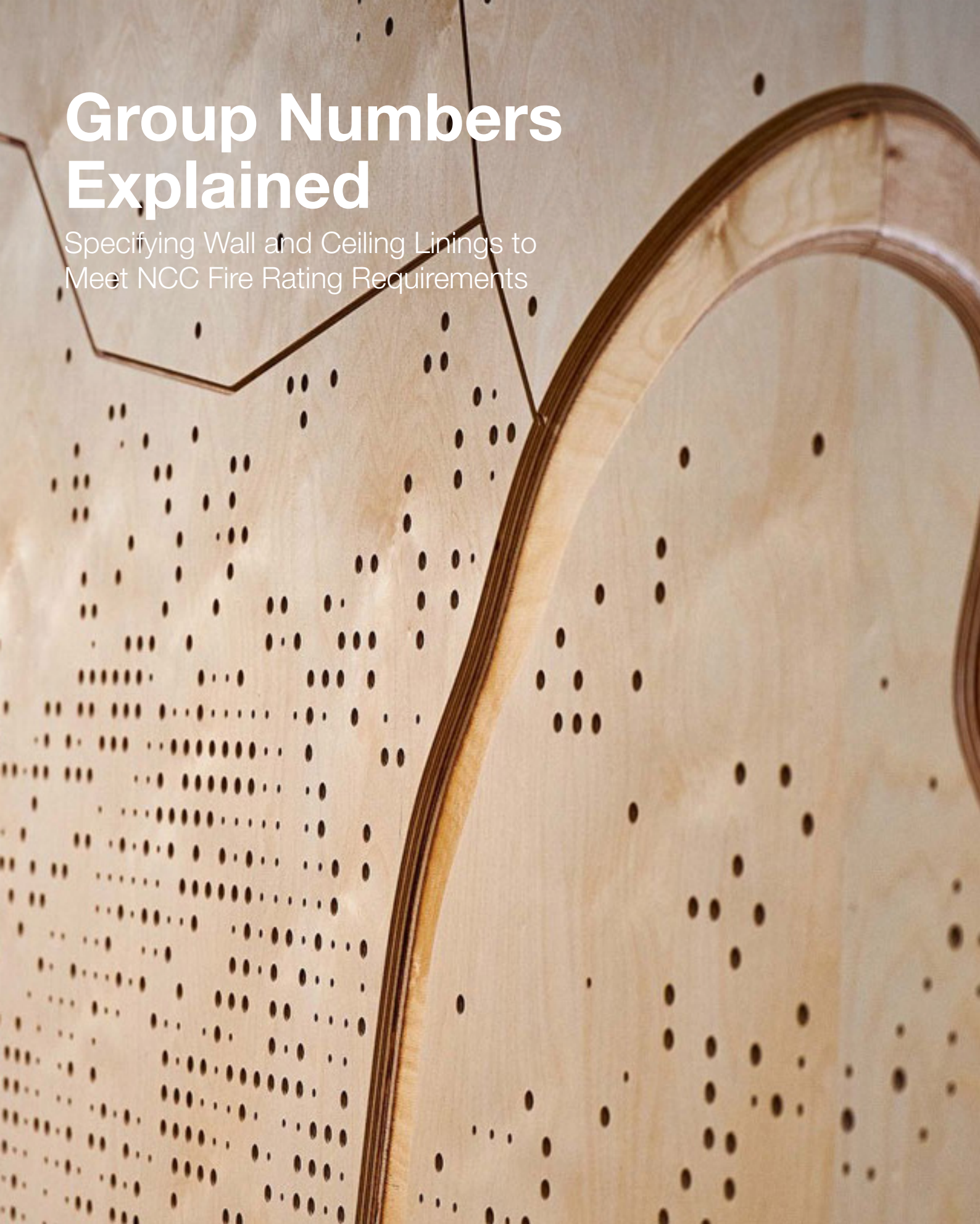


Group Numbers Explained

Specifying Wall and Ceiling Linings to Meet NCC Fire Rating Requirements





“The goal of fire-safe building design is to ensure tenable evacuation conditions during a fire, which means providing enough time and building stability to allow occupants to reach a place of safety.”

INTRODUCTION

In the aftermath of the recent Lacrosse and Neo200 fires in Melbourne and the devastating Grenfell Tower fire in London, the focus of the architecture and construction industry has been on addressing fire safety issues in building design. Much of the discussion has centred on the types of building materials used and how they will perform during a fire event.

In 2019, the owners of the apartments in the Lacrosse tower were awarded millions of dollars in damages after a fire fuelled by non-compliant, combustible cladding caused significant damage to the building. The builder was ordered to pay more than \$5.7 million to apartment owners, but the architect, fire engineer and building certifier who worked on the project would be required to pay most of that back to the builder after being found that they had breached contractual obligations. This decision makes it clear that the primary responsibility for the fire

safety of a building is placed on architects, designers and consultants.

Against this backdrop, it is the responsibility of all design and construction professionals to have a detailed understanding of the requirements in the National Construction Code (NCC) surrounding fire safety. However, the regulatory landscape is ever-changing and, at times, confusing. Between Fire Resistance Levels, Fire Hazard Properties and the other fire safety requirements in the NCC, it is not always clear what fire testing standards apply, and when.

In this whitepaper, we take a closer look into the what and how of Fire Hazard Properties and Group numbers for wall or ceiling linings, and how to ensure that the building product you select does in fact meet the relevant fire rating requirements.

WHAT IS A GROUP NUMBER?

The goal of fire-safe building design is to ensure tenable evacuation conditions during a fire, which means providing enough time and building stability to allow occupants to reach a place of safety. To meet this objective, Performance Requirement CP4 of the NCC requires materials and assemblies in Class 2 to 9 buildings to appropriately resist the spread of fire and limit the generation of smoke, heat and toxic gases. Deemed-to-Satisfy (DTS) Provision C1.10(a)(ii) achieves this requirement in part by requiring wall and ceiling linings to meet the Fire Hazard Properties of Specification C1.10.

'Fire Hazard Properties' refers to the properties of a material or assembly that indicate how they behave under specific fire-test conditions. Per the NCC, these properties include:

- Average specific extinction area, critical radiant flux and Flammability Index.
- Smoke-Developed Index, smoke development rate and Spread-of-Flame Index.
- Group number and smoke growth rate index (SMOGRARC).

"Group number" means the number of one of four groups of materials used in the regulation of fire hazard properties and is applied to materials used as a finish, surface, lining, or attachment to a wall or ceiling. Materials are assigned a Group number based on testing that measures how readily the material ignites and releases heat.

The Group number rating refers to four classifications from 1 to 4, with Group 1 materials performing the best in a fire, while Group 4 materials perform the worst.

When do Group Numbers apply?

Specification C1.10 requires a wall or ceiling lining system to comply with the Group number specified in Table 3 in that same provision (Table 3 is reproduced below).

Note that Group number requirements change depending on Building Class, whether the building is sprinklered or unsprinklered, and in relation to fire-isolated exits and fire control rooms. From 1 May 2019, the NCC makes fire sprinkler protection mandatory for buildings with a rise in storeys of four or more, and an effective height of not more than 25 metres.¹

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

Class of building	Fire-isolated <i>exits</i> 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 <i>health-care buildings</i>	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 <i>health-care buildings</i>	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 <i>schools</i> , 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 <i>schools</i> , 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 <i>schools</i> , 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 <i>schools</i> , 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



How do products obtain a Group Number?

To comply with Specification C1.10, wall and ceiling linings must meet the requirements of a Group number, which is determined by fire testing in accordance with AS 5637.1:2015 “Determination of fire hazard properties – Wall and ceiling linings”. The two relevant tests are as follows:

- **AS ISO 9705:2003 Full-scale room test.** Under this test, a standard room is constructed from the lining submitted for testing with a heat flux meter installed. The room is ignited at one corner and data is recorded, including the time at which (if at all) the heat flux meter records 1 megawatt (MW) (i.e. when flashover occurs), relative to the heat applied at the ignition source.² This type of full-scale testing measures how material behaves in an actual fire event.
- **Oxygen calorimeter test.** This method is also referred to as the ‘cone calorimeter test’ after the cone-shaped heater used in the test apparatus. The test may be performed in accordance with AS/NZS 3837:1998 “Method of test for heat and smoke release rates for materials and products using an oxygen consumption calorimeter” or ISO 5660-1 heat release rate (cone calorimeter method) and smoke production rate (dynamic method).³ In comparison to full-scale testing, this type of small-scale testing is predictive in nature.

AS 5637.1:2015 limits use of the oxygen calorimeter test for certain materials, gypsum plasterboard, solid timber, wood products such as particleboard and plywood, and rigid non-thermoplastic foams such as polyurethane.⁴ The test cannot be used for linings with joints, openings, profiled facings or reflective surfaces, or for linings that contain materials that melt or shrink away from a flame.⁵

WHAT IS THE DIFFERENCE BETWEEN GROUP NUMBERS, FRLS AND 'NON-COMBUSTIBLE' MATERIALS?

Group numbers vs FRLs

The term 'fire rating' is often used interchangeably when referring to different fire performance requirements in the NCC. Fire Resistance Levels (FRLs) are sometimes described in this way, but are distinct from Group numbers.

FRL is the ability of a building element to withstand a fire under test conditions for a certain period of time. This measure is expressed in 30 minute increments (e.g. 90/90/90) for the following three criteria:

- **Structural adequacy.** This is a measure of an assembly's ability to be load-bearing, or carry a predetermined load, for a period of time during fire conditions.
- **Integrity.** This is a measure of an assembly's ability to restrict the passage of flame and hot gasses for a period of time.
- **Insulation.** This is a measure of an assembly's ability to contain temperatures and stop heat transfer between zones for a period of time.

Specification C1.1 in the NCC contains requirements for building elements to be fire-resisting and to have a FRL. Fire resistance testing is governed by AS 1530.4:2014 "Methods for fire tests on building materials, components and structures, Part 4: Fire-resistance tests for elements of construction".

Group 1 materials vs 'Non-combustible' building materials

Group 1 materials are generally non-combustible, or near non-combustible. There may be some confusion as the NCC calls for the use of 'non-combustible' building elements and components under DtS provision C1.9. This provision requires specified building elements (e.g. external and common walls, flooring and floor framing or lift pits, and non-loadbearing internal walls where they are required to be fire-resisting) and their components to be 'non-combustible'.

A 'non-combustible' material is one that is not deemed combustible as determined by AS 1530.1: 1994 "Combustibility Tests for Materials". To meet the 'non-combustibility' requirement, the construction or part of a building must be constructed wholly of materials that are not deemed to be combustible.

An external building material can only be "non-combustible" if it passes the test in AS 1530.1: 1994. In comparison, to meet Group number requirements, internal walls and linings must be tested in accordance with AS 5637.1:2015 as described above.

HOW DO I KNOW IF A PRODUCT IS GROUP RATED?

Once you know which Group number is required for your project, you must ensure you specify a material that has been tested to the relevant standard, and has a valid Group number classification. This can be ascertained by requesting a testing certificate for the product that confirms the product has been tested to AS 5637.1:2015.

When assessing the testing certificate, ensure that it refers to the same product as the manufactured product. Inconsistent or incorrect details as to material thickness, type, finish, and construction can mean that the certificate is not valid for the product in question. This is especially important when choosing between perforated

and non-perforated versions of the same product. A testing certificate for a solid panel is not valid for a perforated panel.

This level of due diligence is critical as there are some products that make misleading or incorrect claims about their fire performance. Some cheaper, imported products may not comply with the relevant Australian standards governing fire performance of building materials. When choosing a product for a local construction project, the manufacturer or supplier should be able to clearly demonstrate the product complies with the NCC and the relevant standards.

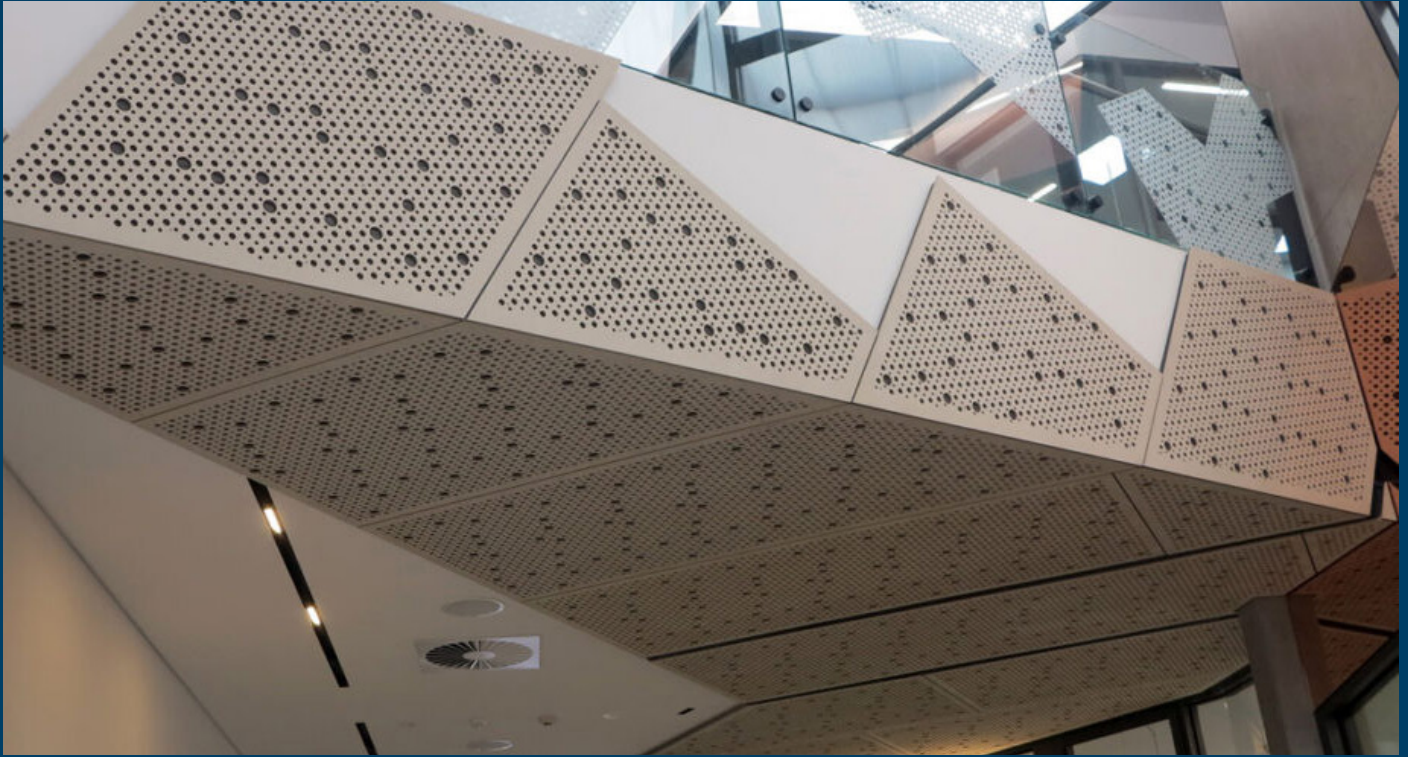
GROUP-RATED MATERIALS FROM KEYSTONE LININGS

Since 1985, Keystone Linings have been the pioneers in manufacturing acoustic panels. The company continues to be the industry leader supplying commercial and private venues where sound-proofing and acoustics are of paramount importance.

Keystone Linings offers a range of fire-rated products for specification in a range of indoor applications, including:

Product	Solid	Perforated
<p>Key Endura Key Endura architectural panels are strong and durable, and available in a variety of fibre cement sheet sizes and thickness, making them an excellent choice for both internal and external applications. The panels come recessed or square edged and are easy to install onsite.</p>	Group 1 Options Available	Group 1 Options Available
<p>Key Ink Available in fibre cement or compressed fibre cement substrate, Key Ink digitally-printed panels come in a range of slotted and perforated options, with the versatility of hi-resolution custom prints, giving your decor a unique look.</p>	Group 1 Options Available	Group 1 Options Available
<p>Key Nirvana Pre-finished decorative MDF panels perfect for creating aesthetically pleasing interior wall and ceiling panels, including interior acoustic wall and ceiling systems, feature decorative panels for walls and ceilings, partition walls, and ideal for ceiling tiles. It is environmentally friendly with no solvent finish for low VOC emission.</p>	Group 1, 2 & 3 Options Available	Group 1, 2 & 3 Options Available
<p>Key Ply Made from natural materials from renewable resources, Key Ply panels are engineered to create powerful acoustic atmospheres, with excellent sound insulation –all while exuding an elegant timber appearance.</p>	Group 1&3 Options Available	Group 1&3 Options Available
<p>Key Eclipse With inherent fire retardant qualities in its MDF core, Key Eclipse is a Group 1 rated, eco-friendly board with excellent sound insulation for internal applications.</p>	Group 2 Options Available	Group 2 Options Available
<p>Key Lena Key Lena panels provide a cost-effective and long-lasting acoustic MDF solution for ceiling and walls. Engineered to create powerful acoustic atmospheres, they can give your space a pop of colour with various finishes while being environmentally sustainable.</p>	Group 3 Options Available	Group 3 Options Available

“Materials are assigned a Group number based on testing that measures how readily the material ignites and releases heat.”



REFERENCES

- ¹ Bicknell, Tom. "New residential fire sprinkler requirements in NCC 2019." ABCB. <https://ncc.abcb.gov.au/news/2019/new-residential-fire-sprinkler-requirements-ncc-2019> (accessed 1 May 2022).
- ² Australian Building Codes Board. "The what and how of fire hazard properties for wall and ceiling linings." ABCB. <https://www.abcb.gov.au/news/2021/what-and-how-fire-hazard-properties-wall-and-ceiling-linings> (accessed 1 May 2022).
- ³ Ibid.
- ⁴ Ibid.
- ⁵ Ibid.

All information provided correct as of September 2022