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REPORT NO: ACA – 120319

**INSULATION AUSTRALASIA COMPLIANCE PROGRAM -
STAGE 1: CHECKLIST OF REQUIREMENTS TO
AS/NZS 4859.1 & NCC 2012**

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EXECUTIVE SUMMARY

To be considered for Insulation Australasia (IA) membership, applicants must substantiate compliance to the relevant Australian and New Zealand Standards, and National Construction Code (NCC). Compliance with the NCC, and the insulation product standard AS/NZS4859.1 is demonstrated by fulfilling *evidence of suitability* requirements.

A three-stage process has been identified to ensure all necessary compliance aspects are considered to the satisfaction of the IA Board.

Stage 1 requirements are addressed in this report.

Stage 1 involves providing a checklist for each product classification, listing the compliance requirements of AS/NZS 4859.1, and the National Construction Code 2012. Each checklist provides a consistent interpretation for confirming IA evidence of suitability requirements for insulation products in their intended applications.

Stage 2 involves identification of the options available to IA members for demonstrating compliance with the Stage 1 requirements. Stage 2 will be delivered through the integration of services provided by testing authorities, certification authorities, and industry professionals. It will include estimates of time and costs associated with dealing with these providers, and demonstrate how these functions should work together. At the completion of Stage 2, IA members will be in a position to make an informed decision regarding the most appropriate route for their business.

Stage 3 involves IA members choosing their preferred means of compliance with IA guidelines. It will be a tailored solution to suit specific, manufacturing footprint, product classification(s), market share, target market, and budgeting requirements. In all cases, the Stage 1 and Stage 2 deliverables provide the building blocks to compile manufacturers supporting documentary evidence including, product test reports, technical literature, quality system, and installation instructions.



1	INSULATION AUSTRALASIA COMPLIANCE PROGRAM.....	6
2	SCOPE.....	7
3	CHECKLISTS	7
4	AS/NZS 4859.1 -2002, Amdt.1 - 2006.....	9
4.1	Product Classifications.....	9
4.2	Requirements.....	12
5	NCC 2012 INSULATION REQUIREMENTS	12
5.1	NCC Volume 1, Building Code of Australia 2012, Class 2 to 9 Buildings:.....	12
5.2	NCC Volume 2, Building Code of Australia 2012, Class 1 and 10 Buildings:	17
6	FUTURE WORK - STAGE 2 & STAGE 3.....	20
7	SUMMARY.....	21
8	APPENDIX A: FORMED SHAPES CHECKLIST	22
8.1	AS/NZS 4859.1 Requirements.....	22
8.2	NCC 2012, BCA Vol.1 Requirements	25
8.3	NCC 2012, BCA Vol.2 Requirements	28
9	APPENDIX B: FORMED IN-SITU CHECKLIST	30
9.1	AS/NZS 4859.1 Requirements.....	30
9.2	NCC 2012, BCA Vol.1 Requirements	33
9.3	NCC 2012, BCA Vol.2 Requirements	36
10	APPENDIX C: LOW DENSITY FIBROUS CHECKLIST	38
10.1	AS/NZS 4859.1 Requirements.....	38
10.2	NCC 2012, BCA Vol.1 Requirements	42
10.3	NCC 2012, BCA Vol.2 Requirements	46
11	APPENDIX D: LOOSE FILLS CHECKLIST	47
11.1	AS/NZS 4859.1 Requirements.....	47
11.2	NCC 2012, BCA Vol.1 Requirements	51
11.3	NCC 2012, BCA Vol.2 Requirements	53
12	APPENDIX E: REFLECTIVE INSULATION CHECKLIST	54
12.1	AS/NZS 4859.1 Requirements.....	54
12.2	NCC 2012, BCA Vol.1 Requirements	59
12.3	NCC 2012, BCA Vol.2 Requirements	64
13	APPENDIX F: LARGE SCALE CHECKLIST	66
13.1	AS/NZS 4859.1 Requirements.....	66



13.2 NCC 2012, BCA Vol.1 Requirements 69

13.3 NCC 2012, BCA Vol.2 Requirements 72



1 INSULATION AUSTRALASIA COMPLIANCE PROGRAM

Insulation Australasia (IA), a product agnostic industry association established in September 2011 to promote the pivotal role of thermal insulation in building energy efficiency.

Underpinned by industry best-practice in product compliance and installation methods, IA membership is open to manufacturers, importers and installers. To be considered for membership, applicants must substantiate compliance to the relevant Australian and New Zealand Standards, and National Construction Code (NCC) requirements.

Within the context of the NCC and the insulation product standard AS/NZS4859.1, evidence of suitability may be demonstrated via a number of means. Variations in the methods used by registered authorities and certifying professionals has resulted in variable quality in the evidence of suitability presented to the IA Board.

To address this variability, and demonstrate compliance with requirements to the satisfaction of IA, provisions are proposed to ensure:

1. Test certificates are issued by a recognised testing laboratory as defined by AS/NZS 4859.1.
2. Testing is performed on finished product, that the product description accurately matches the product, and that the test certificate is not more than 2 years old.
3. Test samples are selected in accordance with the stated test methodology.
4. Packaging and labelling is independently verified to AS/NZS 4859.1 requirements.
5. Certifying organisations conduct annual audits, and update their online Certifications Lists accordingly to ensure all certification is current.
6. Certified product manufacturing specifications are reviewed annually for modifications that require re-submission of test data.
7. Full manufacturing and product audits occur at least every three (3) years to ensure ongoing compliance to ISO Guide 65.
8. Calculations of performance, particularly for Total R-Values, are endorsed by a registered testing authority.
9. Product applications are indeed 'buildable' (e.g. not claiming 80mm airspace under a 40mm roof batten).



10. The suitability qualified person/certification body cites all relevant requirements of the NCC when assessing a product's fitness for purpose for nominated applications.
11. All references to StandardsMark™ include the member company's accreditation number, which also appears on the certifying company's website.

However, these targets are not achievable without an IA agreed interpretation of the NCC and AS/NZS 4859.1 requirements for each product classification. This report addresses these criteria to provide members with a consistent interpretation of the evidence of suitability required by accredited organisations and certifying professionals.

2 SCOPE

To provide an interpretation of the NCC and AS/NZS 4859.1 requirements for each insulation product classification as defined by AS/NZS 4859.1 – Materials for the thermal insulation of buildings, Clause 2.3.2 and Clause 9.2.

To provide individual check lists for each product classification for demonstrating compliance with the mandatory regulatory requirements by drilling down to address specific NCC and Australian Standards requirements (e.g. fire performance indices, corrosion performance, water absorption, permeability, etc.) as applicable.

It is expected that this report will provide members with a consistent interpretation that may be used by accrediting organisations and certifying professionals to confirm evidence of suitability for products and their applications.

3 CHECKLISTS

Individual checklists are provided for each Product Classification in the Appendices A to F. They include those requirements specific to that product classification in accordance with;

- AS/NZS 4859.1,
- NCC 2012, BCA Vol.1, and
- NCC 2012, BCA Vol.2.



By using these checklists, members, testing laboratories, certification authorities, appraisal organizations, and consultants, may determine the minimum compliance requirements of each product classification for its intended application. This will ensure consistency and completeness in third-party evaluations of the minimum regulatory compliance requirements in accordance with Insulation Australasia guidelines.

This document will be used as an initiation point to guide Insulation Australasia members testing, certification and appraisal process requirements for product testing, documentation, and certification to relevant Australian Standards as determined by the National Construction Code (NCC).

It will be used as a reference to develop a common understanding of the regulatory compliance requirements for documents used to fulfil the *Evidence of Suitability*, between Insulation Australasia Members, and;

- Registered Testing Authorities;
 - o registered by the National Association of Testing Authorities (NATA), to test in the relevant field; or
 - o outside Australia registered by an authority recognised by NATA through a mutual recognition agreement; or
 - o recognised as being a Registered Testing Authority under legislation at the time the test was undertaken.
- Product Certification Body accredited by JAS-ANZ
- Certification authorities,
- Appraisal organizations,
- Professional Engineers, and
- Other appropriately qualified persons.

Such documents include:

- Certificate of Conformity issued under the ABCB (CodeMark) scheme,
- Certificate of Accreditation issued by a State or Territory accreditation authority, or
- Report issued by a *Registered Testing Authority*, showing that the material or form of construction has been submitted to the tests listed in the report, and setting out the results



of those tests and any other relevant information that demonstrates its suitability for use in the building.

- Certificate from a *professional engineer* or *other appropriately qualified person* that certifies that a material, design, or form of construction complies with the requirements of the BCA; and sets out the basis on which it is given and the extent to which relevant specifications, rules, codes of practice or other publications have been relied upon.

4 AS/NZS 4859.1 -2002, Amdt.1 - 2006

AS/NZS 4859.1 – *Materials for the thermal insulation of buildings* specifies requirements and methods of test for thermal insulating materials. As AS/NZS 4859.1 is a primary reference document of the National Construction Code 2012 Volumes 1 and 2, insulation materials that are installed in applications governed by the NCC must conform to the requirements of this standard.

This standard does not deal with performance requirements for systems or materials that have some primary function other than providing thermal insulation (e.g. sarking, structural panels, etc.).

Although this standard covers thermal performance of insulation, there are other requirements in the NCC, or elsewhere, for the same material to have other properties such as for acoustic isolation or fire properties. In a regulatory situation, a requirement for thermal performance cannot compromise any other required performance.

4.1 Product Classifications

Insulation materials or assemblies are classified in AS/NZS 4859.1. Different testing requirements apply to each classification subject to the particular performance aspects specific to each classification. Product classifications are defined in AS/NZS 4859.1, Clause 2.3.2. Product classifications may be applied to all unspecified products and materials according to definable characteristics. In addition, Reflective Insulation are sub-divided into Product Groups 1 to 7 are defined in AS/NZS 4859.1, Clause 9.2.



The definitions of Product Classifications and Product Groups include:

4.1.1 Formed Shapes

Self-supporting materials that do not have reflective (solar or infrared) external surfaces, that may combine reflective and bulk materials, where all bulk insulations supplied not supplied compression packaged. E.g. Panels, sheets, complete building elements, and other assemblies.

4.1.2 Formed In-situ

E.g. Paints, Coatings, Sprayed fibres, Foamed in-situ plastics.

4.1.3 Low Density Fibrous

Pre-formed, including blanket, cut into pieces, usually compression packaged bulk insulation compressed rolls and batts. E.g. Rockwool, Glasswool, Polyester, Sheep's Wool.

4.1.4 Loose Fills

Granular or loose, could compact under load. E.g. Cellulose fibre, Vermiculite, Sheep's wool, Glasswool, Rockwool, and Expanded Beads.

4.1.5 Reflective Insulation

Insulation that incorporates a reflective metallic surface, including formed shapes or low density fibrous, incorporating a reflective surface, reflective foil insulation, reflective claddings, foil-faced bulk insulation. Reflective insulations are divided into 7 groups dependent on their composition and application.

Group 1: Pliable building membranes

Pliable building membranes that have at least one reflective surface. If the products within this group are installed facing an appropriate airspace, they may provide thermal insulation. If they are marketed for this property, the requirements of this Standard shall apply.

NOTE: These products are often intended to have a prime function as a sarking or vapour



barrier. For this application, test methods, performance classifications and installation requirements are covered by AS/NZS 4200.1 and AS/NZS 4200.2.

Group 2: Single Sheet Segmented Reflective Pliable Membranes

Single sheet segmented reflective pliable membranes for installation between structural members (such as folded single sheet foil laminate).

Group 3: Multiple Layered Segmented Reflective Pliable Membranes

Multiple layers of segmented reflective pliable membranes, formed and assembled to give multiple reflective airspaces for installation between and over structural members.

Group 4: Reflective Material Bonded to Rigid Insulation or Support

Reflective material bonded directly, or via a substrate, to a rigid insulation or support to provide a product in sheet form for application to structural members.

Group 5: Reflective Material Bonded to Pliable Non-Reflective Insulating Material

Reflective material bonded directly or via a substrate to a pliable non-reflective insulating material, for installation between or over structural members or in a continuous length.

Group 6: Reflective Material Bonded to the Inside of Individual Wall Cladding Sheet

Reflective material bonded directly or via a substrate to the inside of individual wall cladding sheets (metal or plastic), weatherboard type.

Group 7: Reflective Material Bonded to the Underside of a Metal Cladding Sheet

Reflective material bonded directly, or via a substrate, to the underside of a metal roof or wall sheet.

4.1.6 Large Scale

Materials that do not permit thermal resistance measurement on a small scale: E.g. assemblies that ‘repeat’ on a scale too big to measure a representative area.



4.2 Requirements

Specific requirements for individual materials or insulation types are given in AS/NZS 4859.1 Sections 5 to 9, and in Standards for Rigid Cellular Insulations governed by AS 1366.1 (polyurethane), AS 1366.2 (polyisocyanurate), AS 1366.3 (moulded polystyrene), AS 1366.4 (extruded polystyrene), and AS 4073 (in-situ set urea-formaldehyde foam). Note that where a conflict exists, the requirements of AS/NZS 4859.1 override those of these standards.

Materials or assemblies that do not fall within the scope of AS/NZS 4859.1 Sections 5 to 9, or one of, AS 1366.1 (polyurethane), AS 1366.2 (polyisocyanurate), AS 1366.3 (moulded polystyrene), AS 1366.4 (extruded polystyrene), and AS 4073 (in-situ set urea-formaldehyde foam), are only required to comply with Sections 1 to 4. In addition, alternative means for demonstrating compliance are shown in AS/NZS 4859.1, Appendix A. These are outside the scope of the current 'Stage 1' project.

5 NCC 2012 INSULATION REQUIREMENTS

Based on a review of the National Construction Code 2012, BCA Volumes 1 and 2, clauses containing *Deemed-to-Satisfy* (DtS) requirements for insulation products are listed below.

It should be noted that *Alternative Solutions* are available to demonstrate compliance with the performance requirement(s) relevant to each of the DtS provisions.

5.1 NCC Volume 1, Building Code of Australia 2012, Class 2 to 9 Buildings:

5.1.1 A1.1 Definitions

Sarking-type material means a material such as a reflective insulation or other flexible membrane of a type normally used for a purpose such as water proofing, vapour proofing or thermal reflectance.

Reflective insulation means a building membrane with a reflective surface such as a reflective foil laminate, reflective barrier, foil batt or the like capable of reducing radiant heat flow.



Designated bushfire prone area means land which has been designated under a power in legislation as being subject, or likely to be subject, to bushfires.

5.1.2 A2.2 Evidence of suitability

Evidence supporting the use of a material or form of construction meets a Performance Requirement or a Deemed-to-Satisfy Provision, may be in the form of one or a combination of the following:

- A report issued by a Registered Testing Authority, showing that the material or form of construction has been submitted to the tests listed in the report, and setting out the results of those tests and any other relevant information that demonstrates its suitability for use in the building.
- A certificate from a professional engineer or other appropriately qualified person which;
 - o certifies that a material, design, or form of construction complies with the requirements of the BCA; and
 - o sets out the basis on which it is given and the extent to which relevant specifications, rules, codes of practice or other publications have been relied upon.
- Any other form of documentary evidence that correctly describes the properties and performance of the material.

5.1.3 A2.4 Fire hazard properties

Where a building component or assembly is required to have a fire hazard property, e.g. Average Specific Extinction Area, Flammability Index, Smoke-Developed Index, or Spread-of-Flame Index, it must be determined as outlined in the following sections.

5.1.4 Specification A2.4 Fire Hazard Properties

2.2 Form of test: Tests for Spread-of-Flame Index and Smoke-Developed Index must be carried out in accordance with AS/NZS 1530.3.



5.1.5 C1.10 Fire Hazard Properties

For Class 2 to 9 buildings, the fire hazard properties of Specification C1.10 must be complied with for materials used:

- As wall or ceiling linings and their attachments,
- In air-handling ductwork
- As sarking-type materials, and
- As insulation materials.

Paint or fire retardant coatings must not be used to achieve this compliance.

This requirement does not apply to roof insulating material applied in continuous contact with a substrate, or for any other material that does not significantly increase the hazards of fire.

5.1.6 C1.12 Non-combustible materials

A bonded laminated material may be deemed non-combustible if:

- each laminate is non-combustible; and
- each adhesive layer does not exceed 1 mm in thickness; and
- the total thickness of the adhesive layers does not exceed 2 mm; and
- the Spread-of-Flame Index and the Smoke-Developed Index of the laminated material as a whole does not exceed 0 and 3 respectively.

5.1.7 Specification C1.1 Fire-Resisting Construction

2.4 Attachments not to impair fire-resistance: A combustible material may be used as a finish or lining to a wall or roof if the material is exempted under C1.10 or complies with the fire hazard properties prescribed in Specification C1.10; and it is not located near or directly above a required exit so as to make the exit unusable in a fire; and it does not otherwise constitute an undue risk of fire spread via the facade of the building. In any case, the attachment of a facing or finish, or the installation of ducting or any other service, to a part of a building required to have an FRL must not impair the required FRL of that part.



5.1.8 Specification C1.10 Fire Hazard Properties

A material used as a finish, surface, lining or attachment to a wall or ceiling must achieve a group number determined by testing to either AS ISO 9705; or AS/NZS 3837 of Group 1, Group 2, or Group 3. This designation is used in accordance with Specification C1.10, Table 3 to determine valid applications for the different classes of buildings.

For buildings not fitted with a sprinkler system complying with Specification E1.5, a material must also achieve a smoke growth rate index (SMOGR_{RC}) of not more than 100, or an average specific extinction area less than 250 m²/kg.

Sarking-type material installed as an exposed wall or ceiling lining in a fire control room or fire-isolated exit, shall achieve a 0 (zero) maximum flammability index.

Sarking-type material installed as an exposed wall or ceiling lining in other locations shall achieve a flammability index of not greater than 5.

Insulation materials other than sarking-type materials installed as an exposed wall or ceiling lining shall achieve a Spread of Flame Index of 9, or a Smoke Developed Index of 8, if the Spread of Flame Index is more than 5.

5.1.9 C2.7 Separation by fire walls

Sarking-type material may pass through or cross the fire wall. Other insulation materials must demonstrate the required fire resisting performance of the fire wall is maintained.

5.1.10 F1.6 Sarking

Sarking-type materials used for weatherproofing of roofs and walls must comply with AS/NZS 4200 Parts 1 and 2.

5.1.11 G5 Construction in bushfire prone areas

In a designated bushfire prone area, a Class 2 or 3 building; or a Class 10a building associated with a Class 2 or 3 building, must comply with AS 3959 which requires sarking-type materials to have a Flammability Index not greater than 5.



5.1.12 J1.2 Thermal construction — general

Insulation material:

- must comply with AS/NZS 4859.1, and
- be installed so that it
 - o abuts or overlaps adjoining insulation other than at supporting members such as studs, noggins, joists, furring channels and the like where the insulation must be against the member; and
 - o forms a continuous barrier with ceilings, walls, bulkheads, floors or the like that inherently contribute to the thermal barrier; and
 - o does not affect the safe or effective operation of a service or fitting.

Reflective insulation must be installed with;

- the necessary airspace to achieve the required R-Value between a reflective side of the reflective insulation and a building lining or cladding; and
- be closely fitted against any penetration, door or window opening; and
- adequately supported by framing members; and
- each adjoining sheet of roll membrane be overlapped not less than 50 mm, or taped together.

Bulk insulation must be installed so that:

- it maintains its position and thickness, other than where it is compressed between
- cladding and supporting members, water pipes, electrical cabling or the like; and
- in a ceiling, where there is no bulk insulation or reflective insulation in the wall beneath, it overlaps the wall by not less than 50 mm.

5.1.13 Specification J5.2 Air-conditioning and ventilation systems

Insulation of ductwork and fittings, used for heating or cooling, including evaporative cooling, must comply with AS/NZS 4859.1.

5.1.14 Specification J5.4 Insulating of piping, vessels, heat exchangers and tanks

Insulation provided on piping, vessels, heat exchangers and tanks must comply with AS/NZS 4859.1.



5.2 NCC Volume 2, Building Code of Australia 2012, Class 1 and 10 Buildings:

Volume Two of the Building Code of Australia contains requirements for Class 1 and 10a buildings. These include detached houses and attached dwellings separated by a fire resisting wall.

5.2.1 1.1.1 Definitions

Flammability Index means the index number determined under AS 1530.2.

Reflective insulation means a building membrane with a reflective surface such as a reflective foil laminate, reflective barrier, foil batt or the like capable of reducing radiant heat flow.

Sarking-Type Material means a material such as a reflective insulation or other flexible membrane of a type normally used for a purpose such as waterproofing, vapour proofing or thermal reflectance.

5.2.2 1.2.4 Early Fire Hazard Indices

Where a Deemed-to-Satisfy Provision requires a building component or assembly to have an Early Fire Hazard Index, it must be determined in accordance with Specification A2.4 of BCA Volume One (e.g. Tested in accordance with AS 1530.2, AS/NZS 1530.3, AS ISO 9705, AS/NZS 3837 etc.).

5.2.3 3.5.1.2 Roof tiling

Sarking must be installed under tiled roofs in accordance with BCA Vol.2, Table 3.5.1.1b which specifies minimum rafter length and roof pitch limitations for this requirement.

Where sarking is installed, an anti-ponding device/board must be provided on roofs with pitches of less than 20 degrees; and on all roof pitches where there is no eaves overhang; and be fixed along the eaves line from the top of the fascia back up the rafter with a clearance of approximately 50 mm below the first batten.



5.2.4 3.7.1.5 Construction of external walls

Where sarking is installed it must be located so that ponding of water is avoided between the fascia and the first roofing batten (see BCA Vol.2, Figure 3.7.1.3, for typical construction of external walls).

5.2.5 3.7.1.8 Separating walls

Roof sarking may cross a separating wall where the building requires non-combustible roof covering, to the underside of the roof covering.

5.2.6 3.7.1.9 Fire hazard properties

The fire hazard properties of materials used in buildings require sarking-type materials used in the roof must have a flammability index not greater than 5.

5.2.7 3.7.4.0 Bushfire Areas

Performance Requirement P2.3.4 is satisfied if buildings located in a designated bushfire prone area are constructed in accordance with AS 3959. AS 3959 requires “sarking” to have a flammability index of not greater than 5.

5.2.8 3.12.0 Application of Part 3.12

Performance Requirement P2.6.1 for the thermal performance of the building is satisfied by complying with 3.12.1.1, for building fabric thermal insulation.

5.2.9 3.12.1.1 Building fabric thermal insulation

Insulation must comply with AS/NZS 4859.1 and be installed so that it;

- abuts or overlaps adjoining insulation other than at supporting members such as columns, studs, noggins, joists, furring channels and the like where the insulation must butt against the member; and
- forms a continuous barrier with ceilings, walls, bulkheads, floors or the like that inherently contribute to the thermal barrier; and
- does not affect the safe or effective operation of a domestic service or fitting.



Reflective insulation must be installed;

- with the necessary airspace, to achieve the required R-Value between a reflective side of the reflective insulation and a building lining or cladding; and
- closely fitted against any penetration, door or window opening; and
- adequately supported by framing members; and
- with each adjoining sheet of roll membrane overlapped not less than 150 mm; or taped together.

Bulk insulation must be installed;

- so that it maintains its position and thickness, other than where it crosses roof battens, water pipes, electrical cabling or the like; and
- in a ceiling so that it overlaps all uninsulated external walls by not less than 50 mm.

5.2.10 3.12.5.1 Insulation of services

Thermal insulation for central heating, water piping and heating and cooling ductwork must comply with AS/NZS 4859.1.

It must be protected against the effects of weather and sunlight; and be able to withstand the temperatures within the piping or ductwork.



6 FUTURE WORK - STAGE 2 & STAGE 3

While this report defines the mandatory requirements for each of the insulation product classifications to the NCC 2012 and AS/NZS 4859.1, it represents the first stage of the three-stage process to comply with the Insulation Australasia guidelines as outlined in the scope of this document.

Stage 2 involves identification of the options available to IA members for demonstrating compliance with the guidelines. This will be through a combination of expertise delivered by:

- Registered testing authorities,
- JAS-ANZ accredited product certification bodies,
- Certification authorities,
- Appraisal organizations,
- Professional engineers, and
- Other appropriately qualified persons.

Stage 2 should include estimates of the time and costs associated with each of these organisations, and provide examples to demonstrate how these very different organisations work together to be able to deliver an individual outcome to suit the specific requirements of each IA member.

At the completion of stage 2, the IA membership will be in a position to make an informed decision regarding the most appropriate route for demonstrating compliance to the satisfaction of IA requirements.

Stage 3 of the process involves individual members choosing the means of demonstrating compliance with the IA guidelines by tailoring a service to suit their specific product classification(s), manufacturing facilities, market share, target market, and budgeting requirements. All compliance routes will require manufacturers supporting documentary evidence which, for example will consist of quality systems, product test reports, technical literature and installation instructions.



7 SUMMARY

Information sourced from the National Construction Code, BCA Vol.1 and Vol.2, and selected primary referenced documents, has been used to create a series of checklists targeted at the specific compliance requirements of NCC 2012 for each insulation product classification.

This represents the completion of Stage 1 of a proposed 3-Stage compliance process designed to provide Insulation Australasia with the information required for demonstrating compliance with the mandatory requirements of AS/NZS 4859.1, and NCC 2012.

Notes:

1. Acronem Consulting Australia Pty Ltd (Acronem) shall not be liable for loss, cost, damages or expenses incurred by the client or any other person or company, resulting from the use of any information or interpretation given in this report.
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8 APPENDIX A: FORMED SHAPES CHECKLIST

Self-supporting materials that do not have reflective (solar or infrared) external surfaces, that may combine reflective and bulk materials, where all bulk insulations supplied not supplied compression packaged. Eg. Panels, sheets, complete building elements, and other assemblies.

8.1 AS/NZS 4859.1 Requirements

AS/NZS 4859.1 supersedes the requirements of:

- AS 2463, Sea grass bulk thermal insulation.
- AS 2464 Part 1, Corrosiveness of thermal insulation,
- AS 2464 Part 5, Steady state thermal transmission properties by means of a heat flow meter, and
- AS 2464 Part 6, Steady state thermal transmission properties by means of the guarded hotplate.

8.1.1 *Shall be suitable for the purpose*

Consideration shall be given to, known safety issues, freedom from objectionable odour, and the influence of aging.

8.1.2 *Demonstration of Compliance – Testing and Calculation*

Where a performance is measured by testing, it shall be performed by a recognised laboratory.

Where a performance is calculated, the calculations shall be performed by an appropriately qualified person, and shall be endorsed by a recognized laboratory.

Test results for a product shall be valid for a maximum of 5 years, or until a change in formulation or design. Test results shall be reported to include factors affecting heat flow including, temperatures, airflows, ventilation, convection, dimensions, orientation, statement of compliance with the test method employed, all reporting requirements of the test method, statement of accreditation held by the laboratory, statement of compliance with AS/NZS 4859.1, conditions of validity.

Where compliance with AS/NZS 4859.1 is claimed, the claimant shall provide:



- Details of the means of compliance.
- Copies of the test and calculation reports upon request.
- For each test:
 - o The name of the testing laboratory
 - o The date of test
 - o Identification of the test standard and procedure, including the allowances for factors affecting performance.
 - o Test report numbers
 - o The type of recognition held by the laboratory to perform the test.
- For each calculation:
 - o The name of the person who performed the calculation.
 - o The date of calculation
 - o The temperature conditions, including the allowances for factors affecting performance.
 - o The report number
 - o The name of the testing laboratory that has endorsed the report.
 - o A signed dated stamp of acceptance of the calculation by the testing laboratory.
 - o The type of recognition held by the laboratory to perform the test.

8.1.3 Thermal Properties

Formed Shapes thermal properties shall be determined by testing to ASTM C177, C335, C158, C1363, ISO 8301, 8302, 8990, performed for appropriate environmental and installation conditions including temperatures, airflows, radiant energy, dimensions and orientation, moisture content, material uniformity.

As an alternative to ASTM C335, the Material R-value of pre-formed pipe insulation may be calculated on the basis of a planar section of insulation of the same specification.

8.1.4 Corrosiveness

Materials and assemblies shall not increase the risk of corrosion damage to building structures, and shall be non-corrosive when tested in accordance with AS/NZS 4859.1 Appendix H.

8.1.5 Packaging

Packaging shall provide adequate protection during handling, transport and storage. Packaging shall not degrade performance of the product once removed from packaging.



8.1.6 Labelling

Labels shall include at least one of the terms “R”, “R-value”, “Thermal Resistance”, combined with the term “Declared”, and one of the terms “Material”, “System”, or “Total”.

The declared R-value shall be the long-term value accounting for de-rating from aging or environmental factors. Declared R-value shall be reported to two significant figures.

Where the product is supplied for retail sale labelling shall be provided with each package. Where product is not supplied in packaged quantities documentation shall be supplied that conveys the same information as that required on a label. All required labelling information shall be conspicuous.

Labelling shall include:

- Product Name
- Description of Contents
- Name and Address of Manufacturer
- Batch identification or other traceability information
- Safety Instructions
- A statement of compliance with AS/NZS 4859.1.
- One or more declared R-values ($\text{m}^2\cdot\text{K}/\text{W}$), accompanied by a clear statement as to the conditions under which it/they apply, and preceded by one or more of the qualifiers ‘Total’, ‘System’, or ‘Material’ as appropriate. When ‘heat flow up’ and ‘heat flow down’, or ‘Summer’ and ‘Winter’ R-values are different, all values shall be quoted with equal emphasis and prominence.
- Number of pieces.
- Nominal total area (m^2)
- Nominal length, width and thickness of each piece.
- Nominal net weight of contents or supplied quantity (kg).
- A Statement “the Total R-value depends on installation and may be greater than or less than the R-value of the product”.
- Declared Material R-value

8.1.7 Safety Instructions

Where applicable, safety instructions shall include one of the following statements.



“Caution: Electric cables and equipment partially or completely surrounded with bulk thermal insulation may overheat and fail. This applies to wiring installed prior to 1989. Read the instructions accompanying this pack.”

“Caution: Electric cables and equipment partially or completely surrounded with bulk thermal insulation may overheat and fail. This applies to wiring installed prior to 1989. Read the following instructions.”

8.2 NCC 2012, BCA Vol.1 Requirements

BCA Volume 1 provides requirements for Commercial Buildings (Class 2 to 9). The requirements of this section will apply if the product is to be installed in these buildings.

8.2.1 Evidence of Suitability

Products must demonstrate that they comply with the performance requirements through appropriate: Test Report(s) from a Registered Testing Authority, and/or Certificate(s) from a Professional Engineer, or appropriately qualified person.

8.2.2 Fire Hazard Properties

Paint or fire retardant coatings must not be used to achieve this compliance.

Wall or Ceiling Lining, or Attachment:

Where a formed shape product is used as a wall or ceiling lining, or as an attachment to a wall or ceiling lining, it must be achieve a *Group Number* by testing to AS ISO 9705 or by prediction using AS/NZS 3837 test results. The Group Number of a product determines where the product may be used in a building. The following table outlines where different Group Numbered products may be used.



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

Where:

- "Sprinklered" means a building fitted with a compliant sprinkler system.
- "Specific areas" means within;
 - o for Class 2 and 3 buildings, a sole-occupancy unit; and
 - o for Class 5 buildings, open plan offices with a minimum floor dimension/floor to ceiling height ratio > 5; and
 - o for Class 6 buildings, shops or other building with a minimum floor dimension/floor to ceiling height ratio > 5; and
 - o for Class 9a health-care buildings, patient care areas; and
 - o for Class 9b theatres and halls, etc., an auditorium; and
 - o for Class 9b schools, a classroom; and
 - o for Class 9c aged care buildings, resident use areas.

Materials used in “Unsprinklered” buildings must also achieve a smoke growth rate index (SMOGRARC) of not more than 100 (as determined in the AS ISO 9705 test), or an average specific extinction area less than 250 m²/kg (as determined in the AS/NZS 3837 test).



Wall or Ceiling Attachment, or General Insulation:

Where a formed shape product is used as an attachment to a wall or ceiling, or as an insulation material, it must be tested in accordance with AS/NZS 1530.3 for spread-of-flame and smoke-developed indices as required for the applications below.

Material or assembly location	Flammability Index	Spread-of-Flame Index	Smoke-Developed Index
Fire control rooms subject to Specification E1.8 and fire-isolated <i>exits</i> , other than a <i>sarking-type material</i> used in a ceiling or used as an attachment or part of an attachment to a building element. <small>Note 1</small>	—	0	2
Class 9b buildings used as a theatre, public hall or the like:			
(a) Any part of fixed seating in the audience area or auditorium.	—	0	5
(b) A proscenium curtain <i>required by Specification H1.3</i> .	—	0	3
Escalators, moving walkways or non- <i>required non-fire-isolated stairways</i> or pedestrian ramps subject to Specification D1.12 .	—	0	5
Other materials or locations and insulation materials other than <i>sarking-type materials</i> . <small>Notes 2 and 3</small>	—	9	8 if the <i>Spread-of-Flame Index</i> is more than 5

Where:

1. In a fire control room or fire-isolated stairway, a material used as an attachment or part of an attachment to a building element must, if combustible, be attached directly to a noncombustible substrate and not exceed 1 mm finished thickness.
2. A material, other than one located within a fire-isolated exit or fire control room, may be covered on all faces by concrete or masonry not less than 50 mm thick, as an alternative to meeting the specified indices.
3. In the case of a composite member or assembly, the member or assembly must be constructed so that when assembled as proposed in a building—
 - o any material which does not comply with this Table is protected on all sides and edges from exposure to the air; and
 - o the member or assembly, when tested in accordance with Specification A2.4, has a Spread-of-Flame Index and a Smoke-Developed Index not exceeding those prescribed in this Table; and



- the member or assembly retains the protection in position so that it prevents ignition of the material and continues to screen it from access to free air for a period of not less than 10 minutes.

8.2.3 Building Fabric Thermal Insulation

Formed Shapes:

- must comply with AS/NZS 4859.1, and
- be installed so that it
 - abuts or overlaps adjoining insulation other than at supporting members such as studs, noggins, joists, furring channels and the like where the insulation must be against the member; and
 - forms a continuous barrier with ceilings, walls, bulkheads, floors or the like that inherently contribute to the thermal barrier; and
 - does not affect the safe or effective operation of a service or fitting.

Formed Shapes must be installed so that:

- it maintains its position and thickness, other than where it is compressed between cladding and supporting members, water pipes, electrical cabling or the like; and
- in a ceiling, where there is no bulk insulation or reflective insulation in the wall beneath, it overlaps the wall by not less than 50 mm.

8.2.4 Air-Conditioning, Ventilation, Piping, Vessel, Heat Exchanger and Tank Thermal Insulation

Formed Shapes on ductwork and fittings, used for heating or cooling, including evaporative cooling, piping, vessels, heat exchangers and tanks must comply with AS/NZS 4859.1.

8.3 NCC 2012, BCA Vol.2 Requirements

BCA Volume 2 provides requirements for Houses (Class 1 and 10). The requirements of this section will apply if the product is to be installed in these buildings.

8.3.1 Building fabric thermal insulation

Formed shapes must comply with AS/NZS 4859.1 and be installed so that it;

- abuts or overlaps adjoining insulation other than at supporting members such as columns, studs, noggins, joists, furring channels and the like where the insulation must butt against the member; and



- forms a continuous barrier with ceilings, walls, bulkheads, floors or the like that inherently contribute to the thermal barrier; and
- does not affect the safe or effective operation of a domestic service or fitting.

Formed shapes must be installed;

- so that it maintains its position and thickness, other than where it crosses roof battens, water pipes, electrical cabling or the like; and
- in a ceiling so that it overlaps all uninsulated external walls by not less than 50 mm.

8.3.2 *Insulation of Services*

Formed shapes used for central heating, water piping and heating and cooling ductwork must comply with AS/NZS 4859.1.



9 APPENDIX B: FORMED IN-SITU CHECKLIST

E.g. Paints, Coatings, Sprayed fibres, Foamed in-situ plastics.

9.1 AS/NZS 4859.1 Requirements

AS/NZS 4859.1 supersedes the requirements of:

- AS 2464 Part 1, Corrosiveness of thermal insulation,
- AS 2464 Part 5, Steady state thermal transmission properties by means of a heat flow meter, and
- AS 2464 Part 6, Steady state thermal transmission properties by means of the guarded hotplate.

9.1.1 *Shall be suitable for the purpose*

Consideration shall be given to, known safety issues, freedom from objectionable odour, and the influence of aging.

9.1.2 *Demonstration of Compliance – Testing and Calculation*

Where a performance is measured by testing, it shall be performed by a recognised laboratory.

Where a performance is calculated, the calculations shall be performed by an appropriately qualified person, and shall be endorsed by a recognized laboratory.

Test results for a product shall be valid for a maximum of 5 years, or until a change in formulation or design. Test results shall be reported to include factors affecting heat flow including, temperatures, airflows, ventilation, convection, dimensions, orientation, statement of compliance with the test method employed, all reporting requirements of the test method, statement of accreditation held by the laboratory, statement of compliance with AS/NZS 4859.1, conditions of validity.

Where compliance with AS/NZS 4859.1 is claimed, the claimant shall provide:

- Details of the means of compliance.
- Copies of the test and calculation reports upon request.
- For each test:
 - o The name of the testing laboratory



- The date of test
- Identification of the test standard and procedure, including the allowances for factors affecting performance.
- Test report numbers
- The type of recognition held by the laboratory to perform the test.
- For each calculation:
 - The name of the person who performed the calculation.
 - The date of calculation
 - The temperature conditions, including the allowances for factors affecting performance.
 - The report number
 - The name of the testing laboratory that has endorsed the report.
 - A signed dated stamp of acceptance of the calculation by the testing laboratory.
 - The type of recognition held by the laboratory to perform the test.

9.1.3 Thermal Properties

The thermal properties of formed in-situ insulation shall be determined by ASTM C177, C335, C158, C1363, ISO 8301, 8302, 8990, performed for appropriate environmental and installation conditions including temperatures, airflows, radiant energy, dimensions and orientation, moisture content, material uniformity.

Where some or all of this thermal resistance is claimed through their reflective nature, the infrared emittance of these surfaces shall be determined in accordance with ASTM E408, and be stated on the label, and literature, and in conjunction with the measurements or calculations of thermal resistance.

9.1.4 Solar Reflectance

Materials shall be classified as ‘Solar-reflective’ or ‘Non-solar-reflective’. Where materials are intended to influence the thermal performance of the building, solar reflectance shall be measured and shall be stated in conjunction with the measurements or calculations of the effect of the thermal performance of the building.

Where a solar-reflective material or coating is claimed to have thermal resistance, it shall be measured in accordance with Clause 2.2.



9.1.5 Corrosiveness

Materials and assemblies shall not increase the risk of corrosion damage to building structures, and shall be non-corrosive when tested in accordance with AS/NZS 4859.1 Appendix H.

9.1.6 Packaging

Packaging shall provide adequate protection during handling, transport and storage. Packaging shall not degrade performance of the product once removed from packaging.

9.1.7 Labelling

Labels shall include at least one of the terms “R”, “R-value”, “Thermal Resistance”, combined with the term “Declared”, and one of the terms “Material”, “System”, or “Total”.

The declared R-value shall be the long-term value accounting for de-rating from aging or environmental factors. Declared R-value shall be reported to two significant figures.

Where the product is supplied for retail sale labelling shall be provided with each package. Where product is not supplied in packaged quantities documentation shall be supplied that conveys the same information as that required on a label. All required labelling information shall be conspicuous.

Labelling shall include:

- Product Name
- Description of Contents
- Name and Address of Manufacturer
- Batch identification or other traceability information
- Safety Instructions
- A statement of compliance with AS/NZS 4859.1.
- One or more declared R-values ($\text{m}^2\cdot\text{K}/\text{W}$), accompanied by a clear statement as to the conditions under which it/they apply, and preceded by one or more of the qualifiers ‘Total’, ‘System’, or ‘Material’ as appropriate. When ‘heat flow up’ and ‘heat flow down’, or ‘Summer’ and ‘Winter’ R-values are different, all values shall be quoted with equal emphasis and prominence.
- Nominal coverage (area per unit mass) and stabilized mean thickness (mm), for each declared R-value.
- Nominal net weight of contents or supplied quantity



- A statement “the Total R-value depends on installation and may be greater or less than the R-value of the product”.
- Declared Material R-value.

9.1.8 Safety Instructions

Where applicable, safety instructions shall include one of the following statements.

“Caution: Electric cables and equipment partially or completely surrounded with bulk thermal insulation may overheat and fail. This applies to wiring installed prior to 1989. Read the instructions accompanying this pack.”

“Caution: Electric cables and equipment partially or completely surrounded with bulk thermal insulation may overheat and fail. This applies to wiring installed prior to 1989. Read the following instructions.”

9.2 NCC 2012, BCA Vol.1 Requirements

BCA Volume 1 provides requirements for Commercial Buildings (Class 2 to 9). The requirements of this section will apply if the product is to be installed in these buildings.

9.2.1 Evidence of Suitability

Products must demonstrate that they comply with the performance requirements through appropriate: Test Report(s) from a Registered Testing Authority, and/or Certificate(s) from a Professional Engineer, or appropriately qualified person.

9.2.2 Fire Hazard Properties

Paint or fire retardant coatings must not be used to achieve this compliance.

Wall or Ceiling Lining or Attachment:

Where a formed in-situ insulation product is used as a wall or ceiling lining, or as an attachment to a wall or ceiling lining, it must be achieve a *Group Number* by testing to AS ISO 9705 or by prediction using AS/NZS 3837 test results. The Group Number of a product determines where



the product may be used in a building. The following table outlines where different Group Numbered products may be used.

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

Where:

- "Sprinklered" means a building fitted with a compliant sprinkler system.
- "Specific areas" means within;
 - o for Class 2 and 3 buildings, a sole-occupancy unit; and
 - o for Class 5 buildings, open plan offices with a minimum floor dimension/floor to ceiling height ratio > 5; and
 - o for Class 6 buildings, shops or other building with a minimum floor dimension/floor to ceiling height ratio > 5; and
 - o for Class 9a health-care buildings, patient care areas; and
 - o for Class 9b theatres and halls, etc., an auditorium; and
 - o for Class 9b schools, a classroom; and
 - o for Class 9c aged care buildings, resident use areas.



Materials used in “Unsprinklered” buildings must also achieve a smoke growth rate index (SMOGRARC) of not more than 100 (as determined in the AS ISO 9705 test), or an average specific extinction area less than 250 m²/kg (as determined in the AS/NZS 3837 test).

Wall or Ceiling Attachment, or General Insulation:

Where a formed in-situ insulation product is used as an attachment to a wall or ceiling, or as an insulation material, it must be tested in accordance with AS/NZS 1530.3 for spread-of-flame and smoke-developed indices as required for the applications below.

Material or assembly location	Flammability Index	Spread-of-Flame Index	Smoke-Developed Index
Fire control rooms subject to Specification E1.8 and fire-isolated <i>exits</i> , other than a <i>sarking-type material</i> used in a ceiling or used as an attachment or part of an attachment to a building element. ^{Note 1}	—	0	2
Class 9b buildings used as a theatre, public hall or the like:			
(a) Any part of fixed seating in the audience area or auditorium.	—	0	5
(b) A proscenium curtain <i>required by Specification H1.3</i> .	—	0	3
Escalators, moving walkways or non- <i>required non-fire-isolated stairways</i> or pedestrian ramps subject to Specification D1.12 .	—	0	5
Other materials or locations and insulation materials other than <i>sarking-type materials</i> . Notes 2 and 3	—	9	8 if the <i>Spread-of-Flame Index</i> is more than 5

Where:

1. In a fire control room or fire-isolated stairway, a material used as an attachment or part of an attachment to a building element must, if combustible, be attached directly to a noncombustible substrate and not exceed 1 mm finished thickness.
2. A material, other than one located within a fire-isolated exit or fire control room, may be covered on all faces by concrete or masonry not less than 50 mm thick, as an alternative to meeting the specified indices.
3. In the case of a composite member or assembly, the member or assembly must be constructed so that when assembled as proposed in a building—



- any material which does not comply with this Table is protected on all sides and edges from exposure to the air; and
- the member or assembly, when tested in accordance with Specification A2.4, has a Spread-of-Flame Index and a Smoke-Developed Index not exceeding those prescribed in this Table; and
- the member or assembly retains the protection in position so that it prevents ignition of the material and continues to screen it from access to free air for a period of not less than 10 minutes.

9.2.3 Building Fabric Thermal Insulation

Formed in-situ insulation:

- must comply with AS/NZS 4859.1, and
- be installed so that it
 - abuts or overlaps adjoining insulation other than at supporting members such as studs, noggins, joists, furring channels and the like where the insulation must be against the member; and
 - forms a continuous barrier with ceilings, walls, bulkheads, floors or the like that inherently contribute to the thermal barrier; and
 - does not affect the safe or effective operation of a service or fitting.

Bulk Formed in-situ insulation must be installed so that:

- it maintains its position and thickness, other than where it is compressed between cladding and supporting members, water pipes, electrical cabling or the like; and
- in a ceiling, where there is no bulk insulation or reflective insulation in the wall beneath, it overlaps the wall by not less than 50 mm.

9.2.4 Air-Conditioning, Ventilation, Piping, Vessel, Heat Exchanger and Tank Thermal Insulation

Formed in-situ insulation of ductwork and fittings, used for heating or cooling, including evaporative cooling, piping, vessels, heat exchangers and tanks must comply with AS/NZS 4859.1.

9.3 NCC 2012, BCA Vol.2 Requirements

BCA Volume 2 provides requirements for Houses (Class 1 and 10). The requirements of this section will apply if the product is to be installed in these buildings.

9.3.1 Building fabric thermal insulation

Formed in-situ insulation must comply with AS/NZS 4859.1 and be installed so that it;



- abuts or overlaps adjoining insulation other than at supporting members such as columns, studs, noggins, joists, furring channels and the like where the insulation must butt against the member; and
- forms a continuous barrier with ceilings, walls, bulkheads, floors or the like that inherently contribute to the thermal barrier; and
- does not affect the safe or effective operation of a domestic service or fitting.

Bulk Formed in-situ insulation must be installed;

- so that it maintains its position and thickness, other than where it crosses roof battens, water pipes, electrical cabling or the like; and
- in a ceiling so that it overlaps all uninsulated external walls by not less than 50 mm.

9.3.2 *Insulation of Services*

Formed in-situ insulation of central heating, water piping and heating and cooling ductwork must comply with AS/NZS 4859.1.



10 APPENDIX C: LOW DENSITY FIBROUS CHECKLIST

Pre-formed, including blanket, cut into pieces, usually compression packaged bulk insulation compressed rolls and batts. E.g. Rockwool, Glasswool, Polyester, Sheep's Wool.

10.1 AS/NZS 4859.1 Requirements

AS/NZS 4859.1 supersedes the requirements of:

- AS 2464 Part 1, Corrosiveness of thermal insulation,
- AS 2464 Part 4, Length, width and thickness of batt or blanket type thermal insulation,
- AS 2464 Part 5, Steady state thermal transmission properties by means of a heat flow meter,
- AS 2464 Part 6, Steady state thermal transmission properties by means of the guarded hotplate,
- AS 2464 Part 7, Determination of the average thermal resistance of low-density mineral wool thermal insulation – Batt and blanket, and
- AS 3742, Mineral wool thermal insulation – Batt and blanket.

10.1.1 *Shall be suitable for the purpose*

Consideration shall be given to, known safety issues, freedom from objectionable odour, and the influence of aging.

10.1.2 *Demonstration of Compliance – Testing and Calculation*

Where a performance is measured by testing, it shall be performed by a recognised laboratory.

Where a performance is calculated, the calculations shall be performed by an appropriately qualified person, and shall be endorsed by a recognized laboratory.

Test results for a product shall be valid for a maximum of 5 years, or until a change in formulation or design. Test results shall be reported to include factors affecting heat flow including, temperatures, airflows, ventilation, convection, dimensions, orientation, statement of compliance with the test method employed, all reporting requirements of the test method, statement of accreditation held by the laboratory, statement of compliance with AS/NZS 4859.1, conditions of validity.

Where compliance with AS/NZS 4859.1 is claimed, the claimant shall provide:



- Details of the means of compliance.
- Copies of the test and calculation reports upon request.
- For each test:
 - o The name of the testing laboratory
 - o The date of test
 - o Identification of the test standard and procedure, including the allowances for factors affecting performance.
 - o Test report numbers
 - o The type of recognition held by the laboratory to perform the test.
- For each calculation:
 - o The name of the person who performed the calculation.
 - o The date of calculation
 - o The temperature conditions, including the allowances for factors affecting performance.
 - o The report number
 - o The name of the testing laboratory that has endorsed the report.
 - o A signed dated stamp of acceptance of the calculation by the testing laboratory.
 - o The type of recognition held by the laboratory to perform the test.

10.1.3 Thermal Properties

The thermal properties of Low Density Fibrous insulation shall be determined by testing to ASTM C653 and AS/NZS 4859.1 Appendix D, performed for appropriate environmental and installation conditions including temperatures, airflows, radiant energy, dimensions and orientation, moisture content, material uniformity.

Declared Material R-value shall not be greater than the average thermal resistance of the lot as described in ASTM C653 (where a minimum of 95% of individual pack measurements shall not average less than 90% of the declared material R-value).

In addition to the general requirements for test reports above, the adoption of variations set-out in AS/NZS 4859.1 Appendix D shall also be reported.

Where a product contains sheep's wool of more than 5% by weight, the product shall be conditioned at 45°C and 60% Relative humidity for 24 hours prior to thermal testing. The thermal resistance shall be determined at the lesser of the recovered thickness and the declared thickness.



Where a product contains polyester fibre, adhesives and binders comprising more than 95% by weight, the product shall be conditioned at 45°C for 24 hours prior to thermal testing. The thermal resistance shall be determined at the lesser of the recovered thickness and the declared thickness.

10.1.4 Corrosiveness

Materials and assemblies shall not increase the risk of corrosion damage to building structures, and shall be non-corrosive when tested in accordance with AS/NZS 4859.1 Appendix H. Exemptions from this requirement apply to materials composed entirely of mineral or plastic fibres, inert plastics, or inert minerals that do not react with water.

10.1.5 Packaging

Packaging shall provide adequate protection during handling, transport and storage. Packaging shall not degrade performance of the product once removed from packaging.

10.1.6 Labelling

Labels shall include at least one of the terms “R”, “R-value”, “Thermal Resistance”, combined with the term “Declared”, and one of the terms “Material”, “System”, or “Total”.

The declared R-value shall be the long-term value accounting for de-rating from aging or environmental factors. Declared R-value shall be reported to two significant figures.

Where the product is supplied for retail sale labelling shall be provided with each package. Where product is not supplied in packaged quantities documentation shall be supplied that conveys the same information as that required on a label. All required labelling information shall be conspicuous.

Labelling shall include:

- Product Name
- Description of Contents
- Name and Address of Manufacturer
- Batch identification or other traceability information
- Safety Instructions



- A statement of compliance with AS/NZS 4859.1.
- One or more declared R-values ($\text{m}^2 \cdot \text{K}/\text{W}$), accompanied by a clear statement as to the conditions under which it/they apply, and preceded by one or more of the qualifiers ‘Total’, ‘System’, or ‘Material’ as appropriate. When ‘heat flow up’ and ‘heat flow down’, or ‘Summer’ and ‘Winter’ R-values are different, all values shall be quoted with equal emphasis and prominence.
- The statement “this pack complies with AS/NZS 4859.1 for a net weight of xx kg, a total area of yy m^2 and a mean thickness of zz mm”, where xx, yy and zz appear on a valid and current report of measurement of thermal resistance in accordance with AS/NZS 4859.1.
- Number of pieces.
- Nominal total area (m^2)
- Nominal length and width of each piece.
- Nominal stabilized thickness
- A statement of the time after installation to achieve nominal stabilized thickness and R-value
- A statement “the performance of this product may be reduced if stored for too long in its compression packaging”.
- A Statement “the Total R-value depends on installation and may be greater than or less than the R-value of the product”.
- Declared Material R-value

10.1.7 Safety Instructions

Where applicable, safety instructions shall include one of the following statements.

“Caution: Electric cables and equipment partially or completely surrounded with bulk thermal insulation may overheat and fail. This applies to wiring installed prior to 1989. Read the instructions accompanying this pack.”

“Caution: Electric cables and equipment partially or completely surrounded with bulk thermal insulation may overheat and fail. This applies to wiring installed prior to 1989. Read the following instructions.”

10.1.8 Sheep’s Wool

Where a product contains sheep’s wool of more than 5% by weight, the product shall:

- Be scoured and free of processing additives.
- Have a vegetable content not greater than 3% by weight.



- Be treated to resist insect attack, and achieve a ‘satisfactory’ rating to AS 2001.6.1.
- Wool fibre content shall be measured in accordance with AS 2001.7. If the wool fibre content is greater than 95% the product may be labelled ‘wool’, else, the actual wool content shall be specified on the label.

10.1.9 Low Density Polyester

Where a product contains polyester fibre, adhesives and binders comprising more than 95% by weight, the product shall:

- Be bonded using either heat-bonding of low-melt temperature polyester fibres, or using spray-adhesive bonding.
- When measured in accordance with ASTM C167, have length and width dimensions as nominated on the label within the following tolerances. Cut pieces, length +50mm/-5mm, width +10mm/-5mm. Blankets, length +30mm/m / -5mm/m, width +15mm/-5mm.

10.1.10 Low Density Mineral Wool

Where a product contains mineral wool and binders applied during the manufacturing process comprising more than 95% by weight, the product shall:

- Be manufactured from inorganic oxides or minerals, rock, slag or glass.
- When measured in accordance with ASTM C167, have length and width dimensions as nominated on the label within the following tolerances. Cut pieces, length +30mm/-5mm, width +10mm/-5mm. Blankets, length +20mm/m / -5mm/m, width +15mm/-5mm.
- Unless otherwise stated, comply with the labeling requirements of AS/NZS 4859.1 Section 3.

10.2 NCC 2012, BCA Vol.1 Requirements

BCA Volume 1 provides requirements for Commercial Buildings (Class 2 to 9). The requirements of this section will apply if the product is to be installed in these buildings.

10.2.1 Evidence of Suitability

Products must demonstrate that they comply with the performance requirements through appropriate: Test Report(s) from a Registered Testing Authority, and/or Certificate(s) from a Professional Engineer, or appropriately qualified person.



10.2.2 Fire Hazard Properties

Paint or fire retardant coatings must not be used to achieve this compliance.

Wall or Ceiling Lining, or Attachment:

Where Low Density Fibrous insulation is used as a wall or ceiling lining, or as an attachment to a wall or ceiling lining, it must be achieve a *Group Number* by testing to AS ISO 9705 or by prediction using AS/NZS 3837 test results. The Group Number of a product determines where the product may be used in a building. The following table outlines where different Group Numbered products may be used.

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

Where:

- "Sprinklered" means a building fitted with a compliant sprinkler system.
- "Specific areas" means within;



- for Class 2 and 3 buildings, a sole-occupancy unit; and
- for Class 5 buildings, open plan offices with a minimum floor dimension/floor to ceiling height ratio > 5; and
- for Class 6 buildings, shops or other building with a minimum floor dimension/floor to ceiling height ratio > 5; and
- for Class 9a health-care buildings, patient care areas; and
- for Class 9b theatres and halls, etc., an auditorium; and
- for Class 9b schools, a classroom; and
- for Class 9c aged care buildings, resident use areas.

Materials used in “Unsprinklered” buildings must also achieve a smoke growth rate index (SMOGRARC) of not more than 100 (as determined in the AS ISO 9705 test), or an average specific extinction area less than 250 m²/kg (as determined in the AS/NZS 3837 test).

Wall or Ceiling Attachment, or General Insulation:

Where a Low Density Fibrous insulation product is used as an attachment to a wall or ceiling, or as an insulation material, it must be tested in accordance with AS/NZS 1530.3 for spread-of-flame and smoke-developed indices as required for the applications below.

Material or assembly location	Flammability Index	Spread-of-Flame Index	Smoke-Developed Index
Fire control rooms subject to Specification E1.8 and fire-isolated <i>exits</i> , other than a <i>sarking-type material</i> used in a ceiling or used as an attachment or part of an attachment to a building element. <small>Note 1</small>	—	0	2
Class 9b buildings used as a theatre, public hall or the like:			
(a) Any part of fixed seating in the audience area or auditorium.	—	0	5
(b) A proscenium curtain <i>required by Specification H1.3</i> .	—	0	3
Escalators, moving walkways or non- <i>required non-fire-isolated stairways</i> or pedestrian ramps subject to Specification D1.12 .	—	0	5
Other materials or locations and insulation materials other than <i>sarking-type materials</i> . <small>Notes 2 and 3</small>	—	9	8 if the <i>Spread-of-Flame Index</i> is more than 5

Where:



1. In a fire control room or fire-isolated stairway, a material used as an attachment or part of an attachment to a building element must, if combustible, be attached directly to a noncombustible substrate and not exceed 1 mm finished thickness.
2. A material, other than one located within a fire-isolated exit or fire control room, may be covered on all faces by concrete or masonry not less than 50 mm thick, as an alternative to meeting the specified indices.
3. In the case of a composite member or assembly, the member or assembly must be constructed so that when assembled as proposed in a building—
 - any material which does not comply with this Table is protected on all sides and edges from exposure to the air; and
 - the member or assembly, when tested in accordance with Specification A2.4, has a Spread-of-Flame Index and a Smoke-Developed Index not exceeding those prescribed in this Table; and
 - the member or assembly retains the protection in position so that it prevents ignition of the material and continues to screen it from access to free air for a period of not less than 10 minutes.

10.2.3 Building Fabric Thermal Insulation

Low Density Fibrous insulation:

- must comply with AS/NZS 4859.1, and
- be installed so that it
 - abuts or overlaps adjoining insulation other than at supporting members such as studs, noggins, joists, furring channels and the like where the insulation must be against the member; and
 - forms a continuous barrier with ceilings, walls, bulkheads, floors or the like that inherently contribute to the thermal barrier; and
 - does not affect the safe or effective operation of a service or fitting.

Low Density Fibrous insulation must be installed so that:

- it maintains its position and thickness, other than where it is compressed between cladding and supporting members, water pipes, electrical cabling or the like; and
- in a ceiling, where there is no bulk insulation or reflective insulation in the wall beneath, it overlaps the wall by not less than 50 mm.

10.2.4 Air-Conditioning, Ventilation, Piping, Vessel, Heat Exchanger and Tank Thermal Insulation

Low Density Fibrous insulation of ductwork and fittings, used for heating or cooling, including evaporative cooling, piping, vessels, heat exchangers and tanks must comply with AS/NZS 4859.1.



10.3 NCC 2012, BCA Vol.2 Requirements

BCA Volume 2 provides requirements for Houses (Class 1 and 10). The requirements of this section will apply if the product is to be installed in these buildings.

10.3.1 Building fabric thermal insulation

Low Density Fibrous insulation must comply with AS/NZS 4859.1 and be installed so that it;

- abuts or overlaps adjoining insulation other than at supporting members such as columns, studs, noggins, joists, furring channels and the like where the insulation must butt against the member; and
- forms a continuous barrier with ceilings, walls, bulkheads, floors or the like that inherently contribute to the thermal barrier; and
- does not affect the safe or effective operation of a domestic service or fitting.

Low Density Fibrous insulation must be installed;

- so that it maintains its position and thickness, other than where it crosses roof battens, water pipes, electrical cabling or the like; and
- in a ceiling so that it overlaps all uninsulated external walls by not less than 50 mm.

10.3.2 Insulation of Services

Low Density Fibrous insulation of central heating, water piping and heating and cooling ductwork must comply with AS/NZS 4859.1.



11 APPENDIX D: LOOSE FILLS CHECKLIST

Granular or loose, could compact under load. E.g. Cellulose fibre, Vermiculite, Sheep's wool, Glasswool, Rockwool, Expanded beads.

11.1 AS/NZS 4859.1 Requirements

AS/NZS 4859.1 supersedes the requirements of:

- AS 2461, Mineral wool thermal insulation – Loose Fill,
- AS 2462, Cellulosic fibre thermal insulation,
- AS 2464 Part 1, Corrosiveness of thermal insulation,
- AS 2464 Part 2, Bulk density of blown fibrous loose-fill thermal insulation,
- AS 2464 Part 3, Thermal resistance of low-density fibrous loose-fill thermal insulation,
- AS 2464 Part 5, Steady state thermal transmission properties by means of a heat flow meter, and
- AS 2464 Part 6, Steady state thermal transmission properties by means of the guarded hotplate.

11.1.1 *Shall be suitable for the purpose*

Consideration shall be given to, known safety issues, freedom from objectionable odour, and the influence of aging.

11.1.2 *Demonstration of Compliance – Testing and Calculation*

Where a performance is measured by testing, it shall be performed by a recognised laboratory.

Where a performance is calculated, the calculations shall be performed by an appropriately qualified person, and shall be endorsed by a recognized laboratory.

Test results for a product shall be valid for a maximum of 5 years, or until a change in formulation or design. Test results shall be reported to include factors affecting heat flow including, temperatures, airflows, ventilation, convection, dimensions, orientation, statement of compliance with the test method employed, all reporting requirements of the test method, statement of accreditation held by the laboratory, statement of compliance with AS/NZS 4859.1, conditions of validity.

Where compliance with AS/NZS 4859.1 is claimed, the claimant shall provide:



- Details of the means of compliance.
- Copies of the test and calculation reports upon request.
- For each test:
 - o The name of the testing laboratory
 - o The date of test
 - o Identification of the test standard and procedure, including the allowances for factors affecting performance.
 - o Test report numbers
 - o The type of recognition held by the laboratory to perform the test.
- For each calculation:
 - o The name of the person who performed the calculation.
 - o The date of calculation
 - o The temperature conditions, including the allowances for factors affecting performance.
 - o The report number
 - o The name of the testing laboratory that has endorsed the report.
 - o A signed dated stamp of acceptance of the calculation by the testing laboratory.
 - o The type of recognition held by the laboratory to perform the test.

11.1.3 Thermal Properties

The thermal properties of Loose Fill insulation shall be determined by testing to ASTM C687 and AS/NZS 4859.1 Appendix E, performed for appropriate environmental and installation conditions including temperatures, airflows, radiant energy, dimensions and orientation, moisture content, material uniformity.

In addition to the general requirements for test reports above, the report shall state whether the adoption of variations set-out in AS/NZS 4859.1 Appendix E have been included. Where the variations have been adopted, the suppliers nominated density, and method of agitation shall be reported.

Where a product contains sheep's wool of more than 5% by weight, the product shall be conditioned at 45°C and 60% Relative humidity for 24 hours prior to thermal testing. The thermal resistance shall be determined at the lesser of the recovered thickness and the declared thickness.



11.1.4 Corrosiveness

Materials and assemblies shall not increase the risk of corrosion damage to building structures, and shall be non-corrosive when tested in accordance with AS/NZS 4859.1 Appendix H.

Exemptions from this requirement apply to materials composed entirely of mineral or plastic fibres, inert plastics, or inert minerals that do not react with water, and Cellulose fibre (where the only additive is a mixture of boric acid and borax with the borax being between 15% and 35% of the mixture by weight, and the total quantity of fire retardant is not less than 17% of the finished product by weight).

11.1.5 Packaging

Packaging shall provide adequate protection during handling, transport and storage. Packaging shall not degrade performance of the product once removed from packaging.

11.1.6 Labelling

Labels shall include at least one of the terms “R”, “R-value”, “Thermal Resistance”, combined with the term “Declared”, and one of the terms “Material”, “System”, or “Total”.

The declared R-value shall be the long-term value accounting for de-rating from aging or environmental factors. Declared R-value shall be reported to two significant figures.

Where the product is supplied for retail sale labelling shall be provided with each package. Where product is not supplied in packaged quantities documentation shall be supplied that conveys the same information as that required on a label. All required labelling information shall be conspicuous.

Labelling shall include:

- Product Name
- Description of Contents
- Name and Address of Manufacturer
- Batch identification or other traceability information
- Safety Instructions
- A statement of compliance with AS/NZS 4859.1.



- One or more declared R-values ($\text{m}^2\cdot\text{K}/\text{W}$), accompanied by a clear statement as to the conditions under which it/they apply, and preceded by one or more of the qualifiers ‘Total’, ‘System’, or ‘Material’ as appropriate. When ‘heat flow up’ and ‘heat flow down’, or ‘Summer’ and ‘Winter’ R-values are different, all values shall be quoted with equal emphasis and prominence.
- Nominal coverage (area per unit mass) and stabilized mean thickness (mm), for each declared R-value.
- Nominal net weight of contents or supplied quantity
- A statement “the Total R-value depends on installation and may be greater or less than the R-value of the product”.
- Declared Material R-value.

11.1.7 Safety Instructions

Where applicable, safety instructions shall include one of the following statements.

“Caution: Electric cables and equipment partially or completely surrounded with bulk thermal insulation may overheat and fail. This applies to wiring installed prior to 1989. Read the instructions accompanying this pack.”

“Caution: Electric cables and equipment partially or completely surrounded with bulk thermal insulation may overheat and fail. This applies to wiring installed prior to 1989. Read the following instructions.”

11.1.8 Cellulose Loose Fill

Cellulose Loose Fill shall have a stabilized density of between 20 kg/m^3 and 70 kg/m^3 , and shall have a moisture absorptance of less than 20% when tested to ASTM C739.

11.1.9 Sheep’s Wool Loose Fill

If the product contains sheep’s wool of more than 5% by weight, the product shall:

- Be scoured and free of processing additives.
- Have a vegetable content not greater than 3% by weight.
- Be treated to resist insect attack, and achieve a ‘satisfactory’ rating to AS 2001.6.1.
- Wool fibre content shall be measured in accordance with AS 2001.7. If the wool fibre content is greater than 95% the product may be labelled ‘wool’, else, the actual wool content shall be specified on the label.



11.2 NCC 2012, BCA Vol.1 Requirements

BCA Volume 1 provides requirements for Commercial Buildings (Class 2 to 9). The requirements of this section will apply if the product is to be installed in these buildings.

11.2.1 Evidence of Suitability

Products must demonstrate that they comply with the performance requirements through appropriate: Test Report(s) from a Registered Testing Authority, and/or Certificate(s) from a Professional Engineer, or appropriately qualified person.

11.2.2 Fire Hazard Properties

Paint or fire retardant coatings must not be used to achieve this compliance.

Loose Fill insulation must be tested in accordance with AS/NZS 1530.3 for spread-of-flame and smoke-developed indices as required for the applications below.

Material or assembly location	Flammability Index	Spread-of-Flame Index	Smoke-Developed Index
Fire control rooms subject to Specification E1.8 and fire-isolated <i>exits</i> , other than a <i>sarking-type material</i> used in a ceiling or used as an attachment or part of an attachment to a building element. <small>Note 1</small>	—	0	2
Class 9b buildings used as a theatre, public hall or the like:			
(a) Any part of fixed seating in the audience area or auditorium.	—	0	5
(b) A proscenium curtain <i>required</i> by Specification H1.3 .	—	0	3
Escalators, moving walkways or non- <i>required</i> non- <i>fire-isolated stairways</i> or pedestrian ramps subject to Specification D1.12 .	—	0	5
Other materials or locations and insulation materials other than <i>sarking-type materials</i> . <small>Notes 2 and 3</small>	—	9	8 if the <i>Spread-of-Flame Index</i> is more than 5



Where:

1. In a fire control room or fire-isolated stairway, a material used as an attachment or part of an attachment to a building element must, if combustible, be attached directly to a noncombustible substrate and not exceed 1 mm finished thickness.
2. A material, other than one located within a fire-isolated exit or fire control room, may be covered on all faces by concrete or masonry not less than 50 mm thick, as an alternative to meeting the specified indices.
3. In the case of a composite member or assembly, the member or assembly must be constructed so that when assembled as proposed in a building—
 - any material which does not comply with this Table is protected on all sides and edges from exposure to the air; and
 - the member or assembly, when tested in accordance with Specification A2.4, has a Spread-of-Flame Index and a Smoke-Developed Index not exceeding those prescribed in this Table; and
 - the member or assembly retains the protection in position so that it prevents ignition of the material and continues to screen it from access to free air for a period of not less than 10 minutes.

11.2.3 Building Fabric Thermal Insulation

Loose Fill insulation:

- must comply with AS/NZS 4859.1, and
- be installed so that it
 - abuts or overlaps adjoining insulation other than at supporting members such as studs, noggins, joists, furring channels and the like where the insulation must be against the member; and
 - forms a continuous barrier with ceilings, walls, bulkheads, floors or the like that inherently contribute to the thermal barrier; and
 - does not affect the safe or effective operation of a service or fitting.

Loose Fill insulation must be installed so that:

- it maintains its position and thickness, other than where it is compressed between cladding and supporting members, water pipes, electrical cabling or the like; and
- in a ceiling, where there is no bulk insulation or reflective insulation in the wall beneath, it overlaps the wall by not less than 50 mm.

11.2.4 Air-Conditioning, Ventilation, Piping, Vessel, Heat Exchanger and Tank Thermal Insulation

Should Loose Fill insulation be used in these applications, it must comply with AS/NZS 4859.1.



11.3 NCC 2012, BCA Vol.2 Requirements

BCA Volume 2 provides requirements for Houses (Class 1 and 10). The requirements of this section will apply if the product is to be installed in these buildings.

11.3.1 Building fabric thermal insulation

Loose Fill insulation must comply with AS/NZS 4859.1 and be installed so that it;

- abuts or overlaps adjoining insulation other than at supporting members such as columns, studs, noggins, joists, furring channels and the like where the insulation must butt against the member; and
- forms a continuous barrier with ceilings, walls, bulkheads, floors or the like that inherently contribute to the thermal barrier; and
- does not affect the safe or effective operation of a domestic service or fitting.

Loose Fill insulation must be installed;

- so that it maintains its position and thickness, other than where it crosses roof battens, water pipes, electrical cabling or the like; and
- in a ceiling so that it overlaps all uninsulated external walls by not less than 50 mm.

11.3.2 Insulation of Services

Should Loose Fill insulation be used in this application, it must comply with AS/NZS 4859.1.



12 APPENDIX E: REFLECTIVE INSULATION CHECKLIST

12.1 AS/NZS 4859.1 Requirements

Reflective Insulation: A Product that incorporates a reflective metallic surface of either a rolled metallic foil, or metallic deposit. Reflective insulation that incorporates a bulk insulation component shall also comply with AS/NZS 4859.1 requirements for that component.

12.1.1 Shall be suitable for the purpose

Consideration shall be given to, known safety issues, freedom from objectionable odour, and the influence of aging.

12.1.2 Demonstration of Compliance – Testing and Calculation

Where a performance is measured by testing, it shall be performed by a recognised laboratory.

Where a performance is calculated, the calculations shall be performed by an appropriately qualified person, and shall be endorsed by a recognized laboratory.

Test results for a product shall be valid for a maximum of 5 years, or until a change in formulation or design. Test results shall be reported to include factors affecting heat flow including, temperatures, airflows, ventilation, convection, dimensions, orientation, statement of compliance with the test method employed, all reporting requirements of the test method, statement of accreditation held by the laboratory, statement of compliance with AS/NZS 4859.1, conditions of validity.

Where compliance with AS/NZS 4859.1 is claimed, the claimant shall provide:

- Details of the means of compliance.
- Copies of the test and calculation reports upon request.
- For each test:
 - o The name of the testing laboratory
 - o The date of test
 - o Identification of the test standard and procedure, including the allowances for factors affecting performance.
 - o Test report numbers
 - o The type of recognition held by the laboratory to perform the test.



- For each calculation:
 - o The name of the person who performed the calculation.
 - o The date of calculation
 - o The temperature conditions, including the allowances for factors affecting performance.
 - o The report number
 - o The name of the testing laboratory that has endorsed the report.
 - o A signed dated stamp of acceptance of the calculation by the testing laboratory.
 - o The type of recognition held by the laboratory to perform the test.

12.1.3 Thermal Properties

Reflective Insulation thermal properties shall be determined by testing to ASTM C177, C518, C1363, ISO8301, 8302, 8990, performed for appropriate environmental and installation conditions including temperatures, airflows, radiant energy, dimensions and orientation, moisture content, material uniformity.

R-values shall be expressed as either System R-value (R_{sys}) or Total R-value (R_t) calculated in accordance with AS/NZS 4859.1, Appendix K.

Where some or all of this thermal resistance is claimed through their reflective nature, the infrared emittance of these surfaces shall be determined in accordance with ASTM E408, and be stated on the label, and literature, and in conjunction with the measurements or calculations of thermal resistance.

12.1.4 Corrosiveness

Materials and assemblies shall not increase the risk of corrosion damage to building structures, and shall be non-corrosive when tested in accordance with AS/NZS 4859.1, Appendix H.

12.1.5 Packaging

Packaging shall provide adequate protection during handling, transport and storage. Packaging shall not degrade performance of the product once removed from packaging.

Where water-based products are used in the manufacture of reflective insulation, the product shall be adequately dried before packaging.



12.1.6 Labelling

Labels shall include at least one of the terms “R”, “R-value”, “Thermal Resistance”, combined with the term “Declared”, and one of the terms “Material”, “System”, or “Total”.

The declared R-value shall be the long-term value accounting for de-rating from aging or environmental factors. Declared R-value shall be reported to two significant figures.

Where the product is supplied for retail sale labelling shall be provided with each package. Where product is not supplied in packaged quantities documentation shall be supplied that conveys the same information as that required on a label. All required labelling information shall be conspicuous.

Labelling shall include:

- Product Name
- Description of Contents
- Name and Address of Manufacturer
- Batch identification or other traceability information
- Safety Instructions
- A statement of compliance with AS/NZS 4859.1.
- One or more declared R-values ($\text{m}^2\cdot\text{K}/\text{W}$), accompanied by a clear statement as to the conditions under which it/they apply, and preceded by one or more of the qualifiers ‘Total’, ‘System’, or ‘Material’ as appropriate. When ‘heat flow up’ and ‘heat flow down’, or ‘Summer’ and ‘Winter’ R-values are different, all values shall be quoted with equal emphasis and prominence.
- A statement “the contribution of this product to Total R-value depends on installation and environmental conditions”.
- A statement “the R-value will be reduced in the event of the accumulation of dust on upward facing surfaces, and in those cavities that are ventilated”.
- Infrared emittance of external reflective surfaces.
- System declared R-values or Total declared R-values as calculated in accordance with the assumptions in Appendix K.

Where a performance summary datasheet is attached to the pack separate to the main product identification label, the label shall, in place of Declared R-Value, state “Reflective insulation, refer to the attached performance summary datasheet.”



12.1.7 Safety Instructions

Where applicable, safety instructions shall include one of the following statements.

“Caution: Electric cables and equipment partially or completely surrounded with bulk thermal insulation may overheat and fail. This applies to wiring installed prior to 1989. Read the instructions accompanying this pack.”

“Caution: Electric cables and equipment partially or completely surrounded with bulk thermal insulation may overheat and fail. This applies to wiring installed prior to 1989. Read the following instructions.”

12.1.8 Dry Delamination

Reflective insulation shall pass the AS/NZS 4201.1 dry delamination test requirements.

12.1.9 Surface Corrosion and Wet Delamination

Reflective insulation shall achieve a pass for surface corrosion and wet delamination when tested in accordance with AS/NZS 4859.1, Appendix I.

A Group 1 product is exempt from this requirement if passes the requirements of AS/NZS 4200.1 which references a suite of test requirements in; Section 5 - Properties, Section 6 - Classification, Section - 7 Allowable Usage, and Section 8 - Marking and Roll Labelling (requiring product to be marked with a ‘Product Identifier’ at up to 3.0m repeat in the machine direction).

A Group 5 product is exempt from this requirement if the reflective surface material is a Group 1 product that meets the requirements of AS/NZS 4200.1 which references a suite of test requirements in; Section 5 - Properties, Section 6 - Classification, Section - 7 Allowable Usage, and Section 8 - Marking and Roll Labelling (requiring product to be marked with a ‘Product Identifier’ at up to 3.0m repeat in the machine direction).



12.1.10 Additional Requirements Specific to Reflective Insulation Groups 1 to 7

Group 1: Pliable building membranes

Pliable building membranes marketed as providing thermal insulation and intended to have a prime function as a sarking or vapour barrier must comply with AS/NZS 4200.1 and AS/NZS 4200.2. Note: As of April 2012, both of these standards are currently under review by Standards Australia Committee BD-058.

AS/NZS 4200.1 references a suite of test requirements in; Section 5 - Properties, Section 6 - Classification, Section - 7 Allowable Usage, and Section 8 - Marking and Roll Labelling.

AS/NZS 4200.2 references requirements in; Section 5 –Allowable usage based on duty classifications, Section 6 – Installation of pliable building membranes in tiled roofing, Section 7 – Installation of pliable building membranes in sheet roofing, ceilings and floors, Section 8 – Installation of pliable building membranes in walls and gables, Section 9 – Penetrations.

Dry delamination testing to AS/NZS 4201.1 is not required if the product passes the requirements of AS/NZS 4200.1.

Group 2: Single Sheet Segmented Reflective Pliable Membranes

A segmented single sheet foil laminate, often incorporating the term ‘batt’, used to divide an air space, installed between and over structural members.

Group 3: Multiple Layered Segmented Reflective Pliable Membranes

A segmented single sheet foil laminate, often incorporating the term ‘batt’, used to provide multiple reflective airspaces, installed between and over structural members.

Dry delamination testing in accordance with AS/NZS 4201.1 shall be performed on 4 samples with a sample size of full product width +100mm.

Group 4: Reflective Material Bonded to Rigid Insulation or Support

A reflective insulation product in sheet form for application onto structural members.

Labelling shall include the Material R-value of the product.



Group 5: Reflective Material Bonded to Pliable Non-Reflective Insulating Material

A reflective insulation product in roll form for application onto structural members.

Labelling shall include the Material R-value of the product.

Group 6: Reflective Material Bonded to the Inside of Individual Wall Cladding Sheet

A reflective insulation variation of a metal or plastic weatherboard type material.

Labelling shall include the Material R-value of the product.

Group 7: Reflective Material Bonded to the Underside of a Metal Cladding Sheet

A reflective insulation variation of a metal roof or wall cladding sheet material.

Dry delamination testing in accordance with AS/NZS 4201.1 shall be performed at a test temperature of 90°C.

Labelling shall include the Material R-value of the product.

12.2 NCC 2012, BCA Vol.1 Requirements

BCA Volume 1 provides requirements for Commercial Buildings (Class 2 to 9). The requirements of this section will apply if the product is to be installed in these buildings.

12.2.1 Evidence of Suitability

Products must demonstrate that they comply with the performance requirements through appropriate: Test Report(s) from a Registered Testing Authority, and/or Certificate(s) from a Professional Engineer, or appropriately qualified person.

12.2.2 Fire Hazard Properties

Paint or fire retardant coatings must not be used to achieve this compliance.

Wall or Ceiling Lining or Attachment:



Where a reflective insulation product is used as a wall or ceiling lining, or as an attachment to a wall or ceiling lining, it must be achieve a *Group Number* by testing to AS ISO 9705 or by prediction using AS/NZS 3837 test results. The Group Number of a product determines where the product may be used in a building. The following table outlines where different Group Numbered products may be used.

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

where:

- "Sprinklered" means a building fitted with a compliant sprinkler system.
- "Specific areas" means within;
 - o for Class 2 and 3 buildings, a sole-occupancy unit; and
 - o for Class 5 buildings, open plan offices with a minimum floor dimension/floor to ceiling height ratio > 5; and
 - o for Class 6 buildings, shops or other building with a minimum floor dimension/floor to ceiling height ratio > 5; and
 - o for Class 9a health-care buildings, patient care areas; and
 - o for Class 9b theatres and halls, etc., an auditorium; and



- for Class 9b schools, a classroom; and
- for Class 9c aged care buildings, resident use areas.

Materials used in “Unsprinklered” buildings must also achieve a smoke growth rate index (SMOGRARC) of not more than 100 (as determined in the AS ISO 9705 test), or an average specific extinction area less than 250 m²/kg (as determined in the AS/NZS 3837 test).

Sarking, Wall or Ceiling Attachment, or General Insulation:

Where a reflective insulation product is used as a sarking material, or as an attachment to a wall or ceiling, or as an insulation material, it must be tested in accordance with AS 1530.2 and AS/NZS 1530.3 for flammability index, and spread-of-flame and smoke-developed indices, as required, for the applications below.



Material or assembly location	Flammability Index	Spread-of-Flame Index	Smoke-Developed Index
Fire control rooms subject to Specification E1.8 and fire-isolated <i>exits</i> , other than a <i>sarking-type material</i> used in a ceiling or used as an attachment or part of an attachment to a building element. ^{Note 1}	—	0	2
Material or assembly location	Flammability Index	Spread-of-Flame Index	Smoke-Developed Index
Class 9b buildings used as a theatre, public hall or the like:			
(a) Any part of fixed seating in the audience area or auditorium.	—	0	5
(b) A proscenium curtain <i>required</i> by Specification H1.3 .	—	0	3
Escalators, moving walkways or non- <i>required</i> non- <i>fire-isolated stairways</i> or pedestrian ramps subject to Specification D1.12 .	—	0	5
<i>Sarking-type material</i> :			
(a) In a fire control room subject to Specification E1.8 or a fire-isolated <i>exit</i> or fire control room used in the form of an exposed wall or ceiling.	0	—	—
(b) In other locations. ^{Note 2}	5	—	—
Other materials or locations and insulation materials other than <i>sarking-type materials</i> . ^{Notes 2 and 3}	—	9	8 if the <i>Spread-of-Flame Index</i> is more than 5

where:

1. In a fire control room or fire-isolated stairway, a material used as an attachment or part of an attachment to a building element must, if combustible, be attached directly to a noncombustible substrate and not exceed 1 mm finished thickness.
2. A material, other than one located within a fire-isolated exit or fire control room, may be covered on all faces by concrete or masonry not less than 50 mm thick, as an alternative to meeting the specified indices.
3. In the case of a composite member or assembly, the member or assembly must be constructed so that when assembled as proposed in a building—
 - o any material which does not comply with this Table is protected on all sides and edges from exposure to the air; and



- the member or assembly, when tested in accordance with Specification A2.4, has a Spread-of-Flame Index and a Smoke-Developed Index not exceeding those prescribed in this Table; and
- the member or assembly retains the protection in position so that it prevents ignition of the material and continues to screen it from access to free air for a period of not less than 10 minutes.

12.2.3 Sarking

Reflective insulation products used for weatherproofing roofs and walls must be tested and comply with AS/NZS 4200 Parts 1 and 2 for their intended application.

Note that for products classified as AS/NZS 4859.1 Reflective insulation ‘Group 2, 3, 4, 5, 6, or 7’, this requirement is additional to those of AS/NZS 4859.1. AS/NZS 4200.1 references a suite of test requirements in; Section 5 - Properties, Section 6 - Classification, Section - 7 Allowable Usage, and Section 8 - Marking and Roll Labelling (requiring product to be marked with a ‘Product Identifier’ at up to 3.0m repeat in the machine direction). AS/NZS 4200.2 references requirements in; Section 5 –Allowable usage based on duty classifications, Section 6 – Installation of pliable building membranes in tiled roofing, Section 7 – Installation of pliable building membranes in sheet roofing, ceilings and floors, Section 8 – Installation of pliable building membranes in walls and gables, Section 9 – Penetrations.

12.2.4 Bushfire Areas

Reflective insulation products used as sarking-type materials must be tested to AS 1530.2 to achieve a Flammability Index not greater than 5.

12.2.5 Building Fabric Thermal Insulation

Reflective insulation:

- must comply with AS/NZS 4859.1, and
- be installed so that it
 - abuts or overlaps adjoining insulation other than at supporting members such as studs, noggins, joists, furring channels and the like where the insulation must be against the member; and
 - forms a continuous barrier with ceilings, walls, bulkheads, floors or the like that inherently contribute to the thermal barrier; and
 - does not affect the safe or effective operation of a service or fitting.

Reflective insulation must be installed with;



- the necessary airspace to achieve the required R-Value between a reflective side of the reflective insulation and a building lining or cladding; and
- be closely fitted against any penetration, door or window opening; and
- adequately supported by framing members; and
- each adjoining sheet of roll membrane be overlapped not less than 50 mm, or taped together.

12.2.6 Air-Conditioning, Ventilation, Piping, Vessel, Heat Exchanger and Tank Thermal Insulation

Reflective Insulation on ductwork and fittings, used for heating or cooling, including evaporative cooling, piping, vessels, heat exchangers and tanks must comply with AS/NZS 4859.1.

12.3 NCC 2012, BCA Vol.2 Requirements

BCA Volume 2 provides requirements for Houses (Class 1 and 10). The requirements of this section will apply if the product is to be installed in these buildings.

12.3.1 Fire hazard properties

Reflective insulation used as roof sarking must achieve a flammability index not greater than 5 when tested to AS 1530.2.

12.3.2 Bushfire Areas

Reflective insulation used as “sarking” must achieve a flammability index not greater than 5 when tested to AS 1530.2.

12.3.3 Building fabric thermal insulation

Reflective insulation must comply with AS/NZS 4859.1 and be installed so that it;

- abuts or overlaps adjoining insulation other than at supporting members such as columns, studs, noggins, joists, furring channels and the like where the insulation must butt against the member; and
- forms a continuous barrier with ceilings, walls, bulkheads, floors or the like that inherently contribute to the thermal barrier; and
- does not affect the safe or effective operation of a domestic service or fitting.



Reflective insulation must be installed;

- with the necessary airspace, to achieve the required R-Value between a reflective side of the reflective insulation and a building lining or cladding; and
- closely fitted against any penetration, door or window opening; and
- adequately supported by framing members; and
- with each adjoining sheet of roll membrane overlapped not less than 150 mm; or taped together.

12.3.4 Insulation of Services

Reflective insulation for central heating, water piping and heating and cooling ductwork must comply with AS/NZS 4859.1.



13 APPENDIX F: LARGE SCALE CHECKLIST

13.1 AS/NZS 4859.1 Requirements

Materials that do not permit thermal resistance measurement on a small scale. E.g. Assemblies that ‘repeat’ on a scale too big to measure a representative area.

13.1.1 Shall be suitable for the purpose

Consideration shall be given to, known safety issues, freedom from objectionable odour, and the influence of aging.

13.1.2 Demonstration of Compliance – Testing and Calculation

Where a performance is measured by testing, it shall be performed by a recognised laboratory.

Where a performance is calculated, the calculations shall be performed by an appropriately qualified person, and shall be endorsed by a recognized laboratory.

Test results for a product shall be valid for a maximum of 5 years, or until a change in formulation or design. Test results shall be reported to include factors affecting heat flow including, temperatures, airflows, ventilation, convection, dimensions, orientation, statement of compliance with the test method employed, all reporting requirements of the test method, statement of accreditation held by the laboratory, statement of compliance with AS/NZS 4859.1, conditions of validity.

Where compliance with AS/NZS 4859.1 is claimed, the claimant shall provide:

- Details of the means of compliance.
- Copies of the test and calculation reports upon request.
- For each test:
 - o The name of the testing laboratory
 - o The date of test
 - o Identification of the test standard and procedure, including the allowances for factors affecting performance.
 - o Test report numbers
 - o The type of recognition held by the laboratory to perform the test.
- For each calculation:



- The name of the person who performed the calculation.
- The date of calculation
- The temperature conditions, including the allowances for factors affecting performance.
- The report number
- The name of the testing laboratory that has endorsed the report.
- A signed dated stamp of acceptance of the calculation by the testing laboratory.
- The type of recognition held by the laboratory to perform the test.

13.1.3 Thermal Properties

Carried out in accordance with AS/NZS 4859.1, Clause 4.3, performed for appropriate environmental and installation conditions including temperatures, airflows, radiant energy, dimensions and orientation, moisture content, material uniformity. Computations shall be performed by an appropriately qualified person, and endorsed by a laboratory accredited, to perform testing to the relevant standards or procedures, either to ISO17025, or a national laboratory accreditation scheme.

Where some or all of this thermal resistance is claimed through their reflective nature, the infrared emittance of these surfaces shall be determined in accordance with ASTM E408, and be stated on the label, and literature, and in conjunction with the measurements or calculations of thermal resistance.

13.1.4 Corrosiveness

Materials and assemblies shall not increase the risk of corrosion damage to building structures, and shall be non-corrosive when tested in accordance with AS/NZS 4859.1, Appendix H.

13.1.5 Packaging

Packaging shall provide adequate protection during handling, transport and storage. Packaging shall not degrade performance of the product once removed from packaging.

13.1.6 Labelling

Labels shall include at least one of the terms “R”, “R-value”, “Thermal Resistance”, combined with the term “Declared”, and one of the terms “Material”, “System”, or “Total”.



The declared R-value shall be the long-term value accounting for de-rating from aging or environmental factors. Declared R-value shall be reported to two significant figures.

Where the product is supplied for retail sale labelling shall be provided with each package. Where product is not supplied in packaged quantities documentation shall be supplied that conveys the same information as that required on a label. All required labelling information shall be conspicuous.

Labelling shall include:

- Product Name
- Description of Contents
- Name and Address of Manufacturer
- Batch identification or other traceability information
- Safety Instructions
- A statement of compliance with AS/NZS 4859.1.
- One or more declared R-values ($\text{m}^2\cdot\text{K}/\text{W}$), accompanied by a clear statement as to the conditions under which it/they apply, and preceded by one or more of the qualifiers ‘Total’, ‘System’, or ‘Material’ as appropriate. When ‘heat flow up’ and ‘heat flow down’, or ‘Summer’ and ‘Winter’ R-values are different, all values shall be quoted with equal emphasis and prominence.

13.1.7 Safety Instructions

Where applicable, safety instructions shall include one of the following statements.

“Caution: Electric cables and equipment partially or completely surrounded with bulk thermal insulation may overheat and fail. This applies to wiring installed prior to 1989. Read the instructions accompanying this pack.”

“Caution: Electric cables and equipment partially or completely surrounded with bulk thermal insulation may overheat and fail. This applies to wiring installed prior to 1989. Read the following instructions.”



13.2 NCC 2012, BCA Vol.1 Requirements

BCA Volume 1 provides requirements for Commercial Buildings (Class 2 to 9). The requirements of this section will apply if the product is to be installed in these buildings.

13.2.1 Evidence of Suitability

Products must demonstrate that they comply with the performance requirements through appropriate: Test Report(s) from a Registered Testing Authority, and/or Certificate(s) from a Professional Engineer, or appropriately qualified person.

13.2.2 Fire Hazard Properties

Paint or fire retardant coatings must not be used to achieve this compliance.

Wall or Ceiling Lining, or Attachment:

Where a Large Scale product is used as a wall or ceiling lining, or as an attachment to a wall or ceiling lining, it must be achieve a *Group Number* by testing to AS ISO 9705 or by prediction using AS/NZS 3837 test results. The Group Number of a product determines where the product may be used in a building. The following table outlines where different Group Numbered products may be used.



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

where:

- "Sprinklered" means a building fitted with a compliant sprinkler system.
- "Specific areas" means within;
 - o for Class 2 and 3 buildings, a sole-occupancy unit; and
 - o for Class 5 buildings, open plan offices with a minimum floor dimension/floor to ceiling height ratio > 5; and
 - o for Class 6 buildings, shops or other building with a minimum floor dimension/floor to ceiling height ratio > 5; and
 - o for Class 9a health-care buildings, patient care areas; and
 - o for Class 9b theatres and halls, etc., an auditorium; and
 - o for Class 9b schools, a classroom; and
 - o for Class 9c aged care buildings, resident use areas.

Materials used in “Unsprinklered” buildings must also achieve a smoke growth rate index (SMOGRARC) of not more than 100 (as determined in the AS ISO 9705 test), or an average specific extinction area less than 250 m²/kg (as determined in the AS/NZS 3837 test).



Wall or Ceiling Attachment, or General Insulation:

Where a formed shape product is used as an attachment to a wall or ceiling, or as an insulation material, it must be tested in accordance with AS/NZS 1530.3 for spread-of-flame and smoke-developed indices as required for the applications below.

Material or assembly location	Flammability Index	Spread-of-Flame Index	Smoke-Developed Index
Fire control rooms subject to Specification E1.8 and fire-isolated <i>exits</i> , other than a <i>sarking-type material</i> used in a ceiling or used as an attachment or part of an attachment to a building element. ^{Note 1}	—	0	2
Class 9b buildings used as a theatre, public hall or the like:			
(a) Any part of fixed seating in the audience area or auditorium.	—	0	5
(b) A proscenium curtain <i>required by Specification H1.3</i> .	—	0	3
Escalators, moving walkways or non- <i>required non-fire-isolated stairways</i> or pedestrian ramps subject to Specification D1.12 .	—	0	5
Other materials or locations and insulation materials other than <i>sarking-type materials</i> . Notes 2 and 3	—	9	8 if the <i>Spread-of-Flame Index</i> is more than 5

Where:

1. In a fire control room or fire-isolated stairway, a material used as an attachment or part of an attachment to a building element must, if combustible, be attached directly to a noncombustible substrate and not exceed 1 mm finished thickness.
2. A material, other than one located within a fire-isolated exit or fire control room, may be covered on all faces by concrete or masonry not less than 50 mm thick, as an alternative to meeting the specified indices.
3. In the case of a composite member or assembly, the member or assembly must be constructed so that when assembled as proposed in a building—
 - any material which does not comply with this Table is protected on all sides and edges from exposure to the air; and
 - the member or assembly, when tested in accordance with Specification A2.4, has a Spread-of-Flame Index and a Smoke-Developed Index not exceeding those prescribed in this Table; and



- the member or assembly retains the protection in position so that it prevents ignition of the material and continues to screen it from access to free air for a period of not less than 10 minutes.

13.2.3 Building Fabric Thermal Insulation

Large Scale:

- must comply with AS/NZS 4859.1, and
- be installed so that it;
 - abuts or overlaps adjoining insulation other than at supporting members such as studs, noggins, joists, furring channels and the like where the insulation must be against the member; and
 - forms a continuous barrier with ceilings, walls, bulkheads, floors or the like that inherently contribute to the thermal barrier; and
 - does not affect the safe or effective operation of a service or fitting.

Large Scale must be installed so that;

- it maintains its position and thickness, other than where it is compressed between cladding and supporting members, water pipes, electrical cabling or the like; and
- in a ceiling, where there is no bulk insulation or reflective insulation in the wall beneath, it overlaps the wall by not less than 50 mm.

13.2.4 Air-Conditioning, Ventilation, Piping, Vessel, Heat Exchanger and Tank Thermal Insulation

Large Scale insulation used for ductwork and fittings, used for heating or cooling, including evaporative cooling, piping, vessels, heat exchangers and tanks must comply with AS/NZS 4859.1.

13.3 NCC 2012, BCA Vol.2 Requirements

BCA Volume 2 provides requirements for Houses (Class 1 and 10). The requirements of this section will apply if the product is to be installed in these buildings.

13.3.1 Building fabric thermal insulation

Large Scale insulation must comply with AS/NZS 4859.1 and be installed so that it;

- abuts or overlaps adjoining insulation other than at supporting members such as columns, studs, noggins, joists, furring channels and the like where the insulation must butt against the member; and
- forms a continuous barrier with ceilings, walls, bulkheads, floors or the like that inherently contribute to the thermal barrier; and



- does not affect the safe or effective operation of a domestic service or fitting.

Large Scale insulation must be installed;

- so that it maintains its position and thickness, other than where it crosses roof battens, water pipes, electrical cabling or the like; and
- in a ceiling so that it overlaps all uninsulated external walls by not less than 50 mm.

13.3.2 Insulation of Services

Large Scale insulation used for central heating, water piping and heating and cooling ductwork must comply with AS/NZS 4859.1.