the air. However, MDF is one of the most widely used wood products for furniture in Western Europe and USA.²² Many manufacturers produce boards with low levels of formaldehyde emissions.

Australian standards limit the amount of formaldehyde emissions that can be released from MDF panels.²³ When working with MDF, precautions such as sufficient ventilation, respirators and face

masks are recommended.²⁴ Once installed, sealed and finished, the material is inert and poses no health risks to occupants. The key performance characteristics of MDF are as follows:

- Impact resistance and load bearing capabilities. MDF can withstand approximately 300% more weight than plasterboard sheets.²⁵ Its structural and surface impact resistance properties are due to its dense composition, with an increased percentage of wood fibres correlating to improved tensile and impact strength.²⁶
- Low ongoing maintenance. Unlike timber, which requires careful, ongoing maintenance and treatment, MDF requires no additional maintenance or treatment. This has a positive impact on cost, but also makes it an ideal solution for applications in places that are difficult to access, such as ceilings, or where it will be subject to high usage.
- Speed of installation. MDF's lightweight nature and easy to handle composition contribute to a more efficient

installation process relative to plasterboard and natural timber products. MDF can also be easily machined, and its lack of finishing requirements makes it suitable for a wide range of applications.

- Versatility. MDF is available in a wide variety of sheet sizes and is receptive to various customisation options. Cost effective and easy to cut, route, and machine into virtually any shape, profile, and design, the material is the ideal solution for almost any application.
- Thermal resistance. MDF has superior insulation capabilities relative to conventional interior lining materials. MDF panels that are 9mm thick have a R-value of 0.079 m² K/W,²⁷

which easily outperforms plasterboard of a similar thickness (R-Value of 0.059m²K/W).

- Fire resistance. Like any other material used for lining, MDF products are applied a fire rating under the NCC regime. Specifiers should select a MDF product with the appropriate fire rating for the proposed application.
- Moisture resistance. While moisture can negatively impact the performance of MDF, technological advancements have allowed moisture-resistant MDF products to enter the market.²⁸ These products are designed to withstand moisture and are less susceptible to moisture damage, ensuring that the MDF retains its functional properties.



EASYCRAFT

Since 1986, Easycraft has been the leading Australian provider of high performance, stylish interior wall and ceiling panels. Strong technical know-how combines with knowledge of the latest building trends to deliver contemporary MDF linings that meet the stringent NCC and BCA requirements for thermal, acoustic, and fire performance. With an unerring commitment to quality and functionality, Easycraft solutions overcome the shortcoming of other lining materials.

The Easycraft catalogue features many high performance products backed by outstanding customer service, stringent product testing and strict adherence to Australian standards. Easycraft works closely with architects and designers to deliver bespoke solutions for complex briefs.

easyVJ

The most popular of Easycraft's MDF decorative wall linings, easyVJ is a modern v-groove design matching the style of traditional timber joint planks. Perfect for wall and ceiling linings, easyVJ is highly versatile and can be used in vertical, horizontal and diagonal orientations in a multitude of residential and commercial applications.

This solution does away with the imperfections and defects of natural timber by providing a consistent board surface with no

knotholes, splitting, or splinters and a decorative profile to the product face. The hidden tongue and groove easyjoin system enables fast and efficient installation that is up to 50% quicker when compared to traditional plasterboard installation.

Made in Australia using all Australian grown species, EasyVJ works as an ideal replacement for plasterboard. Easy and fast to install, customers will save on painting, plastering and labour. The product can be used to create striking feature walls, or as a replacement for plasterboard to enhance entire rooms.

Unlike plasterboard, no joint sealing or sanding is required, and the product comes pre-primed for faster final coating. MDF has superior thermal performance and performs three-times better than plasterboard in relation to impact resistance.

Available in a variety of lengths, easyVJ gives designers and specifiers flexibility and freedom. Fire Rated Interior panels that meet the stringent fire performance requirements set out in the NCC/BCA are also available. Easycraft products also provide specifiers with tested wall systems that comply with the NCC/BCA requirements for acoustics.

Made out of environmentally sustainable materials and manufactured under S 4707:2014 – Chain of Custody compliant management system for certified wood and forest products, easyVJ reflects Easycraft's commitment to the Australian environment.

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