



Fire Hazard Properties & Non-Combustibility

A Guide for Internal Walls & Ceiling Linings

“The FRL does not refer to a material’s fire performance, but rather the performance of the entire system. It describes how well the system as a whole, including all of its components, behaves in a fire.”

INTRODUCTION

Passive fire protection systems are designed to contain the fire at its source and stop the spread of flames and smoke throughout the structure for an intended limited period of time as required by the National Construction Code (NCC). Under the NCC, internal wall and ceiling assemblies are among the key areas of focus for passive fire protection strategies.

Over the last decade, spurred on by high-profile tower fires, the NCC’s fire safety requirements have been strengthened. It might not be sufficient to satisfy the NCC’s requirements to simply have a report or certificate that attests to the satisfactory fire hazard properties of a wall or ceiling lining; you must also ensure that these properties were determined using the right testing methods as required by the relevant Australian standards.

In construction, combustibility refers to a material’s propensity to burn or ignite when subjected to high levels of fire or heat. The NCC includes requirements for non-combustibility, but it can be difficult to understand when certain products can be used and when, and how all these factors contribute to a wall or ceiling assembly’s overall fire resistance level (FRL).

This whitepaper provides a concise and easy-to-follow guide of the fire performance requirements for internal wall and ceiling linings under Section C of the NCC 2022 Vol. 1, with a focus on fire hazard properties and non-combustibility.



UNDERSTANDING FIRE HAZARD PROPERTIES

What is a Group Number?

The key to understanding the fire hazard properties is the “Group Number”, which refers to one of four groups of materials used as a wall or ceiling lining. Materials are classified into Groups 1 (best performing), 2, 3 or 4 (worst performing), with each Group representing how readily a material ignites and releases heat. A fire will develop more slowly, thus providing more time for initial response and evacuation, if the material has greater heat release resistance and lower heat release.

Under the NCC, Group Number classification determines where the material can be used for walls and ceilings

of Class 2 to 9 buildings. Where limiting the spread of smoke and flame is critical, typically only building materials with a low Group Number are permitted. The NCC 2022 requires all linings used as a wall or ceiling covering for Class 2 to 9 buildings to have a Group Number of 1, 2 or 3. Materials belonging to Group 4 cannot be used in the construction of commercial buildings in Australia.

Detailed requirements are found in Clause S7C4 of NCC 2022 and Table S7C4, the latter of which sets out the material groups permitted in different circumstances. Table S7C4 is reproduced below.

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	Walls: 1, 2	Walls: 1, 2, 3	Walls: 1, 2, 3
	Ceilings: 1	Ceilings: 1, 2	Ceilings: 1, 2, 3	Ceilings: 1, 2, 3
Class 2 or 3, sprinklered, excluding accommodation for the aged, people with disabilities and children	Walls: 1	Walls: 1, 2, 3	Walls: 1, 2, 3	Walls: 1, 2, 3
	Ceilings: 1	Ceilings: 1, 2, 3	Ceilings: 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	Walls: 1	Walls: 1, 2	Walls: 1, 2, 3
	Ceilings: 1	Ceilings: 1	Ceilings: 1, 2	Ceilings: 1, 2, 3
Class 3 or 9a, sprinklered, accommodation for the aged, people with a disability, children and health-care buildings	Walls: 1	Walls: 1, 2	Walls: 1, 2, 3	Walls: 1, 2, 3
	Ceilings: 1	Ceilings: 1, 2	Ceilings: 1, 2, 3	Ceilings: 1, 2, 3
Class 5, 6, 7, 8 or 9b schools , unsprinklered	Walls: 1	Walls: 1, 2	Walls: 1, 2, 3	Walls: 1, 2, 3
	Ceilings: 1	Ceilings: 1, 2	Ceilings: 1, 2	Ceilings: 1, 2, 3
Class 5, 6, 7, 8 or 9b schools , sprinklered	Walls: 1	Walls: 1, 2, 3	Walls: 1, 2, 3	Walls: 1, 2, 3
	Ceilings: 1	Ceilings: 1, 2, 3	Ceilings: 1, 2, 3	Ceilings: 1, 2, 3
Class 9b other than schools , unsprinklered	Walls: 1	Walls: 1	Walls: 1, 2	Walls: 1, 2, 3
	Ceilings: 1	Ceilings: 1	Ceilings: 1, 2	Ceilings: 1, 2, 3
Class 9b other than schools , sprinklered	Walls: 1	Walls: 1, 2	Walls: 1, 2, 3	Walls: 1, 2, 3
	Ceilings: 1	Ceilings: 1, 2	Ceilings: 1, 2, 3	Ceilings: 1, 2, 3
Class 9c, sprinklered	Walls: 1	Walls: 1, 2	Walls: 1, 2, 3	Walls: 1, 2, 3
	Ceilings: 1	Ceilings: 1, 2	Ceilings: 1, 2, 3	Ceilings: 1, 2, 3

Source: Australian Building Codes Board. <https://ncc.abcb.gov.au/editions/ncc-2022>

How are Group Numbers determined?

As stated by Clause S7C4, AS 5637.1:2015 “Determination of fire hazard properties Wall and ceiling linings” provides the accepted procedure for determining Group Numbers for wall and ceiling linings. The Standard outlines two testing methods:

- a full-size room burn test as per AS ISO 9705 “Fire tests – Full-scale room test”; or
- a series of small-scale sample tests under AS/NZS 3837:1998 “Method of test for heat and smoke release rates for materials and products using an oxygen consumption calorimeter”.

If a material meets certain requirements of AS5637.1, the results of the small-scale tests can be used to forecast how the lining will function in a full-scale test, and a Group Number can be assigned accordingly.

Can I accept either test?

No, wall and ceiling linings must be tested in accordance with AS 5637.1, which limits the use of the oxygen calorimeter test (AS/NZS 3837) to certain materials. Well-known materials, such as gypsum plasterboard, solid timber, and wood products such as particleboard and plywood, may be tested to this method.

Fire hazard properties report

Evidence of suitability refers to various forms of documentary evidence that can be used to demonstrate that a building product complies with NCC requirements. If you are seeking to rely on a fire hazard properties report for evidence of suitability, it must include a statement of conformance to AS 5637.1; a statement of the test method used (either AS/NZS 3837 or AS ISO 9705); and, if AS/NZS 3837 was used, a statement that it was appropriate to do so for determining the Group Number.¹

NON-COMBUSTIBILITY

What does non-combustibility mean?

Under the NCC, the definition of “non-combustible” when applied to a material, means that the material has not been deemed combustible as determined by AS 1530.1:1994 “Methods for fire tests on building materials, components and structures, Part 1: Combustibility test for materials”. When applied to construction or part of a building, it means that it is constructed wholly of materials that are not deemed to be combustible.

Clause C2D10 of NCC 2022 requires specified building elements and their components to be non-combustible. In a building required to be of Type A or B construction, non-combustible materials are required for external walls, common walls (walls that are common to adjoining buildings), non-loadbearing fire-rated walls and other building elements.

Tests to determine non-combustibility

In contrast to the two Group Number tests mentioned above, the AS1530.1 non-combustibility test entails placing five test samples in a furnace for 30 minutes. During that time, any sample that flames for longer than five seconds is deemed combustible.

The CSIRO describes the purpose of the AS1530.1 test as follows: “The purpose is to provide a consistent and standardised test which conservatively categorises materials (primarily for the construction industry) which, although not completely inert, produce only a limited amount of heat and flame when exposed to temperatures

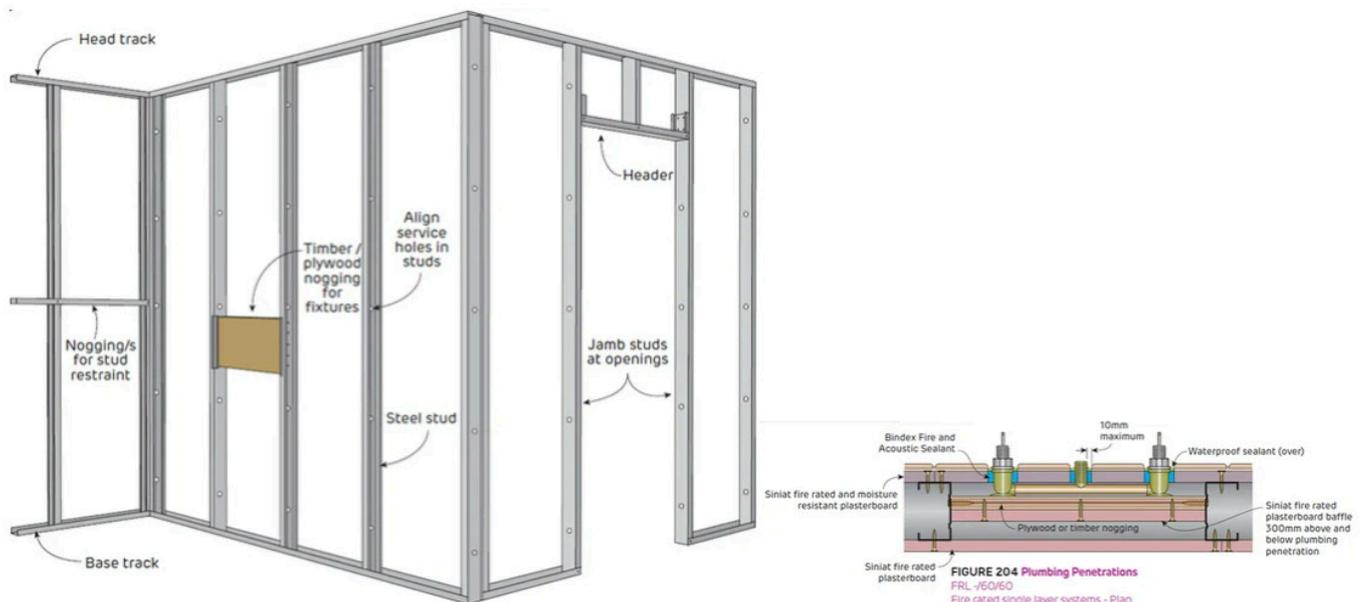
of approximately 750°C and are expected not to burn substantially even when exposed to severe fire conditions.”²

It is important to note that some building materials, including plasterboard, do not have to be tested for combustibility in terms of AS 1530.1. Clause C2D10(6) provides a list of materials that may be used whenever a non-combustible material is required. Though some of these materials may have combustible components, such as the liner paper of plasterboard, these materials are well known for their performance in fires and are considered low risk.

What about the other elements of an assembly?

Other items and components that are exempt from the non-combustibility requirements are listed in Clause C2D10(4) of NCC 2022. This list includes elements used in the construction of internal walls, such as sealants, wall ties, joint trims and so on. The 2022 update included additions such as “isolated blocking for fixing fixtures”, which means plywood or timber noggings used for attaching plumbing services within a wall are exempt from the non-combustibility requirements.

The explanatory information included with Clause C2D10 provides further clarification of what is meant under “isolated”. The blocking of an entire wall is not considered an isolated situation, but isolated fixing and fixing accessories such as screws, anchors, wall plugs, nails and washers fall within the definition. Siniat provides a useful diagram showing where timber noggings are typically used:



“All regular plasterboard may be used wherever non-combustible materials are required in the NCC, and when tested for fire hazard properties, is categorised as a Group Number 1 material. Specially-designed fire-resistant plasterboard contains extra additives to enhance its fire performance.”



FIRE-RESISTANT PLASTERBOARD AND FRLS

A construction element's ability to withstand fire is known as its FRL (fire resistance level). The NCC 2022 requires elements in a building to meet specific FRL requirements.

The FRL does not refer to a material's fire performance, but rather the performance of the entire system. It describes how well the system as a whole, including all of its components, behaves in a fire. Three criteria are tested for the FRL: structural adequacy (how long the system remains able to perform its structural function), integrity (how long it prevents the passage of fire or hot gasses), and insulation (how long it prevents heat from passing from the fire side to the non-exposed side).

All regular plasterboard may be used wherever non-combustible materials are required in the NCC, and when tested for fire hazard properties, is categorised as a Group Number 1 material. Specially-designed fire-resistant plasterboard contains extra additives to enhance its fire performance. When designing a wall, ceiling, or any other building system, fire-resistant plasterboard is useful for increasing the complete system's fire resistance in FRL-specified areas.



SINIAT PLASTERBOARD HELPS YOU MEET FIRE REQUIREMENTS

The fire performance requirements of the NCC 2022 are a complex topic, but with the right information, you can select the best solutions for your next project. Siniat offers various plasterboard products and systems to help meet these requirements.

When used in a system, **Fireshield** fire-resistant board can help provide an FRL of up to 240 minutes. Fireshield is used for internal lining applications such as fire and sound resistant walls and ceilings. It can also be used within specialist commercial systems such as structural column and beam protection systems.

Multishield offers the same fire resistance properties as Fireshield, but with the added benefit of water and mould resistance. It is a multi-purpose board that is also recommended for laminating to the central fire barrier in the Interhome separating wall system (see below).

Siniat's **Interhome** (low-rise) separating wall system is suitable for load bearing walls with an FRL of 60/60/60 supporting non-fire rated floors and roofs. It differs from a conventional twin frame separating wall as it contains a central fire barrier built between timber or steel house frames. The central fire barrier, composed of 25mm Shaftliner or Intershield, limits the spread of fire from one

dwelling to adjoining dwellings. Shaftliner and Intershield are both fire resistant, but Intershield also offers water and mould resistance, which is ideal for protection against the effects of wet weather.

Interhome aluminium clips are used to hold the central fire barrier in position and are purposely made from aluminium. They are designed to melt in a fire, so the frame of the dwelling exposed to the fire can detach from the central fire barrier. The dwelling affected by the fire may therefore degrade, and even collapse, without spreading the fire to the adjoining dwelling.

For slab-to-slab construction in Class 2 or 3 buildings (apartments, hotels or hostels), Siniat offers the Interhome (high-rise) wall system as the ideal solution for these situations.

Siniat's "sister" company Promat is well-known in the industry for its large range of products and systems for the firestopping of service penetrations through the plasterboard systems discussed in this white paper.

For more information about Siniat's fire-resistant products and fire rated systems, visit <https://www.siniat.com.au>. For more information about Promat, visit <https://www.promat.com/en-au/>.

REFERENCES

- 1 AEWCAA. "Technical Note: Fire Hazard Property Requirements for Internal Wall and Ceiling Linings –Class 2 to 9 Buildings." AEWCAA. <https://ewp.asn.au/wp-content/uploads/2023/02/AEWCAA-Technical-Note-Fire-Requirements-for-Internal-Wall-and-Ceiling-Linings-V3.pdf> (accessed 17 July 2023).
- 2 CSIRO. "Fire safety guideline for external walls." CSIRO. <https://www.csiro.au/~media/Do-Business/Files/Services/CSIRO-External-Wall-Safety-Guide-18-04-2016-PDF.pdf> (accessed 17 July 2023).