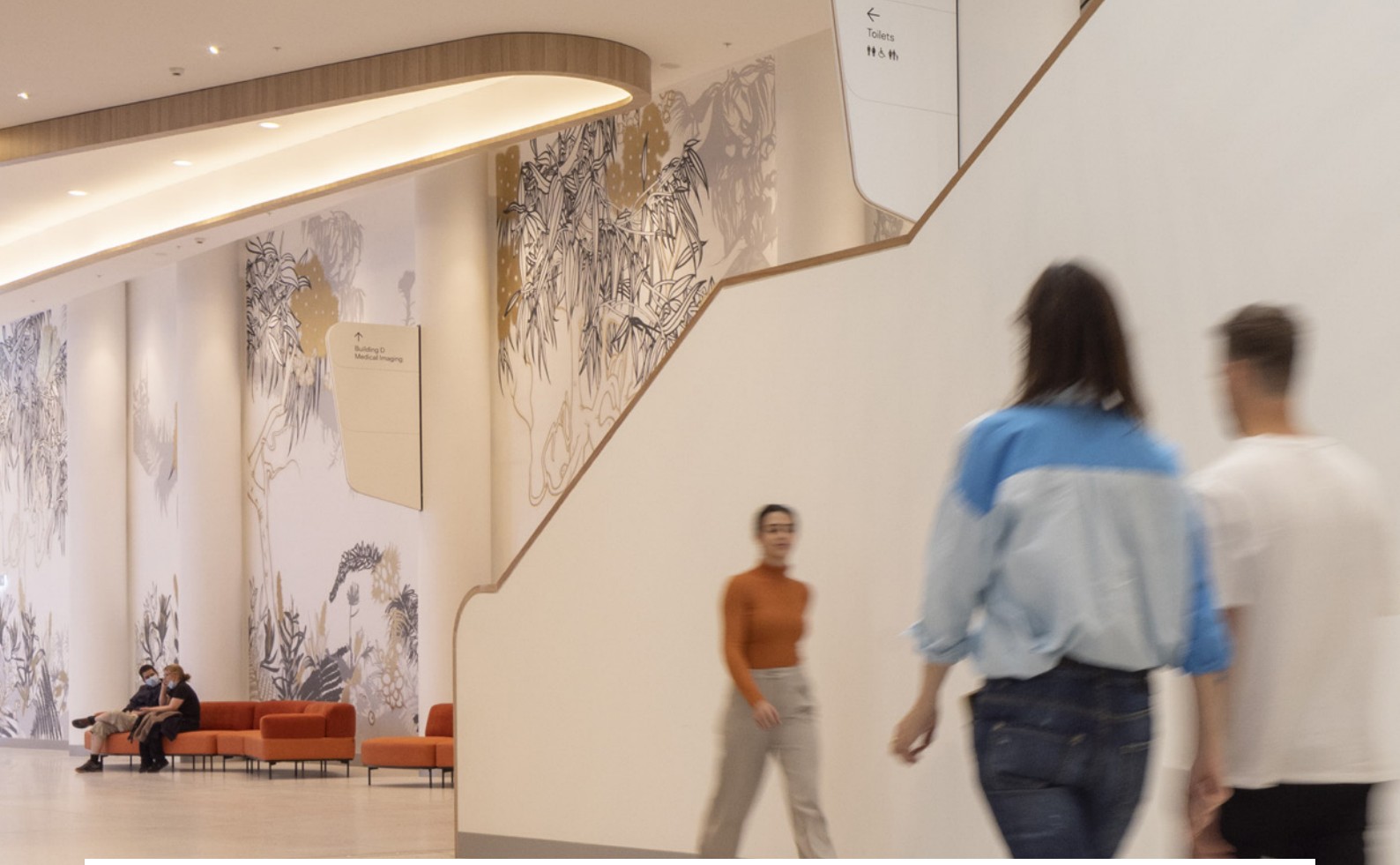
NCC Fire Performance Properties for Insulation Systems

Guide to AS 1530 Parts 1 to 3

Bradford™ | CSR



Introduction

In addition to helping to keep interior temperatures stable and comfortable, insulation plays an important role in fire safety. The National Construction Code (NCC) mandates specific fire performance standards for insulation and other related building materials, which vary across building types and applications. Architects and specifiers must consider not only the thermal efficiency of insulation but also its ability to comply with NCC fire performance requirements.

Selecting compliant materials requires a nuanced understanding of the material's function in a building and fire ratings; it cannot be adequately assessed by simply confirming if a product is "fire compliant". Fire hazard properties are determined by a range of factors and testing protocols, each designed to evaluate different aspects of fire behaviour, including combustibility, flammability, flame spread and smoke production. The Australian Standard AS 1530 Parts 1 to 3 provides essential guidelines for assessing these properties, offering a framework for determining which materials meet the necessary standards for fire safety in various building classes.

Why does fire performance matter more than ever? Fire safety has always been a cornerstone of building design, yet recent disasters have exposed critical gaps in how fire safety regulations are applied. The 2014 Lacrosse apartment fire in Melbourne's Southbank showed how quickly flames could spread externally in a modern high-rise, while the 2017 Grenfell Tower tragedy in London, which claimed 71 lives, underscored the deadly consequences of combustible cladding. These events sent shockwaves through the industry, demanding urgent scrutiny of fire performance standards and stricter compliance to prevent future catastrophes.

This guide aims to clarify the NCC fire performance properties for Class 2 to 9 buildings, focusing on the testing criteria in AS 1530 Parts 1 to 3 and the corresponding provisions in the NCC. By understanding these specific fire performance requirements, architects and specifiers can make informed decisions about insulation and other related products.

Note: While this paper addresses the fundamental aspects of fire performance in relation to AS 1530 Parts 1 to 3, future discussions will delve into AS 1530 Part 4 and explore Fire Resistance Levels (FRLs) and Group Numbers determined by AS 5637.1.

How to comply with the NCC

To meet the NCC Performance Requirements for fire safety, practitioners can choose between a Deemed-to-Satisfy (DTS) solution, a Performance Solution, or a combination of both. The DTS solution is a prescriptive approach, providing specific guidelines on materials, construction methods and design factors that, if followed, are considered to automatically satisfy the Performance Requirements. By adhering to these predefined criteria, architects and specifiers can ensure compliance without the need for additional testing or approvals, making DTS solutions a straightforward compliance route for common applications.

Performance Solutions are methods of complying with the Performance Requirements other than by a DTS Solution. In contrast to a DTS Solution, they offer flexibility, allowing for alternative methods and innovative materials to achieve compliance. According to the Australian Building Codes Board (ABCB), a Performance Solution is “unique for each individual situation” and often enables designers to achieve the desired outcomes through advanced technologies or novel approaches. This method is ideal for projects that require custom solutions or for applications where a DTS solution may not be feasible due to specific design requirements.

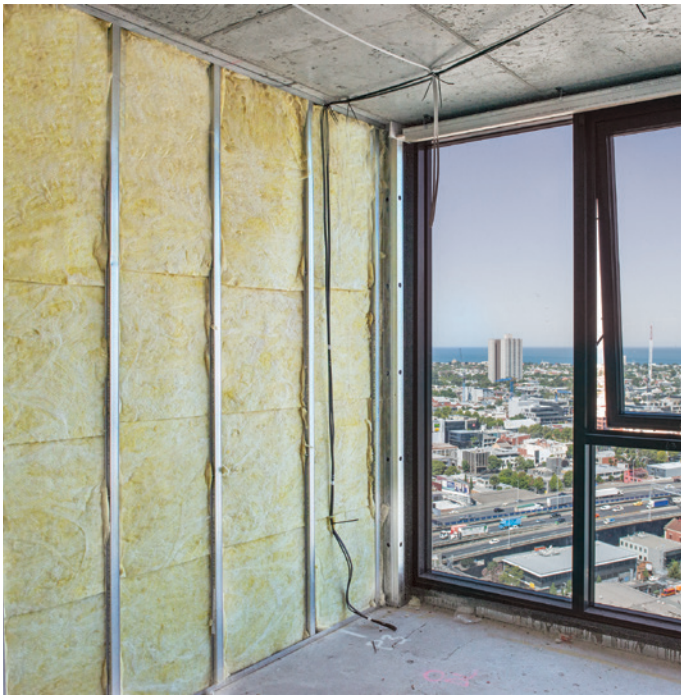
These standards set specific criteria for evaluating the fire performance of building materials, components and systems, providing a reliable basis for architects and specifiers to meet the NCC’s fire-related Performance Requirements.

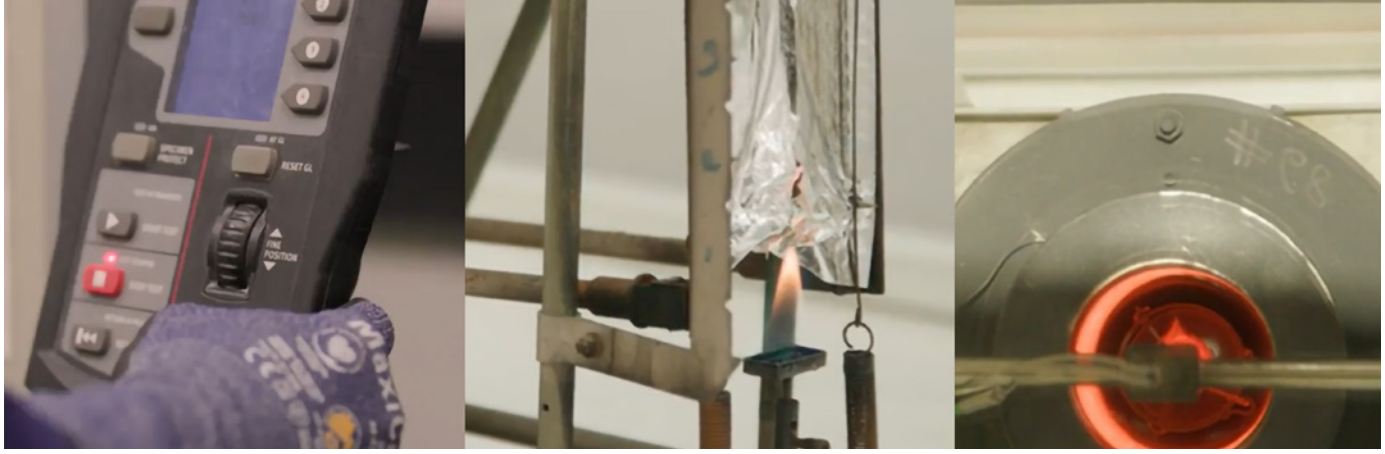
Role of Australian standards

The NCC references numerous Australian Standards that outline detailed requirements for materials, construction methods, testing procedures and safety criteria. By adhering to these standards, builders, architects and specifiers can satisfy the Performance Requirements of the NCC, as these standards have been developed to align with the broader safety, health, amenity and sustainability goals set out in the NCC.

Each Australian Standard related to building construction is developed by Standards Australia, which works with industry experts and regulatory bodies to ensure the standards reflect current industry needs and best practices. When the NCC cites an Australian Standard, it is a recognised method for achieving compliance, often forming part of a Deemed-to-Satisfy (DTS) solution.

Australian fire testing standards, particularly AS 1530 Parts 1 to 3, are integral to achieving compliance with the NCC for fire safety. These standards set specific criteria for evaluating the fire performance of building materials, components and systems, providing a reliable basis for architects and specifiers to meet the NCC’s fire-related Performance Requirements. AS 1530 Part 1 covers combustibility, Part 2 addresses ignitability and flame propagation in sarking-type materials and Part 3 evaluates ignitability, flame propagation, heat and smoke release. Together, these standards offer a comprehensive approach to assessing how materials will behave in a fire.





AS 1530 Part 1: Test for Combustibility of Materials

Under Clause C2D10 of the NCC 2022 Vol. 1, in buildings of Type A or B construction, the following building elements and their components must be non-combustible:

- external and common walls, including all incorporated components such as facade cladding, framing and insulation;
- flooring and floor framing within lift pits; and
- non-load bearing internal walls when these walls are required to be fire-resisting.

The term “non-combustible” refers to a material that is not deemed combustible under AS 1530.1 or is on the list of products specified in the NCC that may be used where a non-combustible material is required (without testing to AS 1530.1).

The AS 1530.1 test procedure involves exposing product samples to a heat source to determine how they react. This evaluates a material’s combustibility based on two key criteria: the duration of flaming and the temperature rise during the test. The test measures how long the material continues to flame after ignition, as well as the extent of temperature increase in the test chamber. A material fails the test if flaming persists beyond the allowable limit or if the temperature rises above the specified threshold, indicating combustibility.

The AS 1530.1 test procedure is specifically designed for homogenous materials, such as unfaced bulk insulation. This method does not apply to products that are coated, faced or laminated, as these additional layers can alter the material’s fire performance characteristics.

Under NCC Clause C2D10(4), (5) and (6), specific exemptions allow certain materials to be used even where non-combustible materials are required. For example, plasterboard and fibre cement sheets are covered by these exemptions. In addition, sarking type materials less than 1 mm thick and with a Flammability Index of 5 or less are permitted wherever non-combustible material is required (no requirement to be tested to AS1530.1). Some ancillary components that may contain a limited amount of combustible material may be attached to an external wall, such as gutters, flashing, light fittings, gaskets, sealants and so on, in accordance with Clause C2D14.

Figure 1. Bradford Acoustigard is compliant to AS1530.1 (non-combustible)

Maximum Service Temperature		150°C (suitable where a long term surface operating temperature ≥90°C is required for insulation around heat generating equipment.)
Fire Hazard Properties	When assessed in accordance with AS/NZS 1530.3	• Ignitability: 0 • Spread of Flame: 0 • Heat Evolved: 0 • Smoke Developed: 1
Non-Combustibility	When assessed to AS 1530.1	Non - Combustible
Sample Specification	The insulation material shall be Bradford Acoustigard Partition Rolls having a material R-Value; Rm….(specify R-Value) @ XXmm….(specify thickness) having a nominal density YYkg/m3 ….(specify density), and shall be deemed non-combustible when tested to AS 1530.1. For installation specifications refer to the relevant Bradford Product Selector.	

Source: https://www.bradfordinsulation.com.au/-/media/bradford/files/acoustigard-rolls-product-technical-statement.pdf

Figure 2. Non-combustibility of materials

Pass	Fail	Not Relevant
• Unfaced stone wool • Unfaced low density or low binder content glasswool insulation • AAC • Masonry	• Expanded or extruded polystyrene • PIR, PUR and phenolic foam • Polyester insulation • Unfaced high density or high binder content glasswool insulation • Faced glasswool or stone wool insulation	• Sarking materials, i.e. roof sarking or wall wrap • Gypsum plasterboard • Fibre cement sheeting

AS 1530 Part 2: Test for Flammability of Materials

Specification 7 in the NCC 2022 outlines the fire hazard property requirements for linings, materials and assemblies in Class 2 to 9 buildings. Fire hazard properties refer to the following properties of a material or assembly that indicate how they behave under specific fire test conditions:

- 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 ($SMOGRA_{RC}$).

Note Table S7C7, which sets out the relevant maximum indices for specific types of materials:

Table S7C7 Other materials

Material or assembly location	Flammability Index	Spread-of-Flame Index	Smoke-Developed Index
Fire control rooms subject to Specification 19 and fire-isolated exits, other than a sarking-type material used in a ceiling or used as an attachment or part of an attachment to a building element. Note 1	N/A	0	2
Class 9b buildings used as a theatre, public hall or the like: Any part of fixed seating in the audience area or auditorium.	N/A	0	5
Class 9b buildings used as a theatre, public hall or the like: A proscenium curtain required by Specification 32.	N/A	0	3
Escalators, moving walkways or non-required non fire-isolated stairway or pedestrian ramps subject to Specification 14.	N/A	0	5
Sarking-type materials: In a fire control room subject to Specification 19 or a fire-isolated exit or fire control room used in the form of an exposed wall or ceiling.	0	N/A	N/A
Sarking-type materials: In other locations. Note 2	5	N/A	N/A
Other materials or locations and insulation materials other than sarking-type material. Notes 2 and 3	N/A	9	8 if the Spread-of-Flame Index is more than 5

Source: https://ncc.abcb.gov.au/editions/ncc-2022/adopted/volume-one/c-fire-resistance/7-fire-hazard-properties

Note that AS1530.2 is concerned with how pliable, thin sheet or woven materials behave when exposed to a naked flame. This is the appropriate standard for assessing the fire hazard performance of sarkings and construction membranes. For flexible sarking-type materials and similar products, a Flammability Index of no greater than 5 is required to comply with fire safety criteria, per NCC Volume 1 Table S7C7.

A sample of the product is ignited using a fixed fuel source and several key measurements are taken. These include the distance and speed at which the flame spreads and the amount of heat produced by the specimen. These measurements are then combined to calculate a Flammability Index for the material, which is a single number representing the material's propensity to spread fire. A lower index (5 or below) typically indicates a material less likely to contribute significantly to flame spread.

Figure 3. Bradford Enviroseal CW is compliant to AS1530.2 (Flammability Index ≤5)

Additional Product Data - AS 4200.1

Duty Classification (AS 4200.1)	Light Wall	
Burst Strength (AS 2001.2.19 and AS 4200.1)	≥ 200 N	
Edge Tear Resistance (TAPPI T470 and AS 4200.1)	≥ 45 N	Machine Direction
	≥ 45 N	Lateral Direction
Folding Endurance (AS 1301.423 and AS 4200.1)	Pass	
Water Control Classification (AS/NZS 4201.4 and AS 4200.1)	Water Barrier	
Vapour Control Classification (ASTM E96 and AS 4200.1)	Class 4 Vapour Permeable	
Air Control Classification (ISO 5636-5 and AS 4200.1)	Air Barrier	
Emittance Classification (AS/NZS 4201.5 and AS 4200.1)	Non-Reflective, 0.9	Inward Facing
	Non-Reflective, 0.9	Outward Facing
Flammability Index (AS 1530.2 and AS 4200.1)	≤ 5 (Low)	
Electrical Conductivity (AS/NZS 3100 Mod. and AS 4200.1)	Non-Conductive	
Resistance to Dry Delamination (AS/NZS 4201.1)	Pass	
Resistance to Wet Delamination (AS/NZS 4201.2)	Pass	
Moisture Shrinkage (AS/NZS 4201.3 and AS 4200.1)	≤ 0.5 %	
Thickness	< 1.0 mm	

Source: https://www.bradfordinsulation.com.au/-/media/bradford/files/enviroseal-cw-and-cw-it-product-technical-statement.pdf

Condensation and other risks can be managed by installing a water barrier membrane with the appropriate vapour permeance for your Climate Zone in Class 2 to 9 buildings. These sarking-type materials do not need to be tested to AS 1530.1 if they meet specific criteria, including not exceeding 1 mm in thickness and having a Flammability Index of 5 or less, allowing their use where non-combustible materials are required (see Clause C2D10(6)(f)).

Fire compliance is determined by a range of factors and testing protocols, each designed to evaluate different aspects of fire behaviour, including combustibility, flame spread and smoke production.

AS/NZS 1530 Part 3: Test for Early Fire Hazard Properties of Materials

Specification 7 in the NCC 2022 Vol. 1 sets out requirements for Smoke-Developed Index (SDI) and Spread-of-Flame (SFI) Index. These properties are determined under AS/NZS 1530 Part 3. The SDI indicates the amount of smoke a material produces as it burns, while the SFI measures the rate at which flames spread once ignited.

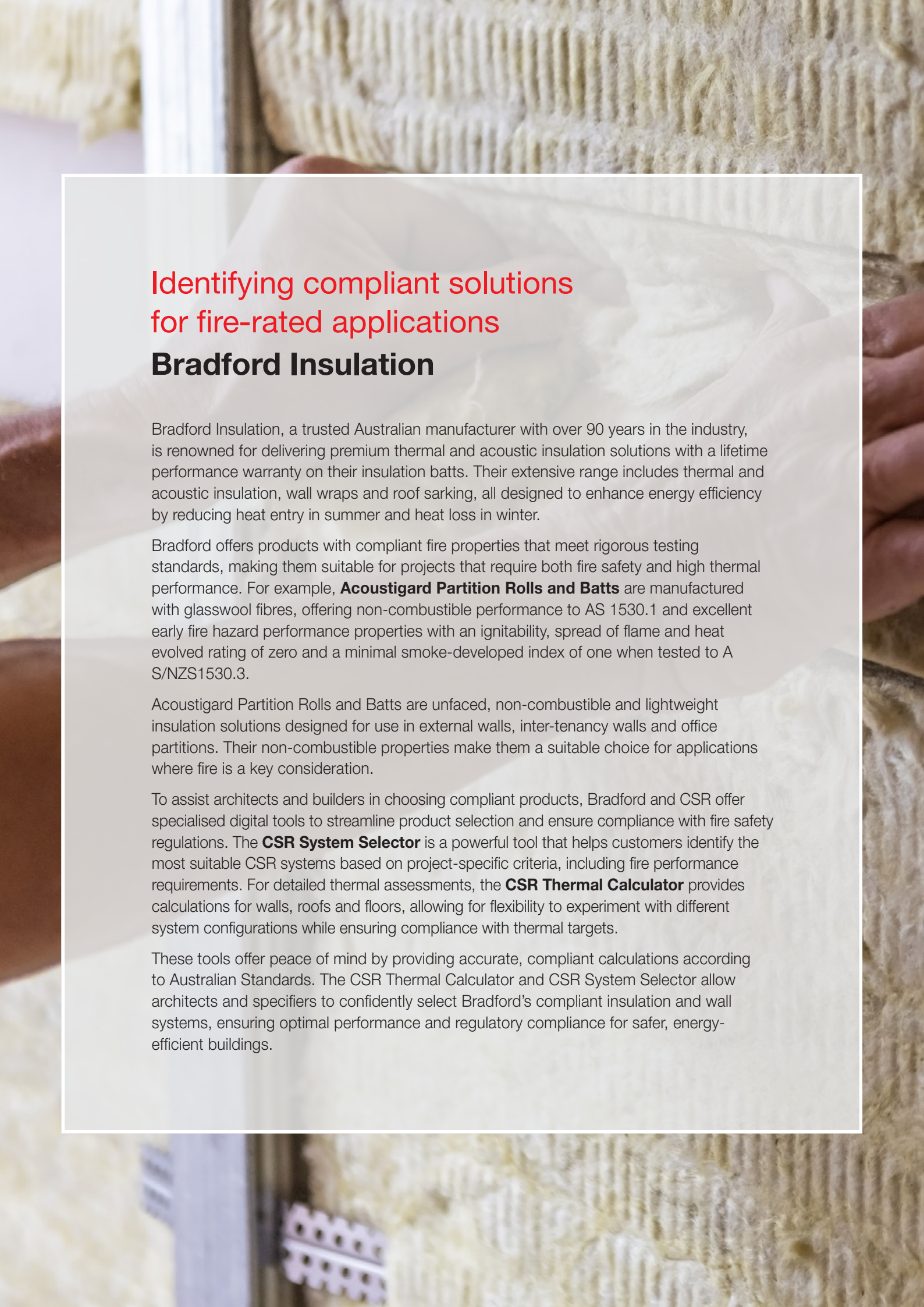
AS/NZS 1530.3 evaluates how a construction component behaves when exposed to an open flame and radiant panel and is applicable to most building materials and components. The AS/NZS 1530.3 test exposes a material sample to radiant heat, measuring ignitability (how easily it catches fire), flame spread (how quickly flames travel across its surface), heat evolved (heat released when burning) and smoke developed. The results generate indices: lower indices indicate better fire performance.

As per Table S7C7 (reproduced above), insulation materials must have a SFI of no more than 9 and an SDI of no more than 8 (if the SFI is above 5).

Figure 4. Bradford Supertel HVAC Boards

Maximum Service Temperature		• 150°C for Unfaced Glasswool
Nominal Density		32 kg/m3
Volatile Organic Compound (VOC) and Formaldehyde Emissions	When tested in accordance with ASTM D5116	• VOC 0.15 mg/m2/hr • Formaldehyde 0.03 mg/m2/h
Fire Hazard Properties	When assessed in accordance with AS/NZS 1530.3	**Plain (Unfaced) Board:** • Ignitability: 0 • Spread of flame: 0 • Heat Evolved: 0 • Smoke Developed: 1 **BMF Faced Board:** • Ignitability: 18 • Spread of flame: 0 • Heat Evolved: 0 • Smoke Developed: 3 **Acoustituff® Faced Board:** • Ignitability: 0 • Spread of flame: 0 • Heat Evolved: 0 • Smoke Developed: 1 **Ultraphon® Faced Blanket:** • Ignitability: 0 • Spread of flame: 0 • Heat Evolved: 0 • Smoke Developed: 3 **Heavy Duty Perforated Faced Board:** • Ignitability: 0 • Spread of flame: 0 • Heat Evolved: 0 • Smoke Developed: 3
UL-181 Burning Test	Insulation 25-100mm thick was assessed in a representative duct section to UL-181's Burning Test, as an indication of how it will perform when the assembled duct undergoes the test. AS 4254.1 and AS 4254.2 require the full duct assembly to be tested to UL 181. (NCC 2019 Volume 1 Amend. 1, Specification C1.10 Clause 5, NCC 2022 Volume 1 S7C5). Insulation satisfies criteria as an indicative test only – specific testing of the final assembly is necessary for the duct to meet Australian Standard requirements.	

Source: https://www.bradfordinsulation.com.au/-/media/bradford/files/supertel-hvac-boards-product-technical-statement.pdf



Identifying compliant solutions for fire-rated applications

Bradford Insulation

Bradford Insulation, a trusted Australian manufacturer with over 90 years in the industry, is renowned for delivering premium thermal and acoustic insulation solutions with a lifetime performance warranty on their insulation batts. Their extensive range includes thermal and acoustic insulation, wall wraps and roof sarking, all designed to enhance energy efficiency by reducing heat entry in summer and heat loss in winter.

Bradford offers products with compliant fire properties that meet rigorous testing standards, making them suitable for projects that require both fire safety and high thermal performance. For example, **Acoustigard Partition Rolls and Batts** are manufactured with glasswool fibres, offering non-combustible performance to AS 1530.1 and excellent early fire hazard performance properties with an ignitability, spread of flame and heat evolved rating of zero and a minimal smoke-developed index of one when tested to A S/NZS1530.3.

Acoustigard Partition Rolls and Batts are unfaced, non-combustible and lightweight insulation solutions designed for use in external walls, inter-tenancy walls and office partitions. Their non-combustible properties make them a suitable choice for applications where fire is a key consideration.

To assist architects and builders in choosing compliant products, Bradford and CSR offer specialised digital tools to streamline product selection and ensure compliance with fire safety regulations. The **CSR System Selector** is a powerful tool that helps customers identify the most suitable CSR systems based on project-specific criteria, including fire performance requirements. For detailed thermal assessments, the **CSR Thermal Calculator** provides calculations for walls, roofs and floors, allowing for flexibility to experiment with different system configurations while ensuring compliance with thermal targets.

These tools offer peace of mind by providing accurate, compliant calculations according to Australian Standards. The CSR Thermal Calculator and CSR System Selector allow architects and specifiers to confidently select Bradford's compliant insulation and wall systems, ensuring optimal performance and regulatory compliance for safer, energy-efficient buildings.

Meet your fire performance requirements with Bradford

Product	Product Information	1530.1	1530.2	1530.3	Fire hazard properties (NCC 2022)
Bradford Anticon and Anticon High Performance Roofing Blanket	Anticon is a foil-faced glasswool insulation blanket with light, medium or heavy-duty facing options and high density options. Designed for metal roof applications for thermal and acoustic performance.	Not classified as non-combustible in accordance with AS1530.1 and is not suitable for use where non-combustible material is required.	N/A (Not applicable)	Ignitability: 0 Spread of flame: 0 Heat Evolved: 0 Smoke Developed: 1	When assessed to AS/NZS 1530.3, this product does not exceed the 'Spread of Flame' or 'Smoke Developed' indices of Table S7C7.
Bradford Building Blanket	Glasswool Building Blanket is an unfaced lightweight insulation product that provides effective thermal and acoustic insulation properties.	Non-combustible	N/A (Not applicable)	Ignitability: 0 Spread of flame: 0 Heat Evolved: 0 Smoke Developed: 1	When assessed to AS/NZS 1530.3 this product does not exceed the 'Spread of Flame' or 'Smoke Developed' indices of Table S7C7.
Bradford Fireseal including Party Wall Batts, Party Wall Sealer, Party Wall Batten Fillers	Bradford Fireseal is made from non-combustible stone wool, which is specifically designed to meet the fire protection requirements for inter-tenancy walls in Class 1 multi-residential applications.	Non-combustible	N/A (Not applicable)	Ignitability: 0 Spread of flame: 0 Heat Evolved: 0 Smoke Developed: 1	When assessed to AS/NZS 1530.3 this product does not exceed the 'Spread of Flame' or 'Smoke Developed' indices of Table S7C7.
Thermoseal Roof Metal Wall	Thermoseal Roof Metal Wall is non-permeable, Class 2 vapour-barrier and water-barrier reflective sarking for use under metal roofs for protection against the elements and additional thermal performance.	This product may be used in accordance with the non-combustible sarking-type material exemption stated in NCC 2022 Volume 1 C2D10(6)(f) and NCC 2022 Volume 2 H3D2(1)(f) – it does not exceed 1mm in thickness and has a Flammability Index ≤5.	Flammability Index (AS 1530.2 and AS 4200.1) ≤ 5 (Low)	N/A (Not applicable)	Meets the fire hazard property requirements for sarking-type materials in all locations except exposed installations in fire control rooms or fire-isolated exits, in NCC 2022 Volume 1 S7C7.The product meets these requirements by having a flammability index ≤5.
Acoustigard Batts and Partition Rolls	Acoustigard Partition Batts and Rolls are non-combustible glasswool for thermal and acoustic insulation in internal or external partitions and walls.	Non-combustible	N/A (Not applicable)	Ignitability: 0 Spread of flame: 0 Heat Evolved: 0 Smoke Developed: 1	When assessed to AS/NZS 1530.3 this product does not exceed the 'Spread of Flame' or 'Smoke Developed' indices of Table S7C7.
Enviroseal CW	Enviroseal CW is a Light Wall duty, Class 4 vapour permeable wall wrap that allows the controlled transmission of water vapour from within the building whilst restricting the ingress of liquid water and air. Suitable for use with brick, timber, steel, fibre cement and Hebel.	This product may be used in accordance with the non-combustible sarking-type material exemption stated in NCC 2022 Volume 1 C2D10(6)(f) and NCC 2022 Volume 2 H3D2(1)(f) – it does not exceed 1mm in thickness and has a Flammability Index ≤5.	Flammability Index (AS 1530.2 and AS 4200.1) ≤ 5 (Low)	N/A (Not applicable)	Meets the fire hazard property requirements for sarking-type materials in all locations except exposed installations in fire control rooms or fire-isolated exits, in NCC 2022 Volume 1 S7C7. The product meets these requirements by having a flammability index ≤5.
Fibertex Board and Blanket Bradford	Fibertex Board and Blanket is a range of stone wool products specifically designed for non-combustible, general purpose industrial applications where fire and thermal properties are required.	Non-combustible	N/A (Not applicable)	Ignitability: 0 Spread of flame: 0 Heat Evolved: 0 Smoke Developed: 1	When assessed to AS/NZS 1530.3 this product does not exceed the 'Spread of Flame' or 'Smoke Developed' indices of Table S7C7.

Bradford™ | CSR