

0471P GI BUILDING SCIENCES IN THERMAL INSULATION AND PLIABLE MEMBRANES

Branded worksection

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Worksection abstract

This branded worksection *Template* is applicable to GI Building Sciences insulation and pliable membranes for floors, walls, ceilings and roofs. It generally relies on AS 3999, AS/NZS 4200.1, AS/NZS 4200.2 and AS/NZS 4859.1. A pliable building membrane may be installed to act as a sarking membrane, vapour barrier, thermal insulation or any combination of the three. This worksection does not cover insulation for services (e.g. for ductwork, use the *0744 Ductwork insulation* worksection).

Background

See the NATSPEC TECHnote DES 004 and the non-mandatory ABCB Condensation in buildings handbook for information relating to the use of insulation and vapour barriers to reduce condensation and moisture flow. See NATSPEC TECHnote DES 015 for information on the BCA energy efficiency provisions.

Guidance text

All text within these boxes is provided as guidance for developing this worksection and should not form part of the final specification. This *Guidance* text may be hidden or deleted from the document using the NATSPEC Toolbar or the hidden text *Hide* and *Delete* functions of your word processing system. For additional information visit FAQs at www.natspec.com.au.

Optional style text

Text in this font (blue with a grey background) covers items specified less frequently. It is provided for incorporation into *Normal* style text where it is applicable to a project.

Related material located elsewhere in NATSPEC

If a listed worksection is not part of your subscription package and you wish to purchase it, contact NATSPEC.

Related material may be found in other worksections. See for example:

- *0411 Waterproofing – external and tanking.*
- *0421 Roofing – combined.*
- *0431 Cladding – combined.*
- *0522 Partitions – framed and lined.*
- *0531 Suspended ceilings – combined.*
- *0621 Waterproofing – wet areas.*
- *0744 Ductwork insulation* for thermal insulation and sheathing of ductwork.

Material not provided by GI Building Sciences

This branded worksection includes generic material which may not be provided by the Product Partner including bulk insulation, rigid cellular sheet insulation and vapour permeable membranes.

Documenting this and related work

You may document this and related work as follows:

- Show on the drawings the extent, type, location, arrangement, fixing and support details of all insulation and pliable membranes.
- Insulation and pliable membranes may be integral to other worksections. Cross reference from related worksections to this worksection or take relevant text from here for inclusion in those worksections.

The *Normal* style text of this worksection may refer to items as being documented elsewhere in the contract documentation. Make sure they are documented.

Search acumen.architecture.com.au, the Australian Institute of Architects' practice advisory subscription service, for notes on the following:

- Guarantees and warranties.

Specifying ESD

The following may be specified by retaining default text:

- Framed wall thermal break strips.

The following may be specified using included options:

- Thermal performance to reduce heating/cooling load by specifying the required R-Value for roof/ceiling, walls and floors.

The following may be specified by including additional text:

- Recycled material content, e.g. recycled waste glass in glass wool insulation.

Refer to the NATSPEC TECHreport TR 01 on specifying ESD.

1 GENERAL

GI Building Sciences is the next step in the evolution of the Green Insulation that was founded almost 15 years ago. GI Building Sciences today continues to follow a strong heritage in innovation and research to deliver a range of insulation and other products that specifically address the challenges presented by the modern world including building affordability, sustainability and social responsibility. We believe everyone deserves smarter, safer and healthier options in building, design and lifestyle.

1.1 RESPONSIBILITY

General

Requirement: Provide GI Building Sciences insulation and pliable membrane systems, as documented.

Documented is defined in *0171 General requirements* as meaning contained in the contract documents.

It is the responsibility of the designer to nominate and detail insulation and pliable membranes conforming to the requirements of the BCA.

1.2 COMPANY CONTACTS

GI Building Sciences technical contacts

Website: www.gibuildingsciences.com.au/contactus

1.3 CROSS REFERENCES

General

Requirement: Conform to the following:

- *0171 General requirements*.

0171 General requirements contains umbrella requirements for all building and services worksections.

List the worksections cross referenced by this worksection. *0171 General requirements* references the *018 Common requirements* subgroup of worksections. It is not necessary to repeat them here. However, you may also wish to direct the contractor to other worksections where there may be work that is closely associated with this work.

NATSPEC uses generic worksection titles, whether or not there are branded equivalents. If you use a branded worksection, change the cross reference here.

1.4 MANUFACTURER'S DOCUMENTS

Technical manuals

Technical: www.gibuildingsciences.com.au/technical

Selection and installation: www.gibuildingsciences.com.au/architects

1.5 INTERPRETATION

Definitions

General: For the purposes of this worksection the following definitions apply:

- FBS-1 (fibre-bio-soluble) mineral wool: Insulation composed of bio-soluble glass or rock fibres.
- Fibre batts: Flexible insulation supplied as factory cut pieces and composed of mineral wool (glass and rock fibre) or polyester fibre.
- Fire hazard properties: To BCA A2.4.

- This includes the Average specific extinction area, Critical radiant flux, Flammability Index, Smoke-Developed Index, Smoke growth rate index, Smoke development rate or Spread-of-Flame Index of a material or assembly as applicable.
- See NATSPEC TECHnote DES 003 for more information on fire hazard properties of insulation and pliable membranes.

This includes the Flammability Index, Smoke-Developed Index and the Spread-of-Flame Index of a material or assembly as applicable.

See NATSPEC TECHnote DES 003 for more information on fire hazard properties of insulation and pliable membranes and NATSPEC TECHnote DES 020 for fire behaviour of building materials and assemblies.

- Pliable building membrane: To AS/NZS 4200.1 and equivalent to sarking-type materials as defined in the BCA.

A pliable building membrane may be installed to act as a sarking membrane, vapour barrier, thermal insulation or any combination of the three.

Thermal insulation terminology

To AS/NZS 4859.1

AS/NZS 4859.1 relies on ASTM C168 for definitions with some qualifications and some additional definitions and in the NOTE to AS/NZS 4859.1 clause 1.5.1 offers ISO 9229 for additional information.

- Vapour permeable (breathable) membrane: A flexible membrane material, normally used for secondary waterproofing that allows for the transmission of water vapour.

Edit the **Definitions** subclause to suit the project or delete if not required. List alphabetically.

1.6 SUBMISSIONS

Certification

Certification: Required.

Certification provider: An organisation accredited by the Joint Accreditation System of Australia and New Zealand (JAS-ANZ).

Delete materials which are not applicable to the project.

Fire hazard properties

General: Submit evidence of conformance to **INSULATION AND PLIABLE MEMBRANE MATERIALS, Fire hazard properties**.

Products and materials

Thermal insulation properties: Submit evidence of conformance to AS/NZS 4859.1.

This is primarily to verify claimed Total R-Value for BCA compliance. For calculated values it is important that the calculations comply with AS/NZS 4859.1 including de-rating in Normative Appendix K. See **NATSPEC TECHnote DES 031** for information on specifying R-Values.

Warranties

General: Submit a copy of project registration with GI Building Sciences.

Requirement: Submit the following:

- [complete/delete]

Describe the requirements of warranties in **PRODUCTS** or **EXECUTION**, as appropriate, and list the submissions required here.

1.7 INSPECTION

Notice

Inspection: Give notice so that inspection may be made of the following:

- Pliable membrane and insulation before they are covered up or concealed.

Amend to suit the project adding critical stage inspection required.

Hold points, if required, should be inserted here.

2 PRODUCTS

BCA J1.2 and BCA 3.12.1 nominate the minimum R-Values for roof, wall and floor construction in all climate zones.

2.1 GENERAL

Product substitution

Other products: Conform to **PRODUCTS, GENERAL, Substitutions** in *0171 General requirements*.

The *0171 General requirements* clause sets out the submissions required if the contractor proposes alternative products. Refer also to NATSPEC TECHnote GEN 006 for more information on proprietary specification.

Marking

Identification: Marked to show the following:

- Manufacturer's identification.
- Product brand name.
- Product type.
- Quantity.

- Product reference code and batch number.
- Date of manufacture.

Edit the list to suit the project or delete if not required.

2.2 INSULATION AND PLIABLE MEMBRANE MATERIALS

Fire hazard properties

See NATSPEC TECHnote DES 003 for more information on the fire hazard properties of insulation materials and NATSPEC TECHnote DES 020 on fire behaviour of building materials and assemblies. See also BCA Spec C1.10 Table 4.

Insulation fire hazard indices: Conform to the following for all materials, tested to AS/NZS 1530.3:

- Spread-of-Flame Index: ≤ 9 .
- Smoke-Developed Index: ≤ 8 if Spread-of-Flame Index > 5 .
- Materials with reflective facing: Test to AS/NZS 1530.3 and the recommendations of Appendix A6.

AS/NZS 1530.3 Informative Appendix clause A6 recommends that reflective surfaces of test specimens (which would otherwise generally pass this test) be blackened and diagonally scored in order to simulate soot deposition onto reflective surfaces in a real fire situation. Note that AS/NZS 1530.3 clause 4.12.2(c) requires insulation materials faced with reflective surface materials to incorporate a representative vertical joint in three test specimens.

Pliable membranes Flammability Index tested to AS 1530.2: ≤ 5 .

Flammability Index is determined under AS 1530.2. There has been some debate about the adequacy of the test procedure in predicting performance of material in real fire situations. Pliable membranes are tested to AS 1530.2 as they are not suitable for testing to AS/NZS 1530.3.

Non-combustible construction required: [complete/delete]

List any parts of the project that the BCA requires to be non-combustible. Delete if none. Construction required to be non-combustible by the BCA (e.g. fire walls and spandrels with a specific FRL) must be constructed wholly of materials that are not deemed combustible. In other situations the BCA does not prohibit the use of combustible insulation materials, provided they meet the other fire properties.

Insulation

Cellulosic fibre (loose fill): To AS/NZS 4859.1 Section 5.

Mineral wool blankets and cut pieces: To AS/NZS 4859.1 Section 8.

Polyester: To AS/NZS 4859.1 Section 7.

Polyisocyanurate (rigid cellular RC/PIR): To AS 1366.2.

Polystyrene (extruded rigid cellular RC/PS-E): To AS 1366.4.

Polystyrene (moulded rigid cellular): To AS 1366.3.

Polyurethane (rigid cellular RC/PUR): To AS 1366.1.

The rigid cellular sheets listed exhibit high combustibility (as do most of the organic fibre materials) and release various toxic products of combustion (e.g. hydrogen cyanide from polyurethane foam). Other alternatives include strawboard and woodwool.

Polyurethane (sprayed): To AS 1366.1 Table 2.

Wet processed fibreboard (including softboard): To AS/NZS 1859.4.

Wool: To AS/NZS 4859.1 Section 6.

Reflective thermal insulation: To AS/NZS 4859.1 Section 9.

AS/NZS 4859.1 Normative Appendix K sets out the assumptions to be used when calculating the system and Total R-Values of building construction that incorporates reflective surfaces. It sets out the indoor and outdoor temperatures to be used and requires de-rating of the insulation effect of reflective surfaces to compensate for dust, labelling ink and so on. The effect of the de-rating may be significant. In situations where reflective foil is used in combination with bulk insulation, a conservative approach would be to ignore the reflective surface effect, i.e. treat the surface as high emittance.

Pliable membranes

Standard: To AS/NZS 4200.1.

Vapour barrier:

- Vapour barrier classification: High.

AS/NZS 4200.1 defines the classifications as high, medium or low. Alternatively, it may be unclassified.

Sarking membrane (other than walls and gables):

- Water barrier classification: High.

Vapour permeable (breathable) membrane:

- Vapour resistance when tested to AS/NZS 4200.1: [complete/delete]

AS/NZS 4200.1 does not set a value for the resistance to water vapour transmission for vapour permeable (breathable) membranes. BS 5250 has a range from 0.1 to 0.6 MN.s/g. A breathable membrane for walls with a vapour resistance of 0.5 MN.s/g is available.

Fasteners and supports

General: Metallic-coated steel.

Consider nominating stainless steel in areas of high corrosivity.

Mesh support to roof insulation

Metallic-coated steel wire netting: To AS 2423 Section 4.

- Size: 45 mm mesh x 1 mm diameter.

This is not suitable for use as safety mesh for fall arrest. AS 2423 covers wire netting and chainwire and requires that all steel products be protected against corrosion by application of a metallic-coating during manufacture, optionally overlaid with an organic coating, see AS 2423 clause 1.3.13.

Welded safety mesh: To AS/NZS 4389.

Welded safety mesh may be used for fall arrest if required by WHS authorities. Coordinate with the *0421 Roofing – combined* worksection which also cites AS/NZS 4389. Mesh support for roof insulation may not be required where fall arrest sarking is used.

2.3 GI BUILDING SCIENCES PRODUCTS

For more details on BCA conformance, see the GI Building Sciences website or the *GI Building Sciences Greenguide*. The insulation range includes a range of reflective and bulk insulation materials that can be used to meet all BCA requirements for thermal and acoustic performance.

Product conformance

Material: To AS/NZS 4859.1.

Acoustic performance: To AS/NZS ISO 717.1.

The BCA cites ISO 717-1:1996 and AS/NZS 1276.1 for testing of construction required to have a certain R_w rating.

GI All-In-One™

Description: System of single layer of reflective insulation comprising reinforced foil laminate external surfaces and a proprietary core consisting of either thermo-cellular or XP foam, encapsulating a wire safety mesh.

Selection criteria: GI All-In-One™ is a patented system of insulation that has high R-values (up to a Total Thermal Resistance of R_T 7.32 in summer and R_T 2.02 in winter), suitable for use in commercial roofs and eliminates the need for proprietary roof spacers, safety mesh and additional insulation reducing the cost of commercial roofing by approximately 30%. A vapour permeability rating of Medium to AS/NZS 4200.1, makes it a solution for condensation control in roofs. It is tested as a commercial fall arrest to AS/NZS 4389 and is accredited as a safety net system. GI All-In-One™ achieves BCA compliant summer and winter R values for most climate zones.

GI All-In-One CRIS™

Description: System of two reflective insulators made of reinforced foil laminate external foil surfaces. The bottom layer is GI All-In-One™ ($R_0.20$) with a proprietary core of foam encapsulating a safety mesh. The upper layer is GI Reflecta-Cell Plus™ reflective insulation containing a thermo-cellular material.

Selection criteria: GI All-In-One CRIS™ is a patented system of insulation, suitable for use in commercial roofs and eliminates the need for proprietary roof spacers, safety mesh and additional insulation reducing the cost of commercial roofing by approximately 30%. A vapour permeability rating of Medium to AS/NZS 4200.1 makes it a great solution for condensation control in roofs. The system can achieve a Total Thermal Resistance, of up to R_T 7.32 in summer and R_T 2.02 in winter

CRIS™

Description: System of two reflective insulators made of reinforced foil laminate external foil surfaces with a centre core of foam or bubble, and with the upper foil surface being treated with Reflecta - Coat™ anti-glare non-corrosive/non-oxidisation additive and non-slip protective coating membrane.

Selection criteria: CRIS™ is a patented system of insulation that has high R-values (up to a Total Thermal Resistance of R_T 7.32 in summer and R_T 2.02 in winter), suitable for use in commercial roofs and eliminates the need for roof spacers, safety mesh and additional insulation reducing the cost of commercial roofing by approximately 30%.

A vapour permeability rating of Medium to AS/NZS 4200.1 makes it a solution for condensation control in roofs.

Reflecta – Guard Plus™

Description: Two reinforced foil laminate external foil surfaces with a 12 mm centre core of thermo-cellular material with an upper foil surface treated with an antiglare non-slip protective coating membrane.

Reflecta – Cell Plus™

Description: Two reinforced foil laminate external foil surfaces with a 5.7 mm centre core of thermo-cellular material with an upper foil surface treated with an antiglare non-slip protective coating membrane.

Reflecta – White Plus™

Description: An exposed ice white face for increased indoor reflective lighting performance and a reinforced scrim foil backing with a fire resistance grade polyethylene core of thermo-cellular structure.

Reflecta – Break Plus™

Description: Two reinforced foil laminate external foil surfaces with a centre core of foam with an upper foil surface treated with an antiglare non-slip protective coating membrane.

Selection criteria: Reflecta-Break Plus™ is a mid-range product and can be used where acoustic properties may not be required. It is more economical than Reflecta-Guard, and can be detailed for tighter spaces provided the R-value is sufficient for the project. It conforms to requirements for a thermal break and may be used in metal-framed buildings. It is also a lighter roll, potentially reducing shipping and installation costs. A vapour permeability rating of Medium to AS/NZS 4200.1 makes it a solution for condensation control in roofs and walls.

Reflecta – Resi™

Description: Two foil laminate external aluminium foil surfaces, with a centre core of 4 mm foam, and with an upper foil surface treated with an antiglare non-slip protective coating membrane.

Reflecta-Resi™ has been designed to provide an excellent alternative to proprietary products in residential applications under metal or under tile roofs. It is the entry point of our range for habitable buildings.

GI Thermofloor™

Description: Two foil laminate external aluminium foil surfaces, with a centre core of thermo-cellular material or foam, and with an upper foil surface treated with an antiglare non-slip protective coating membrane.

GI Thermofloor™ is a patented system of insulation, for underfloor installation, that has high R-values (up to R3.8). It promises the unique properties of reducing labour costs by as much as 50% and requires no brackets or special fixings as is often required by other under floor insulation products. Suitable for use in commercial or residential floors. A vapour permeability rating of Medium to AS/NZS 4200.1 makes it a solution for condensation control in floors.

Reflecta – Shed Plus™

Description: Two foil laminate external aluminium foil surfaces, with a centre core of bubble, and with an upper foil surface treated with an antiglare non-slip protective coating membrane.

Reflecta-Shed Plus™ has been designed specifically for cost effective shed applications only. It is not suitable for use in residential, commercial buildings, or industrial building as classified under the BCA.

3 EXECUTION

3.1 GENERAL

Bulk insulation

Installation: To AS 3999 and BCA J1.2.

AS 3999 includes vapour barriers used in conjunction with bulk insulation.

General: Firmly butt together fibre blankets or batts, with no gaps except as follows:

- Access openings and vents: Do not obstruct.
- Light fittings: To AS/NZS 3000 clause 4.5.
- Electrical cables: To AS 3999 clause 2.6.

The flow of electric current in cables generates heat which needs to dissipate to the surroundings. The insulation should not be installed to completely surround the cable.

Glass wool and rock wool insulation: Conform to the ICANZ Industry code of practice for the safe use of glass wool and rock wool insulation *Industry Code of Practice for the Safe Use of Glass Wool and Rock Wool Insulation*.

The ICANZ Industry code of practice for the safe use of glass wool and rock wool insulation *Industry Code of Practice for the Safe Use of Glass Wool and Rock Wool Insulation* has been jointly developed by AMWU, CFMEU, CEPU, and ICANZ. Copies of the code are available from the respective unions, insulation manufacturers and ICANZ.

Marking: Deliver mineral wool products to site in packaging labelled FBS-1 BIO-SOLUBLE INSULATION.

See the NATSPEC TECHnote PRO 002 for more information on FBS-1 labelling.

Pliable membrane

Installation: To AS/NZS 4200.2 and BCA J1.2 or BCA 3.12.1.1, as appropriate.

Refer to AS/NZS 4200.2 Table 1 for duty classification, maximum spans and additional support. Refer to the ABCB Condensation in buildings handbook for information on condensation and use of vapour barriers, vapour permeable membranes and sarking.

3.2 FLOOR INSULATION

The following covers general applications for floor insulation. Delete applications not required and add other applications, as appropriate.

GI Building Sciences insulation

Fixing: Conform to GI Building Sciences recommendations.

Under suspended framed floors - bulk insulation

Product type: Fibre batts.

Installation: Fit tightly between framing members. If support is not otherwise provided, staple nylon twine to the framing and stretch tight.

AS 3999 includes directives on fixing of insulation, often deferring to the manufacturer's recommendations on the type and spacing of fixing devices. Preferably show fixing details on the drawings.

Under suspended framed floors – rigid insulation

Product type: Rigid cellular extruded sheets.

Installation: [complete/delete]

Select from:

- To the underside of timber strip flooring butted tightly to joists.
- To the underside of timber joists butted tightly to bearers.

Check the selected product for fire hazard properties if the insulation is exposed.

Fixing: [complete/delete]

Select adhesive or mechanical fasteners.

Over suspended framed floors

Product type: Rigid cellular extruded sheets.

Installation: [complete/delete]

Select from:

- Over sheet flooring and between battens supporting a final flooring finish.
- Over sheet flooring with battens supporting a final flooring finish at door thresholds only. Cross reference the flooring and adhesive system.

Below concrete slab on ground

Product type: Rigid cellular extruded sheets.

Preparation: [complete/delete]

e.g. Sand blinding or working slab.

Laying pattern: Stretcher bond, with edges tightly butted.

Damp proof membrane: Lay over insulation.

Over concrete slab on ground

Product type: Rigid cellular extruded sheets.

Substrate preparation: Make sure substrates are as follows:

- Clean and free of any deposit or finish which may impair adhesion or location of insulation.
- Remove excessive projections.

- Voids and hollows > 10 mm with abrupt edges: Fill with a cement:sand mix not stronger than the substrate or weaker than the bedding.

Laying pattern: Stretcher bond, with edges tightly butted.

Fixing: Adhesive fixed directly to the concrete floor slab.

Subsequent finishes: [complete/delete]

Note separation strip, screed and finish as, appropriate.

Under suspended concrete slab – rigid insulation

Use where slab incorporates in-slab heating or the slab separates a conditioned space from an unconditioned space.

Product type: Rigid cellular extruded sheets.

Fixing: [complete/delete]

Select adhesive or mechanical fasteners.

Joints: Apply reinforced foil tape to all joints.

Soffit finish: [complete/delete]

Select a finish to provide the desired appearance if exposed to view or if fire hazard properties are required.

Under suspended concrete slab – bulk insulation

Use where slab incorporates in-slab heating or the slab separates a conditioned space from an unconditioned space.

Product type: Fibre batts.

Fixing: Mechanical fasteners and support mesh or nylon twine.

Soffit finish: [complete/delete]

Select a finish to provide the desired appearance if exposed to view or if fire hazard properties are required.

3.3 WALL INSULATION

The following covers general applications for wall insulation. Delete applications not required and add other applications, as appropriate.

GI Building Sciences wall insulation

Fixing: Conform to GI Building Sciences recommendations.

Framed wall thermal break strips

Product type: Proprietary item.

Application: To steel framing with lightweight external cladding.

R-Value: ≥ 0.2 .

See BCA J1.5(c) and BCA 3.12.1.4(b).

Screw fixing: Button head screws at 1 m centres.

Adhesive fixing: Wallboard adhesive walnuts at 1 m centres.

Framed walls – bulk insulation

Product type: Fibre batts.

Installation: Friction fit between framing members. If other support is not provided, staple nylon twine to the framing and stretch tight.

AS 3999 includes directives on fixing of insulation often deferring to the manufacturer's recommendations on the type and spacing of fixing devices. Preferably show fixing details on the drawings.

Masonry veneer cavity walls

Product: Rigid cellular insulation board.

Application: To steel or timber framing.

Installation: Horizontally with the tongue to the top edge, pushed over prefixed wall ties and held firmly against the wall frame. Keep boards clean and dry and free from mortar and grout. Do not bridge the cavity.

Fixing: Hex head screws at 450 mm centres.

Flashings: Install flashings before installing insulation panels. Prevent entry of water behind the insulation boards.

If construction is required to be non-combustible, check BCA Spec C1.10.

Full masonry – cavity walls

Product: Rigid cellular insulation board.

Application: To the inner masonry skin.

Installation: Horizontally with the tongue to the top edge and firmly against the inner masonry skin. Keep boards clean and dry and free from mortar and grout. Do not bridge the cavity.

Fixing: Proprietary plastic clips on pre-installed wall ties.

Flashings: Install flashings before installing insulation panels. Prevent entry of water behind the insulation boards.

Full masonry walls – internal face

Insulation fixed to the inner face of masonry walls may also be used for retrofitting of insulation to existing walls.

Product type: Rigid cellular extruded boards.

Preparation of substrates: Conform to the following:

- Remove any deposit or finish which may impair adhesion.
- Remove excessive projections and fill voids and hollows with plaster.
- Maximum surface deviation from a 2400 mm straightedge: 6 mm.

Substrate correction: Skim plaster.

Installation: Apply boards horizontally with staggered vertical joints, all close butted and without crushing.

Fixing: Proprietary adhesive compatible with the insulation. Apply sufficient pressure to evenly distribute adhesive.

If the construction is required to be non-combustible, see BCA Spec C1.10.

Vapour permeable (breathable) membrane

The primary function of the membrane is to direct any water that may penetrate the cladding, masonry veneer or exterior finish to the outside of the structure, and act as a barrier to draughts, wind driven rain and dust. There must be adequate provision for the draining, absorption or diffusion of moisture so that moisture is not left trapped between the membrane and the external cladding.

If used as reflective thermal insulation, an air space adjacent to the reflective (low emittance) face is required.

Refer to the ABCB Condensation in buildings handbook for information on condensation and use of vapour barriers, vapour permeable membranes and sarking.

Application: Provide a vapour permeable membrane behind external facing material which does not provide permanent weatherproofing or which may be subject to condensation forming on the internal face, including the following:

- Boards fixed vertically or diagonally.
- Boards or planks fixed in exposed locations where wind driven rain can penetrate the joints.
- Unpainted or unsealed cladding.
- Masonry veneer.

Installation: Run the vapour permeable membrane horizontally on the outer face of external wall framing, over the flashing, from the bottom plate up. Pull taught over the framing and fix to framing members. Seal across the wall cavity at the top.

Horizontal laps: At least 150 mm wide, lapped to make sure water is shed to the outer face of the membrane.

End or vertical overlaps: At least 150 mm wide made over framing.

Openings: Run the vapour permeable membrane over the openings and leave covered until windows and doors are installed. Cut the membrane on a 45° diagonal from each corner of the opening, fold the flaps inside and fix to the inside frame of the opening. If the membrane is used to provide a continuous air tight layer, seal all joints with pressure sensitive adhesive tape.

A complete water tight seal that maintains vapour permeability is achieved at penetrations by installation of a proprietary fabricated corner piece.

Fixing: Install as follows:

Consider nominating stainless steel in areas of high corrosivity.

- Timber frames: Metallic-coated clouts, 20 mm long 6 to 8 mm staples or punched multi-point metallic-coated steel brads.

- Steel or aluminium frames: Hex head screws, with either 20 mm diameter washers or through hardboard strips.
- Plywood: Alternatives:
 - . Metallic-coated clouts, 20 mm long 6 to 8 mm staples or punched multi-point metallic-coated steel brads at minimum 300 mm centres.
 - . Water based contact adhesive with a 50% adhesive cover.

3.4 ROOF INSULATION

The following covers general applications for roof insulation. Delete applications not required and add other applications, as appropriate.

General

Location: The whole of the roof area including skylight shaft walls, except the following:

- Eaves, overhangs, skylights, vents and openings.
- Roofs to outbuildings, garages, and semi-enclosed spaces such as verandahs, porches and carports.

Amend if insulation is required in semi-enclosed spaces (balconies, verandahs) or ancillary buildings (garages, workshops, carports etc.).

Mesh support to roof insulation

GI All-In-One™, GI All-In-One CRIS™ and CRIS™ require no additional support mesh or safety mesh. All other GI materials should be supported using welded safety as required by WHS authorities for fall arrest. AS/NZS 4389, on welded safety mesh, is called up in the 0421 Roofing – combined worksection.

Locations: Provide support to the following:

- Sarking, vapour barrier or reflective thermal insulation membranes laid over roof framing members which are spaced at more than 900 mm centres.
- Blanket type thermal insulation laid over roof framing members as sound insulation to metal roofing.

Wire safety mesh: : Lay over the roof framing allowing only natural mesh sag between members to suit the application. Staple to timber frame, wire to steel frame.

Installing welded safety mesh: To AS/NZS 4389.

Pliable membranes

Sarking membrane:

- Location: Provide sarking under tile and shingle roofing.

AS 2050 specifies sarking requirements for tiled roofs and is cited in the BCA for structural sufficiency and weatherproofing. See AS 3999 clause 5.2 on the installation of roof installation.

If used as reflective thermal insulation, an air space adjacent to the reflective (low emittance) face is required.

Vapour barrier:

- Installation: Lay over the roof framing with sufficient sag to allow the bulk insulation to achieve its full thickness. Overlap all edges 150 mm and seal all joints with pressure sensitive adhesive tape.

Any separate bulk thermal insulation should be placed on the cold side of the vapour barrier.

GI Building Sciences - Metal and tile roof reflective foil

Product: Thermo-Cellular reflective foil insulation.

Installation: Conform to GI Building Sciences recommendations.

CRIS™ installation:

- Upper layer: By roofing contractor.
- Lower layer to underside of purlins: By ceiling/partition contractors.

GI Building Sciences Reflecta-Guard Plus™ products carry the AFIMA Fall Arrest Trademarked logo for Fall Arrest Sarking for Tiled roof applications.

The Reflecta range of products are vapour permeable membranes, and Reflecta-Guard™ and Reflecta-Break™ also conform to requirements for thermal breaks.

Metal roofs – bulk insulation

Product: Fibre blankets or batts.

Installation:

- Batts: Fit tightly between framing members.
- Blanket for sound insulation: Install over the roof framing, reflective thermal insulation (if any), and mesh support, so that the blanket is in continuous contact with the underside of the metal roofing sheets.
- Combined blanket and reflective insulation: Lay reflective insulation face downwards over safety mesh.

Waterproof membrane roofs – IRMA/PMR types

Roofs with insulating membrane protection are also known as IRMA (inverted roof membrane assembly) or PMR (protective membrane roof). Delete if specified in the 0411 Waterproofing – external and tanking worksection.

Product type: Rigid cellular extruded sheets.

Preparation: Make sure membrane is clean and free of loose material.

Separation layer: Lay over membrane with edges lapped 300 mm and turned up at upstands and penetrations.

Specify separation layer in the 0411 Waterproofing – external and tanking worksection, or delete if not required.

Installation: Lay insulation in a brick pattern with shiplap edges pushed together firmly. Cut neatly around penetrations and extend up upstands.

Finish: [complete/delete]

Document a filter layer with 150 mm laps at right angles to the slope above the insulation sheets, stone drainage layer, soil and planting in the appropriate worksections and nominate them in **CROSS REFERENCES, General**.

Cathedral ceiling insulation – metal roofing and roofing tiles

Alternatively use fibre batts bulk insulation installed between ceiling joists.

Product type: Rigid cellular extruded sheets.

Application: Over ceiling lining that has been applied over rafters.

Installation: Lay insulation with long edges at right angles to the rafters and with the tongue pointing up the slope. Start laying at eaves and progress towards the ridge. Secure temporarily by occasional nailing to the rafters, the permanent fixing is provided by the nails used to secure the counter battens to the rafters. Cut boards and tightly fit to abutments and penetrations. Seal gaps with polyurethane foam.

Ceiling insulation – bulk insulation

Product type:

- Framed ceilings: Fibre batts.
- Suspended ceiling: Fibre blanket.

Application: Over ceiling lining.

Installation:

- Batts: Fit tightly between framing members.
- Blankets: Butt joint and layover ceiling panels or lining.

3.5 COMPLETION

Warranties

Insulation and pliable membranes: Submit the manufacturer's published product warranties.

Use only where warranties extending beyond the defects liability period are available for the particular system. Insert the required warranty period and terms, which should be negotiated beforehand. If the warranty is in the form of separate material and installation warranties, require the signatures of both manufacturer and installer. If specifying warranties include the following:

- Warranty.
- Minimum period.
- Form of warranty.

The form(s) required should be provided as part of the contract documentation.

GI Building Sciences warranties

Warranty form: Material warranty covering oxidation, corrosion, faulty manufacture and failure of product.

Warranty period: 15 years.

4 SELECTIONS

Schedules are a way of documenting a selection of proprietary or generic products or systems by their properties. Indicate their locations here and/or on the drawings. Refer to NATSPEC TECHnote GEN 024 for guidance on using and editing schedules.

4.1 INSULATION PRODUCT SCHEDULE

Floor insulation

Property	A	B	C
Application			
GI Building Sciences Product			
Type/Product			
Location			
R-Value			
Thickness (mm)			
R _w rating			
Compressive strength			
Rigid cellular sheet class			

A, B, C: These designate each instance or type or location of the scheduled. Edit to align with the project's codes or tags. Edit codes in the **Schedule** to match those on drawings.

Application: Select from the following:

- Under suspended framed floor.
- Over suspended framed floor.
- Below concrete slab on ground.
- Over concrete slab on ground.
- Under suspended concrete slab.

GI Building Sciences Product: Select from the following products:

- CRIS™
- Reflecta-Cell.
- Reflecta-Guard.
- Reflecta-Break.

Type/Product: Nominate product or select from the following types:

- Bulk insulation.
- Semi-rigid sheets with heavy duty pliable membrane.
- Pliable membrane (foil) faced blanket.
- Rigid cellular extruded sheets. Check the selected product for fire hazard properties if the insulation is exposed.

Location: Describe location or show on the drawings, e.g. Under the entire slab or 1200 mm to the perimeter at two board widths wide.

Thickness: Nominate insulation thickness required to achieve the R-Value.

R_w rating: If the insulation is required to contain or exclude noise. For weighted sound reduction index (R_w) rating, see AS/NZS ISO 717.1. Refer to NATSPEC TECHnote DES 032 for information on airborne sound insulation.

Compressive strength: Refer to structural engineer and product manufacturer for advice.

Rigid cellular sheet class: Refer to AS 1366 series for information on the classification of rigid cellular sheet insulation, e.g. for rigid (moulded and extruded) cellular polystyrene AS 1366.3 Class SL (marked with a yellow colour stripe), or AS 1366.4 Class I (marked on each board).

Wall insulation

Property	A	B	C
Application			

Property	A	B	C
GI Building Sciences Product			
Type/Product			
Location			
R-Value			
Thickness (mm)			
R _w rating			
Rigid cellular sheet class			

A, B, C: These designate each instance or type or location of the item scheduled. Edit to align with the project's codes or tags. Edit codes in the **Schedule** to match those on drawings.

Application: Select from the following:

- Framed walls with cladding.
- Masonry veneer cavity walls.
- Full masonry walls – cavity insulation.
- Full masonry walls – internal face.
- Concrete tilt-up walls.

GI Building Sciences Product: Select from the following products:

- CRIS™
- Reflecta-Cell.
- Reflecta-Guard.
- Reflecta-Break.

Type/Product: Nominate product or select from the following types:

- Bulk insulation
- Rigid cellular extruded sheets. Check the selected product for fire hazard properties if the insulation is exposed.

Location: Describe location or show on the drawings.

Thickness: Nominate insulation thickness required to achieve the R-Value.

R_w rating: If the insulation is required to contain or exclude noise. For weighted sound reduction index (R_w) rating, see AS/NZS ISO 717.1. Refer to NATSPEC TECHnote DES 032 for information on airborne sound insulation.

Rigid cellular sheet class: Refer to AS 1366 series for information on the classification of rigid cellular sheet insulation, e.g. for rigid (moulded and extruded) cellular polystyrene AS 1366.3 Class SL (marked with a yellow colour stripe), or AS 1366.4 Class I (marked on each board).

Roof insulation

Property	A	B	C
Application			
GI Building Sciences Product			
Type/Product			
Location			
R-Value			
Thickness (mm)			
R _w rating			
Rigid cellular sheet class			

A, B, C: These designate each instance or type or location of the item scheduled. Edit to align with the project's codes or tags. Edit codes in the **Schedule** to match those on drawings.

Application: Select from the following:

- Tiled roofs – reflective insulation.
- Metal roofs – reflective insulation.
- Metal roofs – bulk insulation.
- Cathedral ceiling insulation.
- Ceiling insulation.
- Waterproof membrane roofs.
- Under suspended concrete slab.

GI Building Sciences Product: Select from the following products:

- CRIS™
- Reflecta-Cell.
- Reflecta-Guard.
- Reflecta-Break.

Type/Product: Nominate product or select from the following types:

- Bulk insulation.
- Combined bulk insulation blanket and reflective insulation.
- Rigid cellular extruded sheets. Check the selected product for fire hazard properties if the insulation is exposed.

Location: Describe location or show on the drawings.

Thickness: Nominate insulation thickness required to achieve the R-Value.

R_w rating: If the insulation is required to contain or exclude noise. For weighted sound reduction index (R_w) rating, see AS/NZS ISO 717.1. Refer to NATSPEC TECHnote DES 032 for information on airborne sound insulation.

Rigid cellular sheet class: Refer to AS 1366 series for information on the classification of rigid cellular sheet insulation, e.g. for rigid (moulded and extruded) cellular polystyrene AS 1366.3 Class SL (marked with a yellow colour stripe), or AS 1366.4 Class I (marked on each board).

4.2 PLIABLE MEMBRANES

Pliable membranes

Property	A	B	C
Application			
Product			
Location			
Duty to AS/NZS 4200.1			
Vapour barrier resistance to AS/NZS 4200.1			
Emittance classification to AS/NZS 4200.1			
Water barrier classification to AS/NZS 4200.1			

A, B, C: These designate each instance or type or location of the item scheduled. Edit to align with the project's codes or tags. Edit codes in the **Schedule** to match those on drawings.

Application: Select from the following:

- Vapour barrier.
- Vapour permeable (breathable) membrane.
- Sarking membrane.
- Reflective thermal insulation.

Product: Nominate the selected product

Location: Describe location or show on the drawings.

Duty to AS/NZS 4200.1: Select from Extra heavy, Heavy, Medium, Light or Extra light.

Vapour barrier resistance to AS/NZS 4200.1: Select from High, Medium or Low or Unclassified.

Emittance classification to AS/NZS 4200.1: Select from Reflective or Double-sided reflective or state a value.

Water barrier classification to AS/NZS 4200.1: High or Unclassified.

Describe the location or refer to drawings.

REFERENCED DOCUMENTS

The following documents are incorporated into this worksection by reference:

AS ISO 717		Acoustics - Rating of sound insulation in buildings and of building elements
AS/NZS ISO 717.1	2004	Airborne sound insulation
AS 1366		Rigid cellular plastics sheets for thermal insulation
AS 1366.1	1992	Rigid cellular polyurethane (RC/PUR)
AS 1366.2	1992	Rigid cellular polyisocyanurate (RC/PIR)
AS 1366.3	1992	Rigid cellular polystyrene - Moulded (RC/PS - M)
AS 1366.4	1989	Rigid cellular polystyrene - Extruded (RC/PS-E)
AS 1530		Methods for fire tests on building materials, components and structures
AS 1530.2	1993	Test for flammability of materials
AS/NZS 1530.3	1999	Simultaneous determination of ignitability, flame propagation, heat release and smoke release
AS/NZS 1859		Reconstituted wood-based panels - Specifications
AS/NZS 1859.4	2004	Wet-processed fibreboard
AS 2423	2002	Coated steel wire fencing products for terrestrial, aquatic and general use
AS/NZS 3000	2007	Electrical installations (known as the Australian/New Zealand Wiring Rules)
AS 3999	2015	Bulk thermal insulation - Installation
AS/NZS 4200		Pliable building membranes and underlays
AS/NZS 4200.1	1994	Materials
AS/NZS 4200.2	1994	Installation requirements
AS/NZS 4389	2015	Safety mesh
AS/NZS 4859		Materials for the thermal insulation of buildings
AS/NZS 4859.1	2002	General criteria and technical provisions
BCA 3.12.1.1	2016	Acceptable construction - Energy efficiency - Building fabric - Building fabric thermal insulation
BCA A2.4	2016	General Provisions - Acceptance of design and construction - Fire hazard properties
BCA J1.2	2016	Energy efficiency - Building fabric - Thermal construction - General
ICANZ	2003	Industry code of practice for the safe use of glass wool and rock wool insulation
ICANZ FBS-1	2009	Glass wool bio-soluble insulation

The following documents are mentioned only in the *Guidance text*:

AS/NZS 1276		Acoustics - Rating of sound insulation in buildings and of building element
AS/NZS 1276.1	1999	Airborne sound insulation
AS 1366		Rigid cellular plastics sheets for thermal insulation
AS 2050	2002	Installation of roof tiles
ABCB Condensation	2014	Condensation in buildings handbook
BCA 3.12.1	2016	Acceptable construction - Energy efficiency - Building fabric
BCA 3.12.1.4	2016	Acceptable construction - Energy efficiency - Building fabric - External walls
BCA Spec C1.10	2016	Fire resistance - Fire hazard properties
BCA J1.5	2016	Energy efficiency - Building fabric - Walls
NATSPEC DES 003	2006	Fire hazard properties of insulation and pliable membranes
NATSPEC DES 004	2005	Air, moisture and condensation
NATSPEC DES 015	2007	BCA - NCC Volume One Energy efficiency provisions
NATSPEC DES 020	2011	Fire behaviour of building materials and assemblies
NATSPEC DES 031	2014	Specifying R-Values
NATSPEC DES 032	2014	Airborne sound insulation
NATSPEC GEN 006	2007	Product specifying and substitution
NATSPEC GEN 024	2015	Using NATSPEC selections schedules
NATSPEC PRO 002	2006	Mineral wool
NATSPEC TR 01	2016	Specifying ESD
BS 5250	2011	Code of practice for control of condensation in buildings
ASTM C168	2015	Standard Terminology Relating to Thermal Insulation
ISO 717		Acoustics - Rating of sound insulation in buildings and of building elements
ISO 717-1	1996	Airborne sound insulation
ISO 9229	2007	Thermal insulation - Vocabulary