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ICANZ

THE RIGHT INSULATION MATTERS

Well-being
Well-being

Economic
Benefit

Energy
Efficiency

Environment
Environment

INSULATION HANDBOOK

Part 1: Thermal Performance

Total R-Value calculations for
typical building applications

An independent publication of the
Insulation Council of Australia and New Zealand

November 2010

RRP \$29.95

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CONTENTS

THE RIGHT INSULATION MATTERS	PAGE 6
TYPES OF INSULATION	PAGE 9
GLOSSARY OF TERMS	PAGE 10
BCA CLIMATE ZONES	PAGE 12
BCA CLASSES OF BUILDINGS AND TYPES OF CONSTRUCTION	PAGE 13
ROOF CALCULATIONS	
R0100 PITCHED TILED ROOF WITH FLAT CEILING	PAGE 14
R0200 PITCHED METAL ROOF WITH FLAT CEILING	PAGE 15
R0300 PITCHED TILED ROOF WITH CATHEDRAL CEILING BELOW RAFTERS (concealed rafters)	PAGE 16
R0400 METAL ROOF WITH CATHEDRAL CEILING BELOW RAFTERS (concealed rafters)	PAGE 17
R0500 TILED ROOF WITH CATHEDRAL CEILING ABOVE RAFTERS (exposed rafters)	PAGE 18
R0600 METAL ROOF WITH CATHEDRAL CEILING ABOVE RAFTERS (exposed rafters)	PAGE 19
R0700 FLAT METAL ROOF WITH PLASTERBOARD CEILING (concealed rafters)	PAGE 20
R0800 FLAT METAL ROOF WITH PLASTERBOARD CEILING (exposed rafters)	PAGE 21
R0900 FLAT METAL ROOF WITH NO CEILING (warehouse)	PAGE 22
R1000 FLAT METAL ROOF WITH SUSPENDED CEILING	PAGE 23
R1100 FLAT METAL ROOF WITH SUSPENDED CEILING PLENUM RETURN (ventilated)	PAGE 24
R1200 FLAT CONCRETE ROOF WITH SUSPENDED CEILING (non ventilated)	PAGE 25
R1300 FLAT CONCRETE ROOF WITH SUSPENDED CEILING PLENUM RETURN (ventilated)	PAGE 26
WALL CALCULATIONS	
W0100 CLAY MASONRY VENEER	PAGE 27
W0200 LIGHTWEIGHT CLADDING (direct fixing to stud)	PAGE 28
W0300 LIGHTWEIGHT CLADDING FIXED TO BATTENS	PAGE 29
W0800 HOLLOW CONCRETE BLOCKWORK	PAGE 30
W1100 CAVITY CLAY MASONRY	PAGE 31
W1200 REVERSE BRICK VENEER (external cladding fixed directly onto stud frame)	PAGE 32
W1300 METAL CLADDING (warehouse wall, cladding directly fixed to girts)	PAGE 33
W1400 METAL CLADDING (warehouse wall, cladding directly fixed to girts internally lined)	PAGE 34
W1500 CONCRETE TILT SLAB (internally lined, battens direct fix to precast)	PAGE 35
FLOOR CALCULATIONS	
F0100 SUSPENDED TIMBER FLOOR	PAGE 36
F0200 CONCRETE SUSPENDED SLAB (carpark ceiling)	PAGE 37
F0300 AERATED CONCRETE FLOOR PANELS (75mm thick)	PAGE 38

THE RIGHT INSULATION MATTERS

The Right Insulation.....increases building energy efficiency, improves health and well-being and reduces greenhouse gas emissions

About this Handbook

This handbook has been developed to assist designers, specifiers and builders to:

- determine the Total R-value of common construction systems
- increase energy efficiency and reduce environmental impact of building projects
- assist in complying with the requirements of the Building Code of Australia, AS/NZS 4859.1 and energy rating software
- demonstrate accepted industry installation practices
- clarify and standardise the value of reflective foil insulation in typical building applications

While some applications can be used to achieve “Deem to Satisfy” solutions for the BCA Energy Efficiency Provisions, not all solutions will achieve compliance for all applications.

Total R-Value

R value means the thermal resistance (m^2K/W) of a material calculated by dividing the thickness by its thermal conductivity.

Total R-Values are based on the sum of all components of the building system including indoor and outdoor air-films, building materials used in the system and air-spaces.

- Bulk insulation thermal resistance is expressed by Material R-Value
- Reflective insulation thermal resistance is expressed in terms of Total R-Value

Calculations in this handbook have been made using practical assumptions for typical situations, and using conservative assumptions expected in actual systems (rather than ideal theoretical systems that are unrealistic to achieve in practice). In particular the effect of anti-glare coatings or dust on the top surface of foil has been used in accordance with the 2006 amendment to AS/NZS 4859.1.

In addition, the Total R-Value of the un-insulated structures are also provided to demonstrate the thermal resistance without insulation: these are shown for both summer and winter conditions.

Added R-Values indicate the improvement in thermal resistance achieved by correct installation of insulation products. In the case of reflective insulation, these details may be used in combination with other complimentary insulation products to satisfy BCA requirements for added insulation.

Note that the correct choice of insulation is dependent on a range of factors, other than thermal performance. Other factors may include condensation control, moisture absorption, non-combustibility and acoustic performance.

All calculations have been determined on the path of the insulation. Thermal bridging has not been taken into account. Consistent with the approach of the Building Code of Australia Vol 2 Part 3.12, and standard industry practice.

THE RIGHT INSULATION MATTERS

How does reflective insulation work

Reflective insulation may perform differently in “Summer” and “Winter”; therefore you must -

- First identify in which climate zone the particular building project is located (Refer to BCA Climate Map).
- Next, refer to the Minimum Total R-Value table displayed in BCA Part J or Part 3.12.1 to determine whether the ‘Summer’ or ‘Winter’ design condition is applicable.

These steps are explained on the following pages.

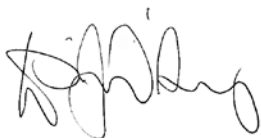
Note:

Recommendations made in this handbook are based on Australian climate conditions

- Building design
- Structural systems
- Building materials

The performances of reflective foil insulation and bulk insulation are based on generic ‘products’ NOT proprietary brands. For information on specific reflective insulation or bulk insulation brands, please direct requests to the appropriate manufacturers. Select a product that has an equivalent or better specification of that nominated in this handbook.

I recommend this publication to all Building Designers as an invaluable source of information essential for the design of Energy Efficient Buildings.



DENNIS D'ARCY

ICANZ CEO

... AND PROVIDES MORE THAN JUST EFFICIENCY FOR BUILDINGS

Environmental benefits:

- Buildings account for over 20% of Australia's GHG emissions
- Energy consumption in buildings is growing faster than most other areas of use.
- Insulation is the most cost effective way of reducing energy consumption and greenhouse gases emissions in the built environment
- Insulating buildings (new and existing) is the most financially attractive of all energy efficiency and renewable energy measures to reduce greenhouse gas emissions.
- Insulation alone can cut Australia's greenhouse gas emissions by up to 5%.
- Current insulation production technology is proven and available now. Installing insulation has an immediate impact on energy demand and GHG emissions.
- A response to climate change demands well-insulated new and existing buildings.

Economic benefits:

- Insulation reduces average home heating and cooling costs by around 30%
- Insulation reduces the burden of increasing energy prices.
- The cost of installing insulation already pays for itself in around 3-5 years through reduced energy bills, and payback time will improve as energy costs rise.
- The right insulation is a once-only cost that lasts for the life of the building (typically 50 – 70 years) and requires no further maintenance.
- Saved energy is the most sustainable energy. Insulated buildings reduce the need for additional power generation capacity by "smoothing out" the peaks in energy demand.
- Well insulated buildings have reduced need for air-conditioning.
- Insulation improves property values and has been shown to increase the return on rented and leased properties.
- Insulation is not expensive. To insulate the ceilings, walls and floors of a typical house costs less than 1% of the construction cost.

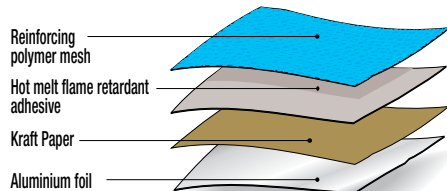
Social benefits:

- People spend a great proportion of their lives in buildings. Insulation provides more than energy efficiency. Thermal and acoustic insulation play important roles in improving the quality of life by providing environments that are more comfortable – this leads to greater productivity at work.
- Studies show that well insulated buildings provide a healthier environment by controlling temperature and noise levels.
- By reducing household and business running costs, energy saving from insulation can provide a buffer to other cost of living increases.
- Insulation protects and improves the quality of life of the elderly and socially disadvantaged.



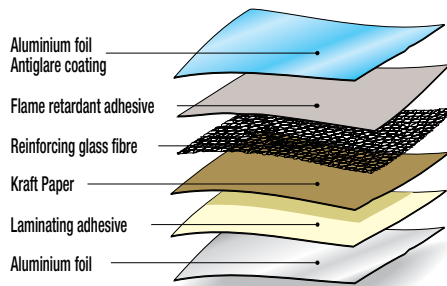
TYPES OF INSULATION

Six types of insulation products are used throughout this Handbook.



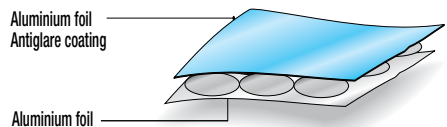
1. Single Sided Poly Weave Foils

A polymesh woven material with a reflective foil adhered to one side, polymesh products can also have a paper inner core layer, the other side typically being opaque. Sometimes referred to as a radiant barrier insulation. Polymesh products are also available in breather (moisture vapour permeable grades). (Emissivity of bright face assumed to be 0.03, poly weave face is 0.87).



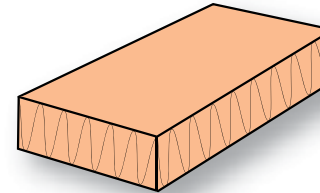
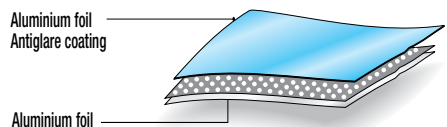
2. Double Sided Antiglare Foils

Antiglare foils with reflective foil on each side of an inner paper based lining, one face being coated with an antiglare ink to reduce glare. Also available in breather grades and in perforated form where holes are approximately 2mm in diameter resulting in 10% open area. (Emissivity of bright face assumed to be 0.03, antiglare face is 0.1).



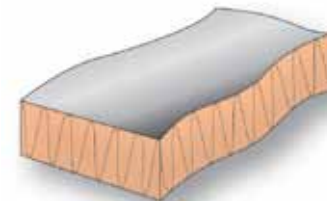
3. Bubble/Foam Foils

Double sided reflective foils. One side coated with antiglare to reduce glare. Centre core material, typically 7mm thick enclosing a single layer of individual air bubbles or closed cell foam (Emissivity of bright face assumed to be 0.03, antiglare face is 0.10).



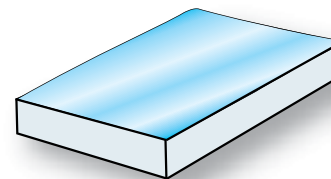
4. Ceiling and Wall Batts

Lightweight, flexible and resilient bulk glasswool insulation batt, specially designed for thermal insulation of ceilings and cavity walls in both domestic and commercial buildings. They have the added benefit of being an effective sound absorber and so contribute to both the thermal and acoustic comfort of building occupants.



5. Foil Faced Blanket

Roofing blanket consists of a lightweight flexible bulk mineral insulation blanket faced on one side with reflective foil laminate. The blanket material is available in various R-values and thicknesses. (Emissivity of bright face assumed to be 0.03).



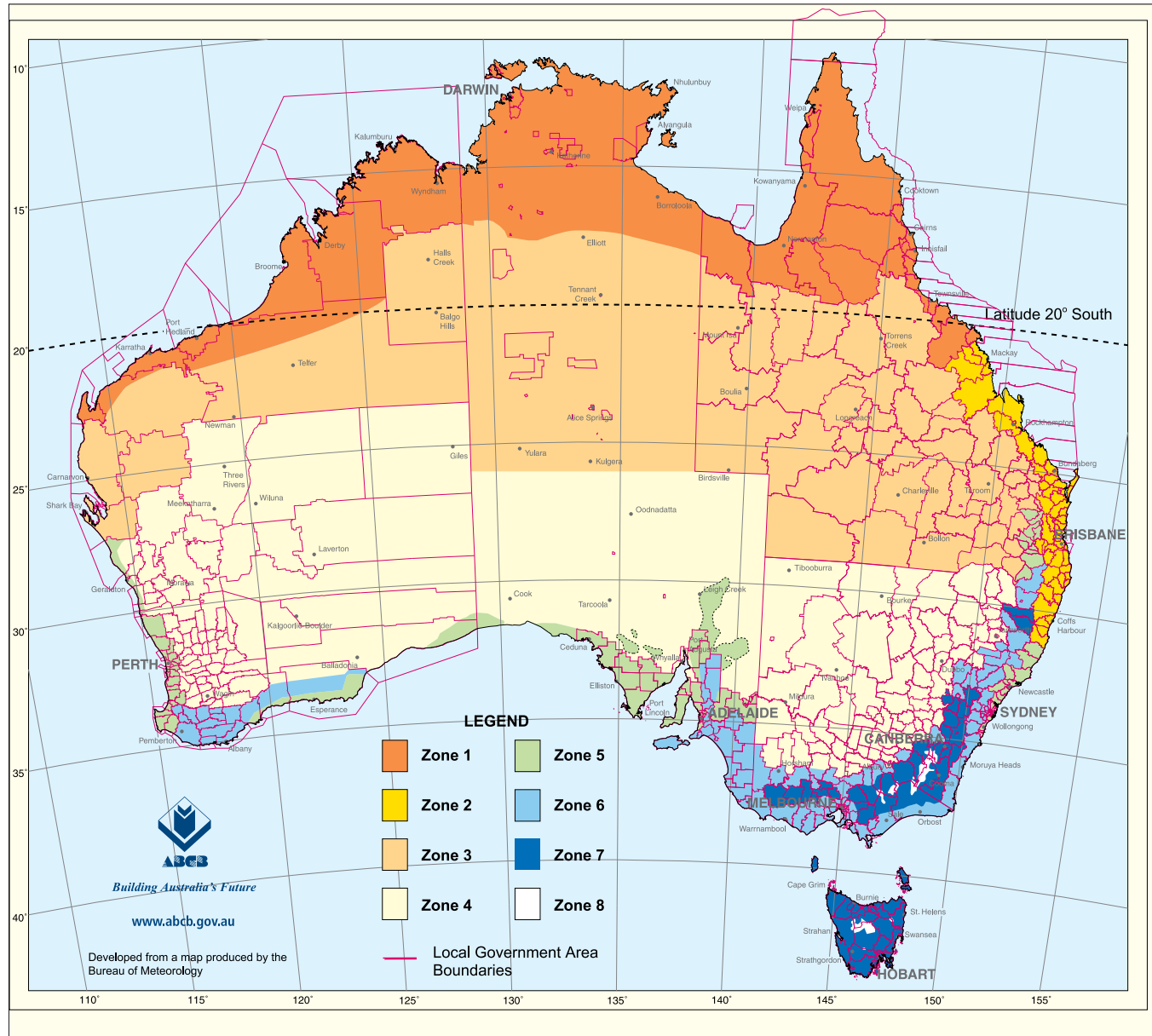
6. Antiglare Reflective EPS Board

Foil-faced polystyrene foam boards consist of expanded polystyrene rigid sheets (EPS) faced on both sides with a reflective foil laminate, one face additionally coated with an antiglare ink to reduce glare. (Emissivity of bright face assumed to be 0.03, antiglare face is 0.10).

GLOSSARY OF TERMS

Added R-value	Thermal resistance added to a construction element by insulation
Bulk insulation	Insulation depending for its performance upon thickness and thermal conductivity to achieve Material R-value
Climate Zone	An area defined in the BCA Climate Zone Map of Australia having energy efficiency provisions based on a range of similar climate characteristics
Conduction	Heat flow transfer by exciting molecules of a solid material
Convection	Heat flow transferred by movement of a fluid (eg. air movement)
Double Sided	Reflective foil on both faces of reflective insulation
Double Sided Antiglare	Reflective foil on both faces of reflective insulation with additional ink coating on external face (for OH&S antiglare requirements)
Emittance	Ratio of radiant energy emitted by a surface compared to that of a blackbody (a blackbody emits radiant energy at the maximum rate possible)
EPS Antiglared Reflective	Expanded polystyrene board, based on 'SL' grade with both sides foil faced, one side with antiglare coating
FBS-1™ Glass Wool	Insulation composed of bio-soluble glass fibres
FBS-1™ Mineral Wool	Insulation composed of fibres manufactured from glass or rock
FBS-1™ Rock Wool	Insulation composed of bio-soluble rock fibres
Heat Transfer	Heat flow from a hot to a cold body (see convection, conduction and radiation)
Indoor air film	A layer of air adjacent to the internal surface of the building element
Material R-value	Thermal resistance determined by dividing thickness by thermal conductivity, excluding surface air film resistances. NOTE: Material R-values shown in the applications may be higher or lower than that stated on packaging. Labelled Material R-values are determined in accordance with AS/NZS 4859.1 - Amdt. 1-2006. The contribution of any insulation product may vary due to the composition of the application. It is for this reason that the Material R-values may vary from their normal values.
Nat. Ventilation	An air space bounded by one or more permeable surfaces allowing a degree of air movement (eg. an attic space below an unsarked tiled roof), 'Natural Ventilation'
Non-Ventilated	Air space enclosed by non permeable building materials
Outdoor air film	A layer of air adjacent to the external surface of the building element
Radiation	Heat flow transfer by electromagnetic radiation (infra red waves)
Reflective Attic Space	Air space between flat ceiling and pitched roof bounded by reflective insulation under roofing material
Reflective Insulation	Insulation depending for its performance upon reduction of radiant heat transfer across air spaces by use of one or more surfaces of high reflectance and low emittance
Single Sided	Reflective foil on only one face of reflective insulation
Summer	Denotes BCA design heat flow direction INTO the structure
System R-value	Thermal resistance of a system, or construction of different materials, excluding surface air film resistances
Thermal bridging	Structural connections that allows heat loss or heat gain through the path of the structural member via conduction.
Thermal conductivity	A measure of the ability of a material to conduct heat
Total R-value	Thermal resistance associated with a material or system, including surface air film resistances
Ventilated	Air space ventilation provided by an opening designed to allow air movement, or by mechanical means
Winter	Denotes BCA design heat flow direction OUT of the structure

AUSTRALIAN CLIMATE ZONE MAP



BUILDING CODE OF AUSTRALIA (BCA) CLIMATE ZONES

HOW TO USE THIS HANDBOOK

Step 1. Determine which climate zone your project is located in Australia from the map.

Step 2. Determine your BCA Building Class, 1 to 10 from the list.

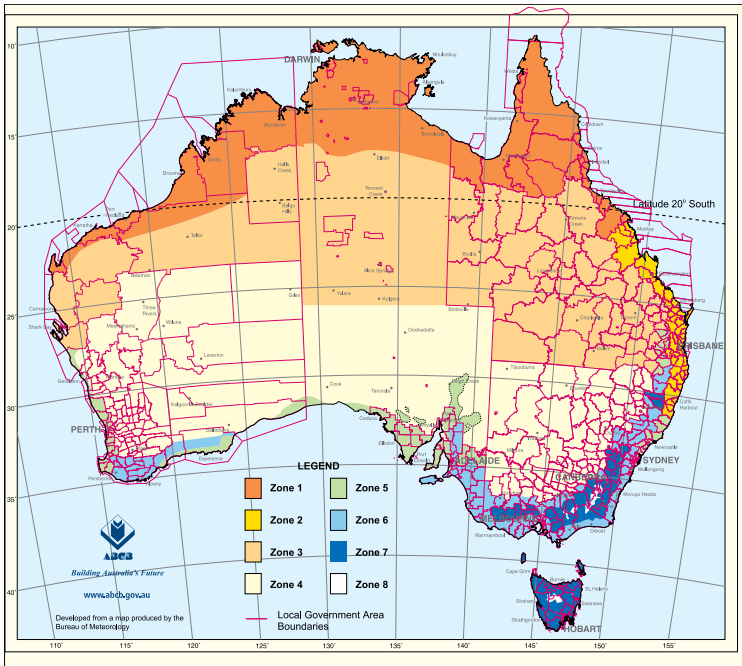
Step 3. For roofs incorporating ceiling insulation and exhaust fans, flues or recessed downlights, review the BCA Ceiling Insulation Compensation table for required increase of ceiling insulation R-value.

Step 4. Determine the design conditions ('Summer' heat flow in or 'Winter' heat flow out) according to the building class, climate zone, and state jurisdiction of your project.

Step 5. Refer to the roof, wall or floor system applicable to your construction type to determine Total R-value.

NOTE: The R-value contribution from each construction element is shown to allow inclusion of higher ceiling R-values to achieve compliance with minimum performance levels of the Deemed to Satisfy requirements contained in the Energy Efficiency Provision of the BCA.

Step 1: Determine Climate Zone



Step 2: BCA - Classes of Buildings

CLASS 1	Class 1A	A single dwelling being a detached house or one or more attached dwellings.
	Class 1B	Boarding/guest house or hostel not exceeding 300m ² and not more than 12 people reside. Which is not located above or below another dwelling or another Class of building other than a private garage.
CLASS 2	A Building containing 2 or more sole occupancy units each being a separate dwelling.	
CLASS 3	A resident building, other than a class 1 or 2, which is common place of long term or transient living for a number of unrelated persons.	
CLASS 4	A dwelling in a building that is Class 5, 6, 7, 8 or 9 if it is the only dwelling in the building.	
CLASS 5	An office building used for professional or commercial purposes, excluding buildings of Class 6, 7, 8 or 9.	
CLASS 6	A shop or other building for the sale of goods by retail or the supply of services direct to the public.	
CLASS 7	A building which	
	Class 7A	Is a carpark
	Class 7B	Is for storage or display of goods or produce for sale by wholesale
CLASS 8	A laboratory, or a building in which a handicraft or process for the production, assembling, altering, repairing, packing, finishing, or cleaning of goods or produce is carried on for trade, sale or gain.	
CLASS 9	A building of a public nature.	
	Class 9A	A health care building
	Class 9B	An assembly building in a primary or secondary school, but excluding any other parts of the building that are of another class.
Class 9C	An aged care building	
CLASS 10	A non habitable building or structure.	
	Class 10A	A private garage, carport, shed or the like
	Class 10B	A structure being a fence, mast, antenna, retaining or free standing wall, swimming pool or the like.

BUILDING CODE OF AUSTRALIA – CLASSES OF BUILDING

STEP 3: BCA - Ceiling Insulation Compensation

Percentage of ceiling area uninsulated	Minimum <i>R-Value</i> of ceiling insulation <i>required</i> to satisfy 3.12.1.2(a)							
	2.5	3.0	3.5	4.0	4.5	5.0	5.5	6.0
	Adjusted minimum <i>R-Value</i> of ceiling insulation <i>required</i> to compensate for loss of ceiling area insulation							
0.5% to less than 1.0%	2.8	3.4	4.0	4.7	5.4	6.2	6.9	
1.0% to less than 1.5%	2.9	3.6	4.4	5.2	6.1	7.0		
1.5% to less than 2.0%	3.1	3.9	4.8	5.8	6.8			
2.0% to less than 2.5%	3.3	4.2	5.3	6.5				
2.5% to less than 3.0%	3.6	4.6	5.9					

Note: Refer to your insulation supplier for installed weight (kg/m²) of insulation, and your ceiling lining supplier for the allowable dead loads of appliances and insulation.

STEP 4: BCA – Design Conditions ('Summer' heat flow in or 'Winter' heat flow out)

		Climate Zone	1	2	3	4	5	6	7	8
				Below 300m Above 300m						
BCA 2009	ROOF/WALLS	Class 1&10, 2, 3, 4, 9c	Summer		Winter					
		Class 5,6,7,8,9a,9b	Summer						Winter	
	FLOORS	Class 1&10	Summer		Winter					
		Class 2,3,4,5,6,7,8,9a,9b,9c	Summer				Winter			
BCA 2010	ROOF/WALLS	Class 1&10*	Summer		Winter					
		Class 3, 5, 6, 7, 8, 9*	Summer						Winter	
	FLOORS	Class 1&10*	Summer				Winter			
		Class 3, 5, 6, 7, 8, 9*	Summer						Winter	

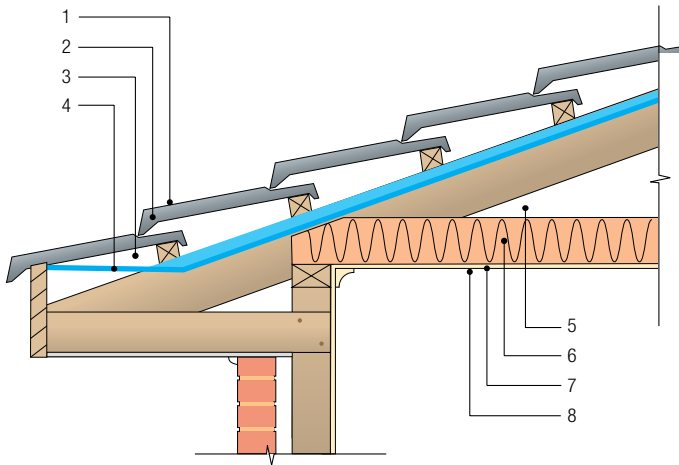
Notes: ABCB Design Alert Spec J1.6, Figure 2 shows different values for upwards and downwards but Table J1.6 does not indicate a predominant heat flow direction for each Climate Zone. In the absence of this information, the worst case scenario (or lower R-value in Figure 2 should be used).

Building Classes 2 and 4 must collectively achieve an average energy rating of not less than 6 stars, and individually achieve an energy rating of not less than 5 stars, and comply with **J1.2**; **J1.3(d)** and **J1.5(c)**, **J1.3(c)** for compensating for a loss of ceiling insulation, and **J1.6(c)** and **J1.6(d)** for floor edge insulation.

STEP 5: Refer to your applicable roof, wall and floor systems to determine Total R-values.

ROOFS

R0100 - PITCHED TILED ROOF WITH FLAT CEILING



ICANZ System Reference R0100

Uninsulated Structure

Pitched tiled roof between 18° and 35°, 40mm battens, attic space, 10mm plasterboard flat ceiling.

Insulation installation

Reflective insulation shall be draped under 40mm battens, antiglare side facing outwards. When used as sarking, reflective insulation, foil shall have 150mm overlap in accordance with AS/NZS 4200.2.

To maintain effectiveness as insulation or sarking, any tears or gaps shall be repaired with a suitable reflective foil tape.

R3.5 ceiling batts positioned between joists on ceiling lining.

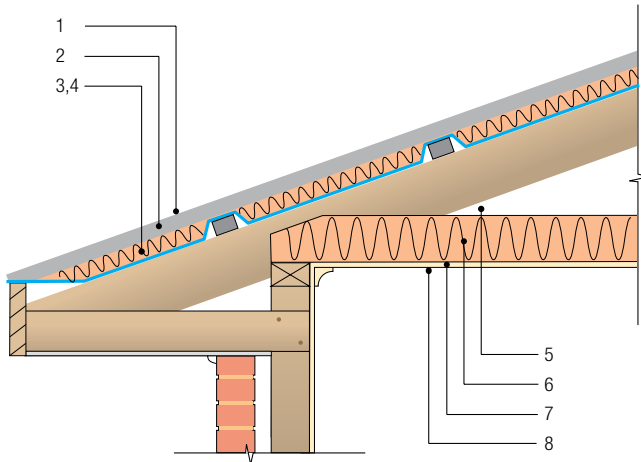
NOTE: Total R-Values can be increased by substituting bulk insulation products of higher Material R-Value.

R-VALUES FOR SYSTEM R0100		SINGLE-SIDED POLY WEAVE WITH R3.5 BATTS				R3.5 CEILING BATTS				SINGLE-SIDED POLY WEAVE				BUBBLE/FOAM FOIL				DOUBLE-SIDED ANTIGLARE			
		NON-VENTILATED		VENTILATED		NAT-VENTILATED		VENTILATED		NON VENTILATED		VENTILATED		NON-VENTILATED		VENTILATED		NON-VENTILATED		VENTILATED	
		R0109W	R0109S	R0110W	R0110S	R0107W	R0107S	R0108W	R0108S	R0101W	R0101S	R0102W	R0102S	R0105W	R0105S	R0106W	R0106S	R0103W	R0103S	R0104W	R0104S
No:	Element Description:	WINTER	SUMMER	WINTER	SUMMER	WINTER	SUMMER	WINTER	SUMMER	WINTER	SUMMER	WINTER	SUMMER	WINTER	SUMMER	WINTER	SUMMER	WINTER	SUMMER	WINTER	SUMMER
1	Outdoor Air Film	0.040	0.040	0.040	0.040	0.040	0.040	0.040	0.040	0.040	0.040	0.040	0.040	0.040	0.040	0.040	0.040	0.040	0.040	0.040	0.040
2	Tiled Roof	0.023	0.023	0.023	0.023	0.023	0.023	0.023	0.023	0.023	0.023	0.023	0.023	0.023	0.023	0.023	0.023	0.023	0.023	0.023	0.023
3	Naturally ventilated 40mm Air space	0.184	0.171	0.184	0.171					0.179	0.171	0.177	0.171	0.303	0.339	0.300	0.339	0.301	0.338	0.296	0.339
4	Reflective Insulation Material R-value	0.000	0.000	0.000	0.000					0.000	0.000	0.000	0.000	0.140	0.140	0.140	0.140	0.000	0.000	0.000	0.000
5	Attic Space	0.560	1.090	0.340	1.360	0.000	0.460	0.000	0.460	0.560	1.090	0.340	1.360	0.560	1.090	0.340	1.360	0.560	1.090	0.340	1.360
6	Ceiling Insulation	3.673	3.371	3.676	3.377	3.684	3.351	3.684	3.351												
7	10mm Plasterboard	0.059	0.059	0.059	0.059	0.059	0.059	0.059	0.059	0.059	0.059	0.059	0.059	0.059	0.059	0.059	0.059	0.059	0.059	0.059	0.059
8	Indoor Air-Film (Non-Reflective Surface)	0.110	0.160	0.110	0.160	0.110	0.160	0.110	0.160	0.110	0.160	0.110	0.160	0.110	0.160	0.110	0.160	0.110	0.160	0.110	0.160
Total R-Value		4.6	4.9	4.4	5.2	3.9	4.1	3.9	4.1	0.97	1.5	0.75	1.8	1.2	1.9	1.0	2.1	1.1	1.7	0.87	2.0
Total R-Value of roof and ceiling materials		0.41	0.56	0.23	0.74	0.23	0.74	0.23	0.74	0.41	0.56	0.23	0.74	0.41	0.56	0.23	0.74	0.41	0.56	0.23	0.74
Added R-Value of insulation		4.2	4.4	4.2	4.4	3.7	3.4	3.7	3.4	0.56	0.98	0.52	1.1	0.82	1.3	0.78	1.4	0.68	1.1	0.64	1.2

A. Calculations and assumptions in accordance with AS/NZS 4859.1:2002, Amendment 1, 2006 on the path of the insulation, as required by BCA Vol 1, Part J and Vol 2, Section 3.12.
 B. Temperatures and parameters are based on Australian climate assumptions. Air temperature difference 12°C (36°C less 24°C) for summer conditions and 6°C difference (18°C less 12°C) for winter. Actual conditions may differ from standardised conditions. This will impact on the actual performance of all insulations.
 C. Thermal resistance of air films and attic spaces based on values obtained from Section K5 and K6 of AS/NZS 4859.1:2006.
 D. Building material elements based on 2000 AIRAH Handbook and attic thermal value based on AS/NZS 4859.1 App K6 table K2.
 E. Where reflective insulation is installed, a simple addition of R-values is not possible. Care must be taken to ensure the performance of reflective air spaces is not "double-counted".
 F. The emittance of the reflective surfaces are dependent on tested values and the conditions of the installation, as specified by AS/NZS 4859.1, Amendment 1, 2006.

ROOFS

R0200 - PITCHED METAL ROOF WITH FLAT CEILING



ICANZ System Reference R0200

Uninsulated Structure

Pitched metal roof between 18° and 35°, 40mm battens, attic space, 10mm plasterboard flat ceiling.

Insulation installation

Foil faced blanket shall be installed with foil facing attic space with the blanket compressed over battens. Blanket must be allowed to recover to its full thickness. AS 3959 "Bushfire Standard" requires that all sarking products must be installed under the batten, else reflective insulation may be draped over battens to create a 40mm air space, antiglare side facing outwards. All joins in foil should be lapped 150mm. To maintain the effectiveness of the insulation membrane, any tears or gaps shall be repaired with a suitable reflective foil tape. R3.5 ceiling batts positioned between joists on ceiling lining.

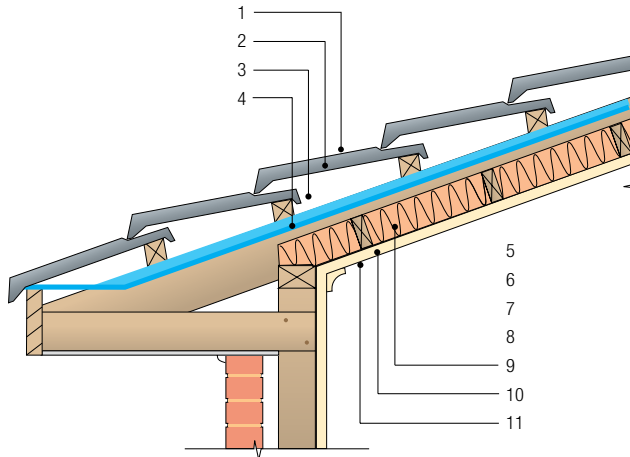
NOTE: Total R-Values can be increased by substituting bulk insulation products of higher Material R-Value.

R-VALUES FOR SYSTEM R0200		FOIL FACED R1.3 BLANKET WITH R3.5 CEILING BATTS				FOIL FACED R1.3 BLANKET				R3.5 CEILING BATTS				BUBBLE/FOAM FOIL				DOUBLE-SIDED ANTIGLARE FOIL			
		NON-VENTILATED		VENTILATED		NON-VENTILATED		VENTILATED		NON-VENTILATED		VENTILATED		NON-VENTILATED		VENTILATED		NON-VENTILATED		VENTILATED	
		R0211W	R0211S	R0212W	R0212S	R0209W	R0209S	R0210W	R0210S	R0207W	R0207S	R0208W	R0208S	R0205W	R0205S	R0206W	R0206S	R0203W	R0203S	R0204W	R0204S
No:	Element Description:	WINTER	SUMMER	WINTER	SUMMER	WINTER	SUMMER	WINTER	SUMMER	WINTER	SUMMER	WINTER	SUMMER	WINTER	SUMMER	WINTER	SUMMER	WINTER	SUMMER	WINTER	SUMMER
1	Outdoor Air Film	0.040	0.040	0.040	0.040	0.040	0.040	0.040	0.040	0.040	0.040	0.040	0.040	0.040	0.040	0.040	0.040	0.040	0.040	0.040	0.040
2	Metal Roof	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
3	Unventilated 40mm Air Space													0.425	0.571	0.417	0.574	0.420	0.569	0.411	0.572
4	Reflective Insulation Material R-value	1.387	1.201	1.386	1.201	1.376	1.216	1.374	1.213					0.140	0.140	0.140	0.140	0.000	0.000	0.000	0.000
5	Attic Space	0.560	1.090	0.340	1.360	0.560	1.090	0.340	1.360	0.180	0.280	0.000	0.460	0.560	1.090	0.340	1.360	0.560	1.090	0.340	1.360
6	Ceiling Insulation	3.661	3.389	3.663	3.393					3.681	3.344	3.684	3.350								
7	10mm Plasterboard	0.059	0.059	0.059	0.059	0.059	0.059	0.059	0.059	0.059	0.059	0.059	0.059	0.059	0.059	0.059	0.059	0.059	0.059	0.059	0.059
8	Indoor Air-Film (Non-Reflective Surface)	0.110	0.160	0.110	0.160	0.110	0.160	0.110	0.160	0.110	0.160	0.110	0.160	0.110	0.160	0.110	0.160	0.110	0.160	0.110	0.160
Total R-Value		5.8	5.9	5.6	6.2	2.1	2.6	1.9	2.8	4.1	3.9	3.9	4.1	1.3	2.1	1.1	2.3	1.2	1.9	0.96	2.2
Total R-Value of roof and ceiling materials		0.39	0.54	0.21	0.72	0.39	0.54	0.21	0.72	0.39	0.54	0.21	0.72	0.39	0.54	0.21	0.72	0.39	0.54	0.21	0.72
Added R-Value of insulation		5.4	5.4	5.4	5.5	1.8	2.0	1.7	2.1	3.7	3.3	3.7	3.4	0.95	1.5	0.90	1.6	0.8	1.4	0.75	1.5

A. Calculations and assumptions in accordance with AS/NZS 4859.1:2006, Amendment 1, 2006 on the path of the insulation, as required by BCA Vol 1, Part J and Vol 2, Section 3.12.
 B. Temperatures and parameters are based on Australian climate assumptions. Air temperature difference 12°C (36°C less 24°C) for summer conditions and 6°C difference (18°C less 12°C) for winter.
 Actual conditions may differ from standardised conditions. This will impact on the actual performance of all insulations.
 C. Thermal resistance of air films and attic spaces based on values obtained from Section K5 and K6 of AS/NZS 4859.1:2006.
 D. Building material elements based on 2000 AIRAH Handbook and attic thermal value based on AS/NZS 4859.1 App K6 table K2.
 E. Where reflective insulation is installed, a simple addition of R-values is not possible. Care must be taken to ensure the performance of reflective air spaces is not "double-counted".
 F. The emittance of the reflective surfaces are dependent on tested values and the conditions of the installation, as specified by AS/NZS 4859.1, Amendment 1, 2006.

ROOFS

R0300 - PITCHED TILED ROOF WITH CATHEDRAL CEILING BELOW (Concealed rafters)



ICANZ System Reference R0300

Uninsulated Structure

Pitched tiled roof between 18° and 35°, 40mm battens, 190mm deep rafters, ceiling battens, 10mm plasterboard.

Insulation installation

Reflective insulation draped beneath 40mm battens to create a 40mm air space. All joints should be lapped 150mm in accordance with AS/NZS 4200.2. To maintain the effectiveness of the insulation membrane, any tears or gaps shall be repaired with a suitable reflective foil tape. Where insulation batts (eg. R3.0) are incorporated in the structure a 25mm reflective air space is maintained between the lower side of the foil and the batts. Where there are no ceiling batts, the airspace below the sarking will be approximately 190mm.

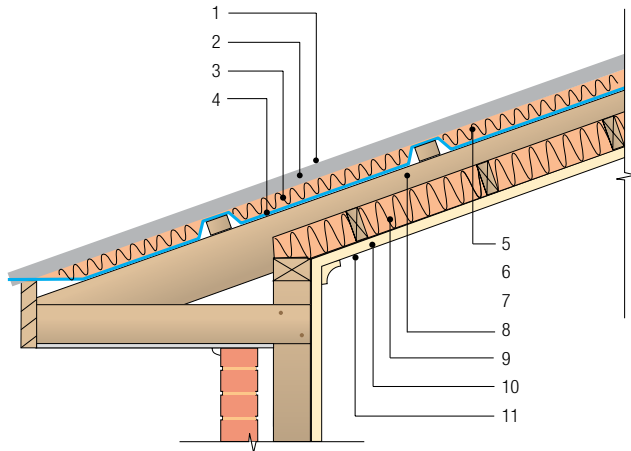
NOTE: Total R-Values can be increased by substituting increased bulk insulation

R-VALUES FOR SYSTEM R0300	SINGLE-SIDED POLY WEAVE FOIL WITH R3.0 CEILING BATTs		SINGLE-SIDED POLY WEAVE FOIL		SINGLE-SIDED POLY WEAVE FOIL WITH 30mm ANTIGLARE REFLECTIVE EPS BOARD		BUBBLE/FOAM FOIL		DOUBLE-SIDED ANTIGLARE FOIL	
	NON-VENTILATED		NON-VENTILATED		NON-VENTILATED		NON-VENTILATED		NON-VENTILATED	
	R0307W	R0307S	R0301W	R0301S	R0309W	R0309S	R0305W	R0305S	R0303W	R0303S
No: Element Description:	WINTER	SUMMER	WINTER	SUMMER	WINTER	SUMMER	WINTER	SUMMER	WINTER	SUMMER
1 Outdoor Air Film	0.040	0.040	0.040	0.040	0.040	0.040	0.040	0.040	0.040	0.040
2 Tiled Roof	0.023	0.023	0.023	0.023	0.023	0.023	0.023	0.023	0.023	0.023
3 Naturally Ventilated 40mm Air Space	0.183	0.171	0.179	0.171	0.182	0.171	0.303	0.339	0.301	0.339
4 Reflective Insulation Material R-value	0.000	0.000	0.000	0.000	0.000	0.000	0.140	0.140	0.000	0.000
5 Unventilated Reflective 80mm Air Space					0.653	1.319				
6 Foil-Faced Polystyrene Board R-value					0.760	0.717				
7 Unventilated Reflective 80mm Air Space					0.639	1.302				
8 Unventilated Reflective Air Space	0.615	0.779	0.536	1.229			0.552	1.270	0.544	1.253
9 Ceiling Insulation	3.146	2.886								
10 10mm Plasterboard	0.059	0.059	0.059	0.059	0.059	0.059	0.059	0.059	0.059	0.059
11 Indoor Air-Film (Non-Reflective Surface)	0.110	0.160	0.110	0.160	0.110	0.160	0.110	0.160	0.110	0.160
Total R-Value	4.2	4.1	0.95	1.7	2.5	3.8	1.2	2.0	1.1	1.9
Total R-Value of roof and ceiling materials	0.41	0.56	0.41	0.56	0.41	0.56	0.41	0.56	0.41	0.56
Added R-Value of insulation	3.8	3.6	0.54	1.1	2.1	3.2	0.82	1.5	0.67	1.3

A. Calculations and assumptions in accordance with AS/NZS 4859.1:2006, Amendment 1, 2006 on the path of the insulation, as required by BCA Vol 1, Part J and Vol 2, Section 3.12.
 B. Temperatures and parameters are based on Australian climate assumptions. Air temperature difference 12°C (36°C less 24°C) for summer conditions and 6°C difference (18°C less 12°C) for winter.
 Actual conditions may differ from standardised conditions. This will impact on the actual performance of all insulations.
 C. Thermal resistance of air films and attic spaces based on values obtained from Section K5 and K6 of AS/NZS 4859.1:2006.
 D. Building material elements based on 2000 AIRAH Handbook and attic thermal value based on AS/NZS 4859.1 App K6 table K2.
 E. Where reflective insulation is installed, a simple addition of R-values is not possible. Care must be taken to ensure the performance of reflective air spaces is not "double-counted".
 F. The emittance of the reflective surfaces are dependent on tested values and the conditions of the installation, as specified by AS/NZS 4859.1, Amendment 1, 2006.

ROOFS

R0400 - METAL ROOF WITH CATHEDRAL CEILING BELOW (Concealed rafters)



ICANZ System Reference R0400

Uninsulated Structure

Pitched metal roof between 18° and 35°, with 40mm battens, 190mm deep rafters, ceiling battens with 10mm plasterboard fixed below.

Insulation Installation

Foil faced blanket shall be installed with foil facing attic space with the blanket compressed over battens.

Blanket must be allowed to recover to its full thickness. AS 3959 “Bushfire Standard” requires that all sarking products must be installed under the batten, else reflective insulation may be draped over battens to create a 40mm air space, antiglare side facing outwards. All joins in foil should be lapped 150mm.

To maintain the effectiveness of the insulation membrane, any tears or gaps shall be repaired with a suitable reflective foil tape. Where insulation batts (eg R3.0) are incorporated in the structure a 25mm reflective air space is maintained between the lower side of the foil and the batts.

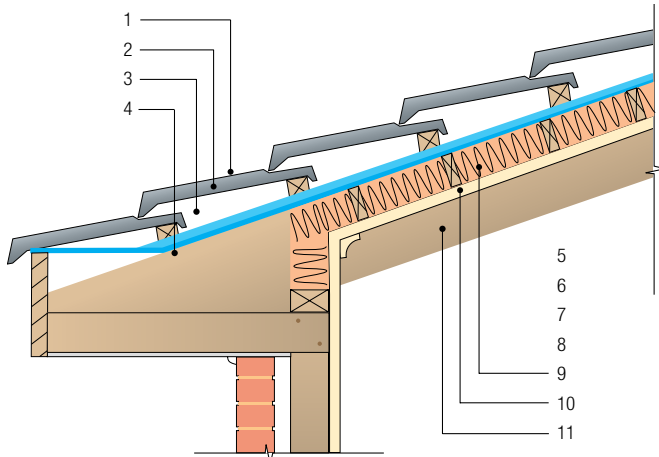
NOTE: Total R-Values can be increased by substituting bulk insulation products of higher Material R-Value.

R-VALUES FOR SYSTEM R0400	FOIL-FACED R1.3 BLANKET WITH R3.0 CEILING BATTS		R3.0 CEILING BATTS WITH DOUBLE-SIDED ANTIGLARE FOIL		DOUBLE-SIDED ANTIGLARE FOIL WITH 30mm ANTIGLARE REFLECTIVE EPS BOARD		BUBBLE/FOAM FOIL		DOUBLE-SIDED ANTIGLARE FOIL	
	NON-VENTILATED		NON-VENTILATED		NON-VENTILATED		NON-VENTILATED		NON-VENTILATED	
	R0411W	R0411S	R0409W	R0409S	R0407W	R0407S	R0405W	R0405S	R403W	R0403S
No: Element Description:	WINTER	SUMMER	WINTER	SUMMER	WINTER	SUMMER	WINTER	SUMMER	WINTER	SUMMER
1 Outdoor Air Film	0.040	0.040	0.040	0.040	0.040	0.040	0.040	0.040	0.040	0.040
2 Metal Roof	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
3 Unventilated 40mm Air Space			0.456	0.583	0.446	0.582	0.425	0.573	0.420	0.572
4 Reflective Insulation Material R-value	1.386	1.203	0.000	0.000	0.000	0.000	0.140	0.140	0.000	0.000
5 Unventilated Reflective 80mm Air Space					0.659	1.337				
6 Foil Faced Polystyrene Board R-Value					0.759	0.719				
7 Unventilated Reflective 80mm Air Space					0.645	1.317				
8 Reflective Air Space	0.622	0.789	0.617	0.783			0.557	1.293	0.550	1.278
9 Ceiling Insulation	3.135	2.905	3.144	2.894						
10 10mm Plasterboard	0.059	0.059	0.059	0.059	0.059	0.059	0.059	0.059	0.059	0.059
11 Indoor Air-Film (Non-Reflective Surface)	0.110	0.160	0.110	0.160	0.110	0.160	0.110	0.160	0.110	0.160
Total R-Value	5.4	5.2	4.4	4.5	2.7	4.2	1.3	2.3	1.2	2.1
Total R-Value of roof and ceiling materials	0.38	0.42	0.38	0.42	0.38	0.42	0.38	0.42	0.38	0.42
Added R-Value of insulation	5.0	4.7	4.0	4.1	2.3	3.8	0.95	1.8	0.80	1.7

A. Calculations and assumptions in accordance with AS/NZS 4859.1:2002, Amendment 1, 2006 on the path of the insulation, as required by BCA Vol 1, Part J and Vol 2, Section 3.12.
 B. Temperatures and parameters are based on Australian climate assumptions. Air temperature difference 12°C (36°C less 24°C) for summer conditions and 6°C difference (18°C less 12°C) for winter.
 Actual conditions may differ from standardised conditions. This will impact on the actual performance of all insulations.
 C. Thermal resistance of air films and attic spaces based on values obtained from Section K5 and K6 of AS/NZS 4859.1:2006.
 D. Building material elements based on 2000 AIRAH Handbook and attic thermal value based on AS/NZS 4859.1 App K6 table K2.
 E. Where reflective insulation is installed, a simple addition of R-values is not possible. Care must be taken to ensure the performance of reflective air spaces is not “double-counted”.
 F. The emittance of the reflective surfaces are dependent on tested values and the conditions of the installation, as specified by AS/NZS 4859.1, Amendment 1, 2006.

ROOFS

R0500 - TILED ROOF WITH CATHEDRAL CEILING ABOVE RAFTERS (Exposed rafters)



ICANZ System Reference R0500

Uninsulated Structure

Pitched tiled roof between 18° and 35°, 40mm battens, 190mm deep rafters, counter batten to provide minimum 70mm air space, 10mm plasterboard ceiling fixed mid-way up exposed rafter.

Insulation Installation

Option 1: Single sided polyweave foil positioned over batten with 30mm reflective EPS board positioned at mid height of 70mm air space providing 20mm air space above and below.

Option 2: Single sided polyweave foil positioned over batten. Original 70mm air space below single sided polyweave foil replaced with 20mm air space and R1.5 - 50mm bulk insulation on the ceiling lining.

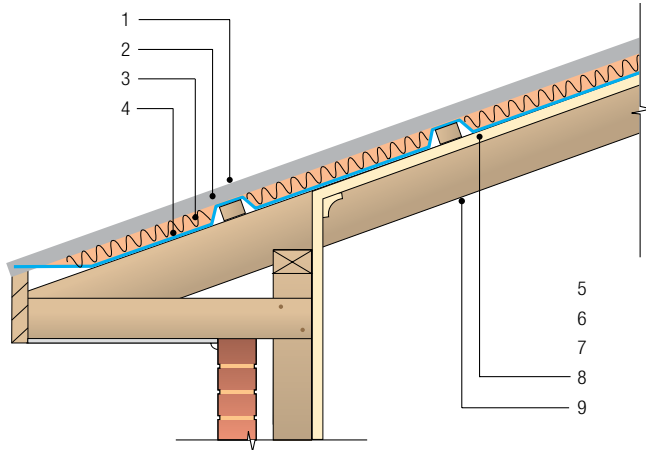
NOTE: Total R-Values can be increased by substituting thicker bulk insulation products of higher Material R-Value.

R-VALUES FOR SYSTEM R0500	SINGLE-SIDED POLY WEAVE FOIL WITH R1.5 GLASSWOOL BATTS		SINGLE-SIDED POLY WEAVE FOIL		SINGLE-SIDED POLY WEAVE FOIL WITH 30mm ANTIGLARE REFLECTIVE EPS BOARD		BUBBLE/FOAM FOIL		DOUBLE-SIDED ANTIGLARE FOIL	
	NON-VENTILATED		NON-VENTILATED		NON-VENTILATED		NON-VENTILATED		NON-VENTILATED	
	R0509W	R0509S	R0501W	R0501S	R0507W	R0507S	R0505W	R0505S	R0503W	R0503S
No: Element Description:	WINTER	SUMMER	WINTER	SUMMER	WINTER	SUMMER	WINTER	SUMMER	WINTER	SUMMER
1 Outdoor Air Film	0.040	0.040	0.040	0.040	0.040	0.040	0.040	0.040	0.040	0.040
2 Tiled Roof	0.023	0.023	0.023	0.023	0.023	0.023	0.023	0.023	0.023	0.023
3 Naturally ventilated 40mm Air Space	0.183	0.171	0.179	0.171	0.182	0.171	0.304	0.339	0.301	0.338
4 Reflective Insulation Material R-value	0.000	0.000	0.000	0.000	0.000	0.000	0.140	0.140	0.000	0.000
5 Unventilated Reflective 20mm Air Space					0.579	0.661				
6 Foil-faced Polystyrene Board R-value					0.760	0.717				
7 Unventilated Reflective 20mm Air Space	0.577	0.649			0.567	0.666				
8 Unventilated 70mm Air Space			0.566	1.117			0.587	1.149	0.576	1.135
9 Ceiling Insulation	1.571	1.447								
10 10mm Plasterboard	0.059	0.059	0.059	0.059	0.059	0.059	0.059	0.059	0.059	0.059
11 Indoor Air-Film (Non-Reflective Surface)	0.110	0.160	0.110	0.160	0.110	0.160	0.110	0.160	0.110	0.160
Total R-Value	2.6	2.5	0.98	1.6	2.3	2.5	1.3	1.9	1.1	1.8
Total R-Value of roof and ceiling materials	0.40	0.44	0.40	0.44	0.40	0.44	0.40	0.44	0.40	0.44
Added R-Value of insulation	2.2	2.1	0.58	1.1	1.9	2.1	0.86	1.5	0.71	1.3

A. Calculations and assumptions in accordance with AS/NZS 4859.1:2002, Amendment 1, 2006 on the path of the insulation, as required by BCA Vol 1, Part J and Vol 2, Section 3.12.
 B. Temperatures and parameters are based on Australian climate assumptions. Air temperature difference 12°C (36°C less 24°C) for summer conditions and 6°C difference (18°C less 12°C) for winter. Actual conditions may differ from standardised conditions. This will impact on the actual performance of all insulations.
 C. Thermal resistance of air films and attic spaces based on values obtained from Section K5 and K6 of AS/NZS 4859.1:2006.
 D. Building material elements based on 2000 AIRAH Handbook and attic thermal value based on AS/NZS 4859.1 App K6 table K2.
 E. Where reflective insulation is installed, a simple addition of R-values is not possible. Care must be taken to ensure the performance of reflective air spaces is not "double-counted".
 F. The emittance of the reflective surfaces are dependent on tested values and the conditions of the installation, as specified by AS/NZS 4859.1, Amendment 1, 2006.

ROOFS

R0600 - METAL ROOF WITH CATHEDRAL CEILING ABOVE RAFTERS (Exposed rafters)



ICANZ System Reference R0600

Uninsulated Structure

Pitched metal roof between 18° and 35°, 110mm battens, rafters, 10mm plasterboard ceiling fixed at top of exposed rafter.

Insulation Installation

Option 1: R1.8 foil faced blanket draped over battens.

The following options may be governed by AS 3959 "Bushfire Standard" which requires that all sarking products must be installed under the batten
 Option 2: In non-bushfire areas reflective insulation may be draped over battens to create a 40mm air space, antiglare side facing outwards. All joins in foil should be lapped 150mm. Remaining 70mm air space replaced with 20mm air space and R1.5 - 50mm, bulk insulation. Bulk insulation positioned on 10mm plasterboard ceiling fixed between batten and exposed roof rafter.

Option 3: In non-bushfire areas, Double sided antiglare foil draped with 40mm sag over 110mm batten. Reflective 30mm thick EPS board positioned at mid height of remaining 70mm air space providing 20mm air space above and below.

Option 4: In non-bushfire areas, Polyweave or double sided antiglare, or bubble/foam foil draped over 90mm batten. (40mm air space above, 50mm air space below).

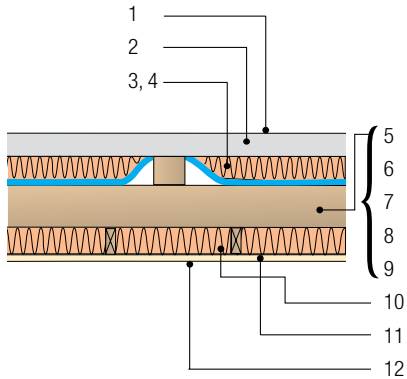
NOTE: Total R-Values can be increased by substituting bulk insulation products of higher Material R-Value.

R-VALUES FOR SYSTEM R0600	FOIL FACED R1.8 BLANKET		DOUBLE-SIDED ANTIGLARE FOIL WITH R1.5 GLASSWOOL BATTS		DOUBLE-SIDED ANTIGLARE FOIL WITH 30mm ANTIGLARE REFLECTIVE EPS BOARD		BUBBLE/FOAM FOIL		DOUBLE-SIDED ANTIGLARE FOIL		
	NON-VENTILATED		NON-VENTILATED		NON-VENTILATED		NON-VENTILATED		NON-VENTILATED		
	R0611W	R0611S	R0609W	R0609S	R0607W	R0607S	R0605W	R0605S	R0603W	R0603S	
No:	Element Description:	WINTER	SUMMER	WINTER	SUMMER	WINTER	SUMMER	WINTER	SUMMER	WINTER	SUMMER
1	Outdoor Air Film	0.040	0.040	0.040	0.040	0.040	0.040	0.040	0.040	0.040	0.040
2	Metal Roof	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
3	Unventilated 40mm Air Space			0.447	0.579	0.445	0.579	0.425	0.570	0.420	0.568
4	Reflective Insulation Material R-value	1.902	1.698	0.000	0.000	0.000	0.000	0.140	0.140	0.000	0.000
	Unventilated Reflective 20mm Air Space	0.533	0.518	0.581	0.654	0.584	0.666				
5	Foil-faced Polystyrene Board R-value					0.759	0.719				
6	Reflective Air Space					0.572	0.668	0.564	1.046	0.555	1.034
7	Ceiling Insulation			1.569	1.453						
8	10mm Plasterboard	0.059	0.059	0.059	0.059	0.059	0.059	0.059	0.059	0.059	0.059
9	Indoor Air-Film (Non-Reflective Surface)	0.110	0.160	0.110	0.160	0.110	0.160	0.110	0.160	0.110	0.160
	Total R-Value	2.6	2.5	2.8	2.9	2.6	2.9	1.3	2.0	1.2	1.9
	Total R-Value of roof and ceiling materials	0.38	0.42	0.38	0.42	0.38	0.42	0.38	0.42	0.38	0.42
	Added R-Value of insulation	2.3	2.1	2.4	2.5	2.2	2.5	0.96	1.6	0.81	1.4

A. Calculations and assumptions in accordance with AS/NZS 4859.1:2006, Amendment 1, 2006 on the path of the insulation, as required by BCA Vol 1, Part J and Vol 2, Section 3.12.
 B. Temperatures and parameters are based on Australian climate assumptions. Air temperature difference 12°C (36°C less 24°C) for summer conditions and 6°C difference (18°C less 12°C) for winter. Actual conditions may differ from standardised conditions. This will impact on the actual performance of all insulations.
 C. Thermal resistance of air films and attic spaces based on values obtained from Section K5 and K6 of AS/NZS 4859.1:2006.
 D. Building material elements based on 2000 AIRAH Handbook and attic thermal value based on AS/NZS 4859.1 App K6 table K2.
 E. Where reflective insulation is installed, a simple addition of R-values is not possible. Care must be taken to ensure the performance of reflective air spaces is not "double-counted".
 F. The emittance of the reflective surfaces are dependent on tested values and the conditions of the installation, as specified by AS/NZS 4859.1, Amendment 1, 2006.

ROOFS

R0700 - FLAT METAL ROOF WITH PLASTERBOARD CEILING (Concealed rafters)



ICANZ System Reference R0700

Uninsulated Structure

Flat metal roof between 0° and 5° pitch, roof battens, rafter sized to allow minimum 190mm air space, ceiling battens, 10mm plasterboard.

Insulation Installation

Option 1: R1.3 foil faced blanket draped over battens to allow full blanket thickness recovery, minimum 25mm airspace to top of R3.0 batts positioned between rafters on ceiling lining. The following options may be governed by AS 3959 "Bushfire Standard" which requires that all sarking products must be installed under the batten.

Option 2: Double sided antiglare foil draped over battens to provide 40mm airspace above. R3.0 batts positioned between rafters on ceiling lining with 25mm airspace to underside of foil.
Option 3: Double sided antiglare foil draped over battens to provide 40mm airspace above. 30mm thick EPS board located at mid height of rafter providing 80mm air space above and below.

Option 4: Polyweave or double sided antiglare or bubble/foam foil draped to provide 40mm airspace above (bright side of foil facing down).

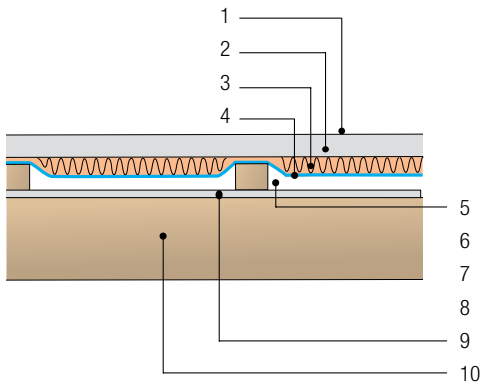
NOTE: Total R-Values can be increased by substituting bulk insulation products of higher Material R-Value.

R-VALUES FOR SYSTEM R0700	FOIL FACED R1.3 BLANKET, WITH R3.0 GLASSWOOL BATTS		DOUBLE-SIDED ANTIGLARE FOIL WITH R3.0 GLASSWOOL BATTS		DOUBLE-SIDED ANTIGLARE FOIL WITH 30mm ANTIGLARE REFLECTIVE EPS BOARD		SINGLE-SIDED POLY WEAVE FOIL		BUBBLE/FOAM FOIL		DOUBLE-SIDED ANTIGLARE FOIL	
	NON-VENTILATED		NON-VENTILATED		NON-VENTILATED		NON-VENTILATED		NON-VENTILATED		NON-VENTILATED	
	R0711W	R0711S	R0709W	R0709S	R0707W	R0707S	R0701W	R0701S	R0705W	R0705S	R0703W	R0703S
No:	Element Description:											
	WINTER	SUMMER	WINTER	SUMMER	WINTER	SUMMER	WINTER	SUMMER	WINTER	SUMMER	WINTER	SUMMER
1	0.040	0.040	0.040	0.040	0.040	0.040	0.040	0.040	0.040	0.040	0.040	0.040
2	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
3			0.430	0.592	0.421	0.592	0.175	0.171	0.402	0.592	0.397	0.592
4	1.385	1.204	0.000	0.000	0.000	0.000	0.000	0.000	0.140	0.140	0.000	0.000
5							0.519	1.688	0.538	1.755	0.532	1.740
6					0.620	1.777						
7					0.759	0.718						
8					0.607	1.740						
9	0.556	0.783	0.551	0.778								
10	3.134	2.907	3.145	2.894								
11	0.059	0.059	0.059	0.059	0.059	0.059	0.059	0.059	0.059	0.059	0.059	0.059
12	0.110	0.160	0.110	0.160	0.110	0.160	0.110	0.160	0.110	0.160	0.110	0.160
Total R-Value	5.3	5.2	4.3	4.5	2.6	5.1	0.9	2.1	1.3	2.7	1.1	2.6
Total R-Value of roof and ceiling materials	0.38	0.42	0.38	0.42	0.38	0.42	0.38	0.42	0.38	0.42	0.38	0.42
Added R-Value of insulation	4.9	4.7	4.0	4.1	2.2	4.7	0.52	1.7	0.91	2.3	0.76	2.2

A. Calculations and assumptions in accordance with AS/NZS 4859.1:2002, Amendment 1, 2006 on the path of the insulation, as required by BCA Vol 1, Part J and Vol 2, Section 3.12.
 B. Temperatures and parameters are based on Australian climate assumptions. Air temperature difference 12°C (36°C less 24°C) for summer conditions and 6°C difference (18°C less 12°C) for winter. Actual conditions may differ from standardised conditions. This will impact on the actual performance of all insulations.
 C. Thermal resistance of air films and attic spaces based on values obtained from Section K5 and K6 of AS/NZS 4859.1:2006.
 D. Building material elements based on 2000 AIRAH Handbook and attic thermal value based on AS/NZS 4859.1 App K6 table K2.
 E. Where reflective insulation is installed, a simple addition of R-values is not possible. Care must be taken to ensure the performance of reflective air spaces is not "double-counted".
 F. The emittance of the reflective surfaces are dependent on tested values and the conditions of the installation, as specified by AS/NZS 4859.1, Amendment 1, 2006.

ROOFS

R0800 - FLAT METAL ROOF WITH PLASTERBOARD CEILING (Exposed rafters)



ICANZ System Reference R0800

Uninsulated Structure

Flat metal roof between 0° and 5° pitch, minimum 110mm high roof battens, located over rafter, 10mm plasterboard located over exposed rafter.

Insulation Installation

Option 1: R1.8 foil faced blanket draped over battens to allow full blanket thickness recovery, minimum 25mm airspace to top of ceiling lining.

The following options may be governed by AS 3959 "Bushfire Standard" which requires that all sarking products must be installed under the batten.

Option 2: Double sided antiglare foil draped over battens to provide 40mm airspace above. R1.5 (50mm) batts positioned between rafters on ceiling lining with 25mm airspace to underside of foil.

Option 3: Double sided antiglare foil draped over battens to provide 40mm airspace above. 30mm thick EPS board located at mid height of rafter providing 20mm air space above and below.

Option 4: Polyweave or double sided antiglare or bubble/foam foil draped to provide 40mm airspace above (bright side of foil facing down).

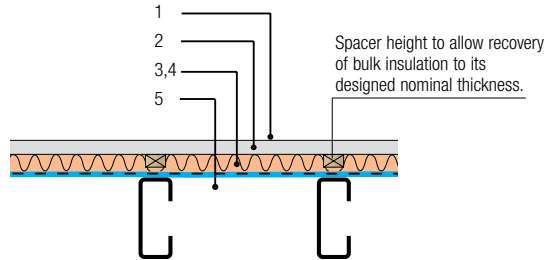
NOTE: Total R-Values can be increased by substituting bulk insulation products of higher Material R-Value.

R-VALUES FOR SYSTEM R0800	FOIL FACED R1.8 BLANKET		DOUBLE-SIDED ANTIGLARE FOIL WITH R1.5 GLASSWOOL BATTS		DOUBLE-SIDED ANTIGLARE FOIL WITH 30mm ANTIGLARE REFLECTIVE EPS BOARD		SINGLE-SIDED POLYWEAVE FOIL		BUBBLE/FOAM FOIL		DOUBLE-SIDED ANTIGLARE FOIL	
	NON-VENTILATED		NON-VENTILATED		NON-VENTILATED		NON-VENTILATED		NON-VENTILATED		NON-VENTILATED	
	R0811W	R0811S	R0809W	R0809S	R0807W	R0807S	R0801W	R0801S	R0805W	R0805S	R0803W	R0803S
No: Element Description:	WINTER	SUMMER	WINTER	SUMMER	WINTER	SUMMER	WINTER	SUMMER	WINTER	SUMMER	WINTER	SUMMER
1 Outdoor Air Film	0.040	0.040	0.040	0.040	0.040	0.040	0.040	0.040	0.040	0.040	0.040	0.040
2 Flat Metal Roof	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
3 Unventilated 40mm Air Space			0.422	0.592	0.419	0.592	0.175	0.171	0.401	0.592	0.397	0.592
4 Reflective Insulation Material R-value	1.902	1.696	0.000	0.000	0.000	0.000	0.000	0.000	0.140	0.140	0.000	0.000
5 Unventilated Reflective 50mm Air Space							0.505	1.258	0.531	1.285	0.522	1.279
6 Unventilated Reflective 20mm Air Space			0.524	0.651	0.524	0.662						
7 Foil-faced Polystyrene Board R-value					0.759	0.719						
8 Unventilated Reflective 20mm Air Space					0.515	0.665						
9 Unventilated Reflective 15mm Air Space	0.518	0.664										
10 Ceiling Insulation			1.569	1.453								
10mm Plasterboard	0.059	0.059	0.059	0.059	0.059	0.059	0.059	0.059	0.059	0.059	0.059	0.059
Indoor Air-Film (Non-Reflective Surface)	0.110	0.160	0.110	0.160	0.110	0.160	0.110	0.160	0.110	0.160	0.110	0.160
Total R-Value	2.6	2.6	2.7	3.0	2.4	2.9	0.89	1.7	1.3	2.3	1.1	2.1
Total R-Value of roof and ceiling materials	0.38	0.42	0.38	0.42	0.38	0.42	0.38	0.42	0.38	0.42	0.38	0.42
Added R-Value of insulation	2.2	2.2	2.4	2.5	2.0	2.5	0.51	1.3	0.9	1.9	0.75	1.7

A. Calculations and assumptions in accordance with AS/NZS 4859.1:2002, Amendment 1, 2006 on the path of the insulation, as required by BCA Vol 1, Part J and Vol 2, Section 3.12.
 B. Temperatures and parameters are based on Australian climate assumptions. Air temperature difference 12°C (36°C less 24°C) for summer conditions and 6°C difference (18°C less 12°C) for winter.
 Actual conditions may differ from standardised conditions. This will impact on the actual performance of all insulations.
 C. Thermal resistance of air films and attic spaces based on values obtained from Section K5 and K6 of AS/NZS 4859.1:2006.
 D. Building material elements based on 2000 AIRAH Handbook and attic thermal value based on AS/NZS 4859.1 App K6 table K2.
 E. Where reflective insulation is installed, a simple addition of R-values is not possible. Care must be taken to ensure the performance of reflective air spaces is not "double-counted".
 F. The emittance of the reflective surfaces are dependent on tested values and the conditions of the installation, as specified by AS/NZS 4859.1, Amendment 1, 2006.

ROOFS

R0900 - FLAT METAL ROOF WITH NO CEILING (Warehouse)



ICANZ System Reference R0900

Uninsulated Structure

Flat metal roof at 0° to 5° pitch, safety mesh*, purlin.

Insulation Installation

Option 1: Foil faced blanket R2.5 laid over safety mesh*, blanket allowed to recover to its nominal thickness by providing a suitable spacer. Foil side of blanket should face into the air space below.

Option 2: Double sided antiglare foil, bubble/foam foil laid on tight safety mesh* without spacers, hence no airspace on top of the material and no R-value contribution from any air space.

Alternatively a spacer must be provided as per air space dimensions nominated.

NOTE: Laps in foil should be 150mm, any tears or holes in the reflective foil should be repaired with foil tape Total R-Values can be increased by substituting bulk insulation products of higher Material R-Value.

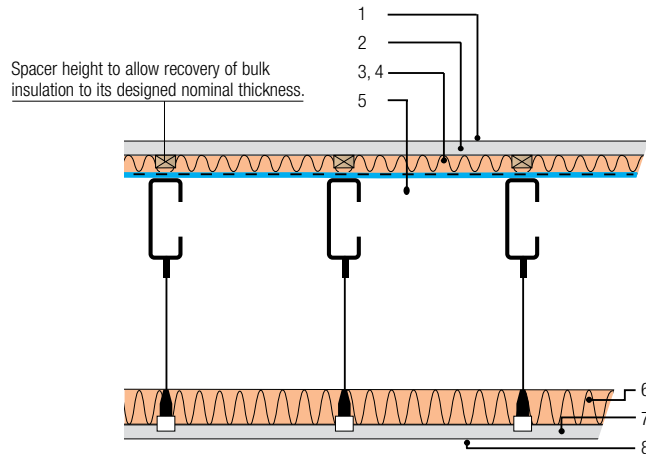
* Safety mesh installed as per mesh manufacturers instructions.

R-VALUES FOR SYSTEM R0900	FOIL FACED R2.5 BLANKET ON TIGHT SAFETY MESH		ANTIGLARE BUBBLE FOIL ON TIGHT SAFETY MESH (NO AIR SPACE ABOVE FOIL)		DOUBLE-SIDED ANTIGLARE FOIL ON TIGHT SAFETY MESH (NO AIR SPACE ABOVE FOIL)		BUBBLE/FOAM FOIL UNDER 40mm SPACER, TIGHT SAFETY MESH		DOUBLE-SIDED ANTIGLARE FOIL UNDER 40mm SPACER, TIGHT SAFETY MESH		
	VENTILATED		VENTILATED		VENTILATED		VENTILATED		VENTILATED		
	R0956W	R0956S	R0930W	R0930S	R0920W	R0920S	R0934W	R0934S	R0924W	R0924S	
No:	Element Description:	WINTER	SUMMER	WINTER	SUMMER	WINTER	SUMMER	WINTER	SUMMER	WINTER	SUMMER
1	Outdoor Air Film	0.040	0.040	0.040	0.040	0.040	0.040	0.040	0.040	0.040	0.040
2	Flat Metal Roof	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
3	Unventilated 40mm Air Space							0.383	0.593	0.373	0.593
4	Reflective Insulation Material R-value	2.633	2.363	0.140	0.140	0.000	0.000	0.140	0.140	0.000	0.000
5	Indoor Air-Film (Reflective Surface)	0.230	0.800	0.230	0.800	0.230	0.800	0.230	0.800	0.230	0.800
Total R-Value		2.9	3.2	0.41	0.98	0.27	0.84	0.79	1.6	0.64	1.4
Total R-Value of roof and ceiling materials		0.15	0.20	0.15	0.20	0.15	0.20	0.15	0.20	0.15	0.20
Added R-Value of insulation		2.8	3.0	0.26	0.80	0.12	0.60	0.64	1.4	0.49	1.2

A. Calculations and assumptions in accordance with AS/NZS 4859.1:2002, Amendment 1, 2006 on the path of the insulation, as required by BCA Vol 1, Part J and Vol 2, Section 3.12.
 B. Temperatures and parameters are based on Australian climate assumptions. Air temperature difference 12°C (36°C less 24°C) for summer conditions and 6°C difference (18°C less 12°C) for winter.
 Actual conditions may differ from standardised conditions. This will impact on the actual performance of all insulations.
 C. Thermal resistance of air films and attic spaces based on values obtained from Section K5 and K6 of AS/NZS 4859.1:2006.
 D. Building material elements based on 2000 ARAH Handbook and attic thermal value based on AS/NZS 4859.1 App K6 table K2.
 E. Where reflective insulation is installed, a simple addition of R-values is not possible. Care must be taken to ensure the performance of reflective air spaces is not "double-counted".
 F. The emittance of the reflective surfaces are dependent on tested values and the conditions of the installation, as specified by AS/NZS 4859.1, Amendment 1, 2006.

ROOFS

R1000 - FLAT METAL ROOF WITH SUSPENDED CEILING



ICANZ System Reference R1000

Uninsulated Structure

Flat metal roof at 0° to 5° pitch with safety mesh* over purlins. Suspended ceiling system forming 100-600mm non-ventilated airspace, 10mm plasterboard.

Insulation Installation

Option 1: Foil faced blanket (R1.3, R1.8, or R2.5) laid over safety mesh*, blanket allowed to recover to its nominal thickness by providing a suitable spacer. Foil side of blanket should face into the air space below. R2.5 ceiling batt positioned on ceiling lining.
Option 2: Double sided antiglare foil, bubble/foam foil laid on tight safety mesh* without spacers, hence no airspace on top of the material and no R-value contribution from any air space.

Alternatively a spacer must be provided as per air space dimensions nominated.

NOTE: Laps in foil should be 150mm, any tears or holes in the reflective foil should be repaired with foil tape Total R-Values can be increased by substituting bulk insulation products of higher Material R-Value.

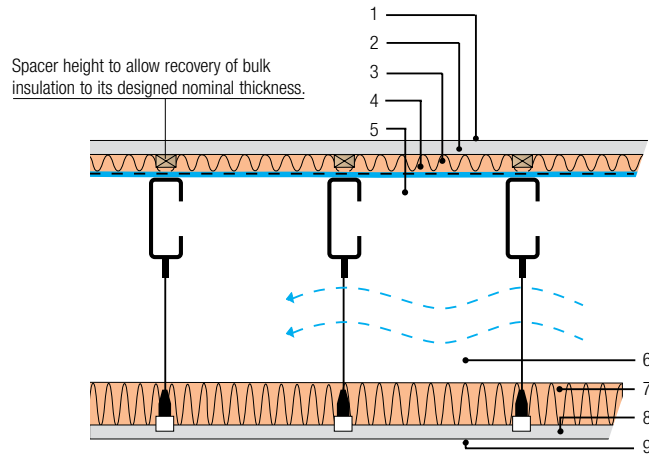
* Safety mesh installed as per mesh manufacturers instructions.

R-VALUES FOR SYSTEM R1000	FOIL FACED BLANKET R1.3 ON TIGHT SAFETY MESH AND R2.5 CEILING BATT		FOIL FACED BLANKET R1.8 ON TIGHT SAFETY MESH		SINGLE-SIDED POLY WEAVE ON TIGHT SAFETY MESH (NO AIR SPACE ABOVE FOIL)		ANTIGLARE BUBBLE FOIL ON TIGHT SAFETY MESH (NO AIR SPACE ABOVE FOIL)		DOUBLE-SIDED ANTIGLARE ON 40mm TIGHT (NO AIR SPACE ABOVE FOIL)		BUBBLE/FOAM FOIL UNDER 40mm SPACER ON TIGHT SAFETY MESH		DOUBLE-SIDED ANTIGLARE UNDER 40mm SPACER ON TIGHT SAFETY MESH	
	NON-VENTILATED		NON-VENTILATED		NON-VENTILATED		NON-VENTILATED		NON-VENTILATED		NON-VENTILATED		NON-VENTILATED	
	R1057W	R1057S	R1055W	R1055S	R1001W	R1001S	R1041W	R1041S	R1021W	R1021S	R1045W	R1045S	R1025W	R1025S
No: Element Description:	WINTER	SUMMER	WINTER	SUMMER	WINTER	SUMMER	WINTER	SUMMER	WINTER	SUMMER	WINTER	SUMMER	WINTER	SUMMER
1 Outdoor Air Film	0.040	0.040	0.040	0.040	0.040	0.040	0.040	0.040	0.040	0.040	0.040	0.040	0.040	0.040
2 Flat Metal Roof	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
3 Unventilated 40mm Air Space											0.402	0.592	0.397	0.592
4 Reflective Insulation Material R-value	1.414	1.169	1.903	1.681	0.000	0.000	0.140	0.140	0.000	0.000	0.140	0.140	0.000	0.000
5 Unventilated Reflective Air Space (>100mm, <600mm)	0.588	1.895	0.567	1.828	0.504	1.662	0.516	1.683	0.504	1.662	0.538	1.755	0.532	1.740
6 Ceiling Insulation	2.607	2.440												
7 10mm Plasterboard	0.059	0.059	0.059	0.059	0.059	0.059	0.059	0.059	0.059	0.059	0.059	0.059	0.059	0.059
8 Indoor Air-Film (Non-Reflective Surface)	0.110	0.160	0.110	0.160	0.110	0.160	0.110	0.160	0.110	0.160	0.110	0.160	0.110	0.160
Total R-Value	4.8	5.8	2.7	3.8	0.71	1.9	0.87	2.1	0.71	1.9	1.3	2.8	1.1	2.6
Total R-Value of roof and ceiling materials	0.38	0.42	0.38	0.42	0.38	0.42	0.38	0.42	0.38	0.42	0.38	0.42	0.38	0.42
Added R-Value of insulation	4.4	5.3	2.3	3.3	0.42	1.5	0.49	1.7	0.33	1.5	0.91	2.3	0.76	2.2

A. Calculations and assumptions in accordance with AS/NZS 4859.1:2002, Amendment 1, 2006 on the path of the insulation, as required by BCA Vol 1, Part J and Vol 2, Section 3.12.
B. Temperatures and parameters are based on Australian climate assumptions. Air temperature difference 12°C (36°C less 24°C) for summer conditions and 6°C difference (18°C less 12°C) for winter. Actual conditions may differ from standardised conditions. This will impact on the actual performance of all insulations.
C. Thermal resistance of air films and attic spaces based on values obtained from Section K5 and K6 of AS/NZS 4859.1:2006.
D. Building material elements based on 2000 AIRAH Handbook and attic thermal value based on AS/NZS 4859.1 App K6 table K2.
E. Where reflective insulation is installed, a simple addition of R-values is not possible. Care must be taken to ensure the performance of reflective air spaces is not "double-counted".
F. The emittance of the reflective surfaces are dependent on tested values and the conditions of the installation, as specified by AS/NZS 4859.1, Amendment 1, 2006.

ROOFS

R1100 - FLAT METAL ROOF SUSPENDED CEILING PLENUM RETURN (Ventilated)



ICANZ System Reference R1100

Uninsulated Structure

Flat metal roof at 0° to 5° pitch with safety mesh* over purlins. Suspended ceiling system forming 100-600mm ventilated airspace (used as a return air plenum), 10mm plasterboard.

Insulation Installation

Option 1: Foil faced blanket (R1.3, R1.8, or R2.5) laid over safety mesh*, blanket allowed to recover to its nominal thickness by providing a suitable spacer. Foil side of blanket should face into the air space below. R2.5 ceiling batt positioned on ceiling lining for acoustic benefits only.
Option 2: Double sided antiglare foil, bubble/foam foil laid on tight safety mesh * without spacers, hence no airspace on top of the material and no R-value contribution from any air space.

Alternatively a spacer must be provided as per air space dimensions nominated.

NOTE: Laps in foil should be 150mm, any tears or holes in the reflective foil should be repaired with foil tape.

Total R-Values can be increased by substituting foil faced blanket products of a higher Material R-value.

As the ceiling void is a return plenum, the ceiling void air space and ceiling cannot be considered in the calculations.

These elements are considered to have nil affect on the building envelope ceiling void is a 'conditioned space'.

Ceiling plenum and ceiling insulation will only provide benefit when the HVAC system is off.

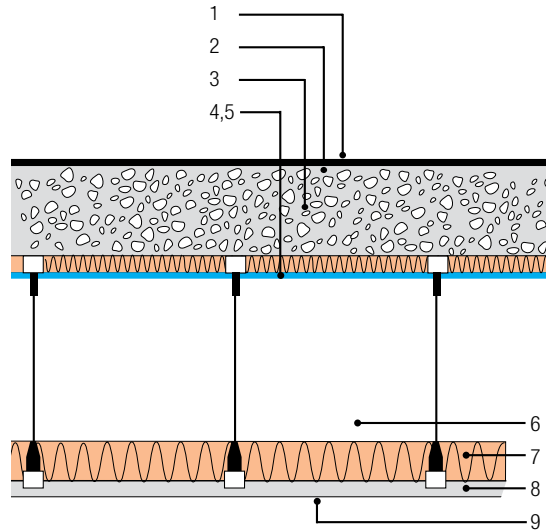
*** Safety mesh installed as per mesh manufacturers instructions.**

R-VALUES FOR SYSTEM R1100	FOIL FACED BLANKET R1.8 ON TIGHT SAFETY MESH AND R2.5 CEILING BATT		FOIL FACED BLANKET R3.0 ON TIGHT SAFETY MESH		BUBBLE FOIL ON TIGHT SAFETY MESH (NO AIR SPACE ABOVE FOIL)		DOUBLE-SIDED ANTIGLARE FOIL ON TIGHT SAFETY MESH (NO AIR SPACE ABOVE FOIL)		BUBBLE/FOAM FOIL UNDER 40mm SPACER ON TIGHT SAFETY MESH		DOUBLE-SIDED ANTIGLARE FOIL UNDER 40mm SPACER ON TIGHT SAFETY MESH	
	VENTILATED		VENTILATED		VENTILATED		VENTILATED		VENTILATED		VENTILATED	
	R1156W	R1156S	R1158W	R1158S	R1130W	R1130S	R1120W	R1120S	R1134W	R1134S	R1124W	R1124S
No: Element Description:	WINTER	SUMMER	WINTER	SUMMER	WINTER	SUMMER	WINTER	SUMMER	WINTER	SUMMER	WINTER	SUMMER
1 Outdoor Air Film	0.040	0.040	0.040	0.040	0.040	0.040	0.040	0.040	0.040	0.040	0.040	0.040
2 Flat Metal Roof	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
3 Unventilated 40mm Air Space									0.372	0.594	0.358	0.595
4 Reflective Insulation Material R-value	1.894	1.717	3.158	2.860	0.140	0.140	0.000	0.000	0.140	0.140	0.000	0.000
5 Air Film Bounding Ceiling Plenum	0.080	0.080	0.080	0.080	0.080	0.080	0.080	0.080	0.080	0.080	0.080	0.080
6 Ventilated Reflective Air Space (>100mm, <600mm)	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
7 Ceiling Insulation	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
8 10mm Plasterboard	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
9 Indoor Air-Film (Non-Reflective Surface)	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Total R-Value	2.0	1.8	3.3	3.0	0.26	0.26	0.12	0.12	0.63	0.85	0.48	0.72
Total R-Value of roof and ceiling materials	0.12	0.12	0.12	0.12	0.12	0.12	0.12	0.12	0.12	0.12	0.12	0.12
Added R-Value of insulation	1.9	1.7	3.2	2.9	0.14	0.14	0.00	0.00	0.51	0.73	0.36	0.60

A. Calculations and assumptions in accordance with AS/NZS 4859.1:2002, Amendment 1, 2006 on the path of the insulation, as required by BCA Vol 1, Part J and Vol 2, Section 3.12.
B. Temperatures and parameters are based on Australian climate assumptions. Air temperature difference 12°C (36°C less 24°C) for summer conditions and 6°C difference (18°C less 12°C) for winter. Actual conditions may differ from standardised conditions. This will impact on the actual performance of all insulations.
C. Thermal resistance of air films and attic spaces based on values obtained from Section K5 and K6 of AS/NZS 4859.1:2006.
D. Building material elements based on 2000 AIRAH Handbook and attic thermal value based on AS/NZS 4859.1 App K6 table K2.
E. Where reflective insulation is installed, a simple addition of R-values is not possible. Care must be taken to ensure the performance of reflective air spaces is not "double-counted".
F. The emittance of the reflective surfaces are dependent on tested values and the conditions of the installation, as specified by AS/NZS 4859.1, Amendment 1, 2006.

ROOFS

R1200 - FLAT CONCRETE ROOF WITH UNVENTILATED CEILING



ICANZ System Reference R1200

Uninsulated Structure

150mm concrete slab with exterior waterproofing membrane. Suspended ceiling system forming 100-600mm non-ventilated airspace, 10mm plasterboard.

Insulation Installation

Option 1: Foil faced sheet or blanket (R1.3, R1.8, or R2.5) pinned to underside of concrete slab allowed to recover to its nominal thickness. Foil side should face into the air space below. R2.5 ceiling batt positioned on ceiling lining.

Option 2: Foil faced sheet or blanket (R1.3, R1.8, or R2.5) pinned to underside of concrete slab allowed to recover to its nominal thickness. Foil side should face into the air space below.

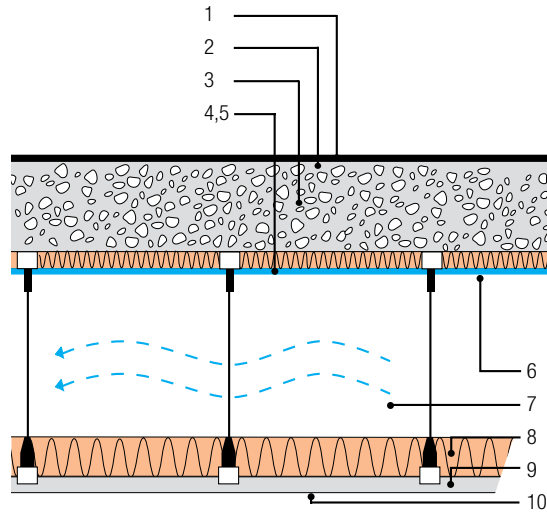
NOTE: Laps in foil should be 150mm, any tears or holes in the reflective foil should be repaired with foil tape
Total R-Values can be increased by substituting foil faced blanket products of a higher Material R-value.

R-VALUES FOR SYSTEM R1200		FOIL FACED R1.3 BLANKET WITH R2.5 CEILING BATT		FOIL FACED R1.3 BLANKET BOARD		30mm ANTIGLARE REFLECTIVE EPS BOARD	
		NON-VENTILATED		NON-VENTILATED		NON-VENTILATED	
		R1233W	R1233S	R1231W	R1231S	R1221W	R1221S
No:	Element Description:	WINTER	SUMMER	WINTER	SUMMER	WINTER	SUMMER
1	Outdoor Air Film	0.040	0.040	0.040	0.040	0.040	0.040
2	Roof Water Proofing Membrane	0.061	0.061	0.061	0.061	0.061	0.061
3	150mm Concrete Slab	0.104	0.104	0.104	0.104	0.104	0.104
4,5	Reflective Insulation Material R-value	1.384	1.204	1.373	1.214	0.763	0.706
6	Unventilated Reflective Air Space (>100mm, <600mm)	0.587	1.878	0.562	1.809	0.059	1.768
7	Ceiling Insulation	2.610	2.437				
8	10mm Plasterboard	0.059	0.059	0.059	0.059	0.059	0.059
9	Indoor Air-Film (Non-Reflective Surface)	0.110	0.160	0.110	0.160	0.110	0.160
Total R-Value		5.0	5.9	2.3	3.4	1.7	2.9
Total R-Value of roof and ceiling materials		0.54	0.58	0.54	0.58	0.54	0.58
Added R-Value of insulation		4.4	5.4	1.8	2.9	1.1	2.3

A. Calculations and assumptions in accordance with AS/NZS 4859.1:2002, Amendment 1, 2006 on the path of the insulation, as required by BCA Vol 1, Part J and Vol 2, Section 3.12.
 B. Temperatures and parameters are based on Australian climate assumptions. Air temperature difference 12°C (36°C less 24°C) for summer conditions and 6°C difference (18°C less 12°C) for winter.
 Actual conditions may differ from standardised conditions. This will impact on the actual performance of all insulations.
 C. Thermal resistance of air films and attic spaces based on values obtained from Section K5 and K6 of AS/NZS 4859.1:2006.
 D. Building material elements based on 2000 AIRAH Handbook and attic thermal value based on AS/NZS 4859.1 App K6 table K2.
 E. Where reflective insulation is installed, a simple addition of R-values is not possible. Care must be taken to ensure the performance of reflective air spaces is not "double-counted".
 F. The emittance of the reflective surfaces are dependent on tested values and the conditions of the installation, as specified by AS/NZS 4859.1, Amendment 1, 2006.

ROOFS

R1300 - FLAT CONCRETE ROOF WITH SUSPENDED CEILING PLENUM RETURN (Ventilated)



ICANZ System Reference R1300

Uninsulated Structure

150mm concrete slab with exterior waterproofing membrane. Suspended ceiling system forming 100-600mm ventilated airspace (used as a return air plenum), 10mm plasterboard.

Insulation Installation

Option 1: Foil faced sheet or blanket (R1.3, R1.8, or R2.5) pinned to underside of concrete slab allowed to recover to its nominal thickness. Foil side should face into the air space below.

Option 2: Foil faced sheet or blanket (R1.3, R1.8, or R2.5) pinned to underside of concrete slab allowed to recover to its nominal thickness. Foil side should face into the air space below.

NOTE: Laps in foil should be 150mm, any tears or holes in the reflective foil should be repaired with foil tape.

Total R-Values can be increased by substituting foil faced blanket products of a higher Material R-value.

As the ceiling void is a return plenum, the ceiling void air space and ceiling cannot be considered in the calculations.

These elements are considered to have nil effect on the building envelope ceiling void is a 'conditioned space'.

Ceiling plenum and ceiling insulation will only provide benefit when the HVAC system is off.

*** Safety mesh installed as per mesh manufacturers instructions.**

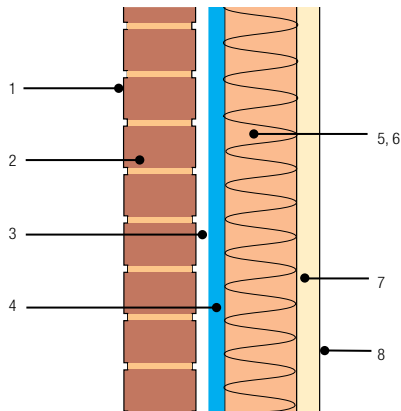
R-VALUES FOR SYSTEM R1300	FOIL FACED R1.3 BLANKET WITH R2.5 CEILING BATT		FOIL FACED R3.0 BLANKET		30mm ANTIGLARE REFLECTIVE EPS BOARD WITH R2.5 CEILING BATT	
	VENTILATED		VENTILATED		VENTILATED	
	R1330W	R1330S	R1340W	R1340S	R1320W	R1320S
No: Element Description:	WINTER	SUMMER	WINTER	SUMMER	WINTER	SUMMER
1 Outdoor Air Film	0.040	0.040	0.040	0.040	0.040	0.040
2 Roof Membrane	0.061	0.061	0.061	0.061	0.061	0.061
3 150mm Concrete Slab	0.104	0.104	0.104	0.104	0.104	0.104
4,5 Foil/Blanket Insulation Material R-value	1.366	1.245	3.154	2.868	0.759	0.719
6 Top Air Film Bounding Ceiling Plenum	0.080	0.080	0.080	0.080	0.080	0.080
7 Ventiladed Reflective Air Space (>100mm, <600mm)	n/a	n/a	n/a	n/a	n/a	n/a
8 Ceiling Insulation	n/a	n/a	n/a	n/a	n/a	n/a
9 10mm Plasterboard	n/a	n/a	n/a	n/a	n/a	n/a
10 Indoor Air-Film (Non-Reflective Surface)	n/a	n/a	n/a	n/a	n/a	n/a
Total R-Value	1.7	1.5	3.4	3.2	1.0	1.0
Total R-Value of roof and ceiling materials	0.29	0.29	0.29	0.29	0.29	0.29
Added R-Value of insulation	1.4	1.2	3.2	2.9	0.76	0.72

(SEE NOTE ABOVE)

A. Calculations and assumptions in accordance with AS/NZS 4859.1:2002, Amendment 1, 2006 on the path of the insulation, as required by BCA Vol 1, Part J and Vol 2, Section 3.12.
 B. Temperatures and parameters are based on Australian climate assumptions. Air temperature difference 12°C (36°C less 24°C) for summer conditions and 6°C difference (18°C less 12°C) for winter.
 Actual conditions may differ from standardised conditions. This will impact on the actual performance of all insulations.
 C. Thermal resistance of air films and attic spaces based on values obtained from Section K5 and K6 of AS/NZS 4859.1:2006.
 D. Building material elements based on 2000 AIRAH Handbook and attic thermal value based on AS/NZS 4859.1 App K6 table K2.
 E. Where reflective insulation is installed, a simple addition of R-values is not possible. Care must be taken to ensure the performance of reflective air spaces is not "double-counted".
 F. The emittance of the reflective surfaces are dependent on tested values and the conditions of the installation, as specified by AS/NZS 4859.1, Amendment 1, 2006.

WALLS

W0100 - CLAY MASONRY VENEER



ICANZ System Reference W0100

Structure

Brick Veneer construction with reflective insulation attached to outside of frame.

110mm General extruded bricks.

Non-vented air space, brick cavity.

(Note: Cavity dimension may vary subject to foil product thickness, this may vary the results.)

Bright side of foil facing stud cavity.

90mm timber stud, non vented air space or Bulk insulation installed in cavity.

10mm plasterboard lining.

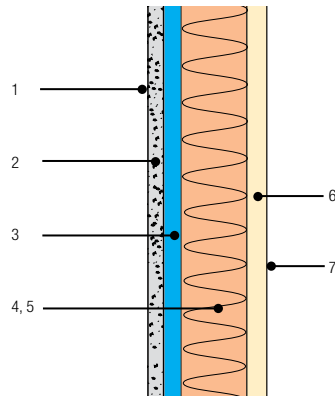
NOTE: Total R-Values can be increased by substituting bulk insulation products of higher Material R-Value.

R-VALUES FOR SYSTEM W0100	SINGLE SIDED POLYWEAVE FOIL WITH R2.5 WALL BATTS		DOUBLE SIDED ANTIGLARE FOIL WITH R2.5 WALL BATTS		R1.5 WALL BATT		SINGLE SIDED POLYWEAVE FOIL		10mm ANTIGLARE REFLECTIVE EPS BOARD		ANTIGLARE BUBBLE/FOAM FOIL		DOUBLESIDED ANTIGLARE FOIL	
	NON-VENTILATED		NON-VENTILATED		NON-VENTILATED		NON-VENTILATED		NON-VENTILATED		NON-VENTILATED		NON-VENTILATED	
	W0111W	W0111S	W0113W	W0113S	W0109W	W0109S	W0101W	W0101S	W0107W	W0107S	W0105W	W0105S	W0103W	W0103S
No:	Element Description:													
1	0.040	0.040	0.040	0.040	0.040	0.040	0.040	0.040	0.040	0.040	0.040	0.040	0.040	0.040
2	0.180	0.180	0.180	0.180	0.180	0.180	0.180	0.180	0.180	0.180	0.180	0.180	0.180	0.180
3										0.659	0.568			
												0.646	0.539	
4	0.200	0.187	0.665	0.598	0.199	0.177	0.197	0.171					0.621	0.535
	0.000	0.000	0.000	0.000			0.000	0.000	0.254	0.236	0.140	0.140	0.000	0.000
5									0.737	0.641	0.800	0.647	0.779	0.671
6	2.626	2.374	2.621	2.373	1.576	1.424								
7	0.059	0.059	0.059	0.059	0.059	0.059	0.059	0.059	0.059	0.059	0.059	0.059	0.059	0.059
8	0.120	0.120	0.120	0.120	0.120	0.120	0.120	0.120	0.120	0.120	0.120	0.120	0.120	0.120
Total R-Value	3.2	3.0	3.7	3.4	2.2	2.0	1.3	1.2	2.1	1.9	2.0	1.7	1.8	1.6
Total R-Value of wall materials	0.56	0.56	0.56	0.56	0.56	0.56	0.56	0.56	0.56	0.56	0.56	0.56	0.56	0.56
Added R-Value of insulation	2.7	2.4	3.1	2.8	1.6	1.4	0.77	0.60	1.6	1.3	1.4	1.2	1.2	1.0

A. Calculations and assumptions in accordance with AS/NZS 4859.1:2002, Amendment 1, 2006 on the path of the insulation, as required by BCA Vol 1, Part J and Vol 2, Section 3.12.
 B. Temperatures and parameters are based on Australian climate assumptions. Air temperature difference 12°C (36°C less 24°C) for summer conditions and 6°C difference (18°C less 12°C) for winter. Actual conditions may differ from standardised conditions. This will impact on the actual performance of all insulations.
 C. Thermal resistance of air films and attic spaces based on values obtained from Section K5 and K6 of AS/NZS 4859.1:2006.
 D. Building material elements based on 2000 ARAH Handbook and attic thermal value based on AS/NZS 4859.1 App K6 table K2.
 E. Where reflective insulation is installed, a simple addition of R-values is not possible. Care must be taken to ensure the performance of reflective air spaces is not "double-counted".
 F. The emittance of the reflective surfaces are dependent on tested values and the conditions of the installation, as specified by AS/NZS 4859.1, Amendment 1, 2006.

WALLS

W0200 - LIGHTWEIGHT CLADDING (Direct fixed to stud)



ICANZ System Reference W0200

Structure and Insulation Installation

Light weight cladding (Material R-value R0.1 assumed). Directly fixed over breather/permeable reflective insulation.

Bright side of foil facing stud cavity.

90mm timber stud, non vented air space or bulk insulation installed in cavity.

10mm plasterboard lining.

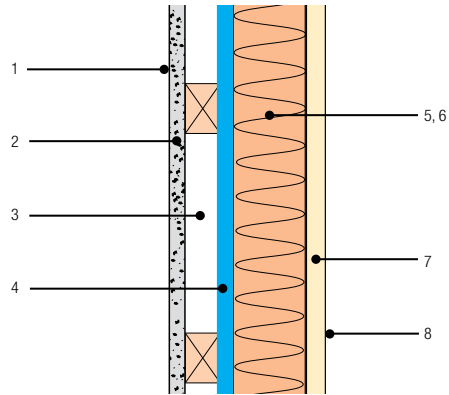
NOTE: Total R-Values can be increased by substituting bulk insulation products of higher Material R-Value.

R-VALUES FOR SYSTEM W0200	SINGLE-SIDED POLY WEAVE FOIL WITH R2.5 WALL BATTS		DOUBLE-SIDED ANTIGLARE FOIL WITH R2.5 WALL BATTS		SINGLE-SIDED POLY WEAVE FOIL		DOUBLE-SIDED ANTIGLARE FOIL	
	NON-VENTILATED		NON-VENTILATED		NON-VENTILATED		NON-VENTILATED	
	W0211W	W0211S	W0213W	W0213S	W0201W	W0201S	W0203W	W0203S
No: Element Description:	WINTER	SUMMER	WINTER	SUMMER	WINTER	SUMMER	WINTER	SUMMER
1 Outdoor Air Film	0.040	0.040	0.040	0.040	0.040	0.040	0.040	0.040
2 R0.1 Lightweight Cladding	0.100	0.100	0.100	0.100	0.100	0.100	0.100	0.100
3 Reflective Insulation Material R-value	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
4 Unventilated 90mm Air Space					0.698	0.561	0.698	0.561
5 Bulk Insulation Wall Batt	2.631	2.381	2.631	2.381				
6 10mm Plasterboard	0.059	0.059	0.059	0.059	0.059	0.059	0.059	0.059
7 Indoor Air-Film (Non-Reflective Surface)	0.120	0.120	0.120	0.120	0.120	0.120	0.120	0.120
Total R-Value	3.0	2.7	3.0	2.7	1.0	0.88	1.0	0.88
Total R-Value of wall materials	0.48	0.48	0.48	0.48	0.48	0.48	0.48	0.48
Added R-Value of insulation	2.5	2.2	2.5	2.2	0.54	0.40	0.54	0.40

A. Calculations and assumptions in accordance with AS/NZS 4859.1:2006, Amendment 1, 2006 on the path of the insulation, as required by BCA Vol 1, Part J and Vol 2, Section 3.12.
 B. Temperatures and parameters are based on Australian climate assumptions. Air temperature difference 12°C (36°C less 24°C) for summer conditions and 6°C difference (18°C less 12°C) for winter.
 Actual conditions may differ from standardised conditions. This will impact on the actual performance of all insulations.
 C. Thermal resistance of air films and attic spaces based on values obtained from Section K5 and K6 of AS/NZS 4859.1:2006.
 D. Building material elements based on 2000 AIRAH Handbook and attic thermal value based on AS/NZS 4859.1 App K6 table K2.
 E. Where reflective insulation is installed, a simple addition of R-values is not possible. Care must be taken to ensure the performance of reflective air spaces is not "double-counted".
 F. The emittance of the reflective surfaces are dependent on tested values and the conditions of the installation, as specified by AS/NZS 4859.1, Amendment 1, 2006.

WALLS

W0300 - LIGHTWEIGHT CLADDING (Fixed to battens)



ICANZ System Reference W0300

Structure and Insulation Installation

Light weight cladding (Material R-value R0.1 assumed). Fixed over 35mm batten with Polyweave, Double Sided Antiglare, Bubble foil or 25mm batten with Reflective EPS board pinned to stud.

Bright side of foil facing stud cavity.

90mm timber stud, non vented air space or Bulk insulation installed in cavity.

10mm plasterboard lining.

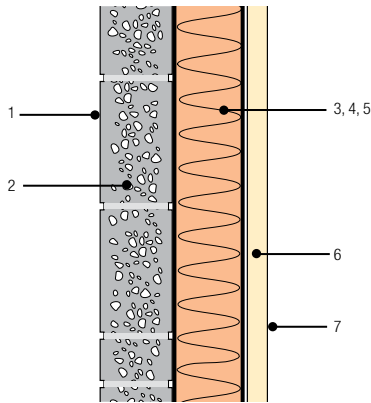
NOTE: Total R-Values can be increased by substituting bulk insulation products of higher Material R-Value.

R-VALUES FOR SYSTEM W0300	SINGLE-SIDED POLY WEAVE FOIL WITH R2.5 WALL BATTS		DOUBLE-SIDED ANTIGLARE FOIL WITH R2.5 WALL BATTS		SINGLE SIDED POLY WEAVE FOIL WITH R1.5 WALL BATTS		SINGLE-SIDED POLY WEAVE FOIL		DOUBLE-SIDED ANTIGLARE FOIL		ANTIGLARE BUBBLE/FOAM FOIL		10mm ANTIGLARE REFLECTIVE EPS BOARD	
	NON-VENTILATED		NON-VENTILATED		NON-VENTILATED		NON-VENTILATED		NON-VENTILATED		NON-VENTILATED		NON-VENTILATED	
	W0311W	W0311S	W0313W	W0313S	W0315W	W0315S	W0301W	W0301S	W0303W	W0303S	W0305W	W0305S	W0307W	W0307S
No: Element Description:	WINTER	SUMMER	WINTER	SUMMER	WINTER	SUMMER	WINTER	SUMMER	WINTER	SUMMER	WINTER	SUMMER	WINTER	SUMMER
1 Outdoor Air Film	0.040	0.040	0.040	0.040	0.040	0.040	0.040	0.040	0.040	0.040	0.040	0.040	0.040	0.040
2 R0.1 Lightweight Cladding	0.100	0.100	0.100	0.100	0.100	0.100	0.100	0.100	0.100	0.100	0.100	0.100	0.100	0.100
3 Unventilated 25mm Air Space														
Unventilated 35mm Air Space	0.204	0.187	0.704	0.622	0.204	0.187	0.200	0.172	0.653	0.557	0.660	0.571	0.640	0.547
4 Reflective Insulation Material R-value	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.140	0.140	0.254	0.239
5 Unventilated Reflective 90mm Air Space														
6 Bulk Insulation Wall Batt	2.627	2.374	2.621	2.379	1.576	1.424	0.728	0.579	0.775	0.614	0.787	0.620	0.793	0.645
7 10mm Plasterboard	0.059	0.059	0.059	0.059	0.059	0.059	0.059	0.059	0.059	0.059	0.059	0.059	0.059	0.059
8 Indoor Air-Film (Non-Reflective Surface)	0.120	0.120	0.120	0.120	0.120	0.20	0.120	0.120	0.120	0.120	0.120	0.120	0.120	0.120
Total R-Value	3.2	2.9	3.6	3.3	2.1	1.9	1.2	1.1	1.8	1.5	1.9	1.7	2.0	1.8
Total R-Value of wall materials	0.48	0.48	0.48	0.48	0.48	0.48	0.48	0.48	0.48	0.48	0.48	0.48	0.48	0.48
Added R-Value of insulation	2.7	2.4	3.2	2.8	1.6	1.5	0.77	0.59	1.3	1.0	1.4	1.2	1.5	1.3

A. Calculations and assumptions in accordance with AS/NZS 4859.1:2002, Amendment 1, 2006 on the path of the insulation, as required by BCA Vol 1, Part J and Vol 2, Section 3.12.
 B. Temperatures and parameters are based on Australian climate assumptions. Air temperature difference 12°C (36°C less 24°C) for summer conditions and 6°C difference (18°C less 12°C) for winter.
 Actual conditions may differ from standardised conditions. This will impact on the actual performance of all insulations.
 C. Thermal resistance of air films and attic spaces based on values obtained from Section K5 and K6 of AS/NZS 4859.1:2006.
 D. Building material elements based on 2000 AIRAH Handbook and attic thermal value based on AS/NZS 4859.1 App K6 table K2.
 E. Where reflective insulation is installed, a simple addition of R-values is not possible. Care must be taken to ensure the performance of reflective air spaces is not "double-counted".
 F. The emittance of the reflective surfaces are dependent on tested values and the conditions of the installation, as specified by AS/NZS 4859.1, Amendment 1, 2006.

WALLS

W0800 - HOLLOW CONCRETE BLOCK



ICANZ System Reference W0800

Structure and Insulation Installation

190mm Hollow Concrete Blockwork, internally lined with reflective insulation adjacent to a 35mm cavity provided by a 35mm batten (or 28mm cavity for 7.5mm Bubble foil) or 25mm batten with 10mm Reflective EPS board.

Reflective foil positioned against blockwork. Bright side of foil facing stud cavity.

Non vented air space or Bulk insulation installed in cavity.

10mm plasterboard lining.

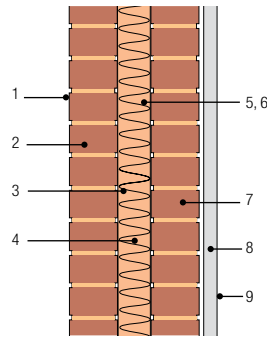
NOTE: Total R-Values can be increased by substituting bulk insulation products of higher Material R-Value.

R-VALUES FOR SYSTEM W0800	R1.0 WALL BATT		R1.5 (50mm) WALL BATT (50mm CAVITY)		SINGLE-SIDED POLY WEAVE FOIL		ANTIGLARE BUBBLE/FOAM FOIL		10mm ANTIGLARE REFLECTIVE EPS BOARD	
	NON-VENTILATED		NON-VENTILATED		NON-VENTILATED		NON-VENTILATED		NON-VENTILATED	
	W0811W	W0811S	W0813W	W0813S	W0801W	W0801S	W0805W	W0805S	W0807W	W0807S
No: Element Description:	WINTER	SUMMER	WINTER	SUMMER	WINTER	SUMMER	WINTER	SUMMER	WINTER	SUMMER
1 Outdoor Air Film	0.040	0.040	0.040	0.040	0.040	0.040	0.040	0.040	0.040	0.040
2 190mm Hollow Concrete Blockwork	0.219	0.219	0.219	0.219	0.219	0.219	0.219	0.219	0.219	0.219
3 Reflective Insulation Material R-value					0.000	0.000	0.140	0.140	0.255	0.237
4 Unventilated 25mm Air Space									0.777	0.655
Unventilated 28mm Air Space							0.783	0.652		
Unventilated 35mm Air Space					0.762	0.612				
5 R1.0 (35mm) Wall Batt	1.051	0.949	1.576	1.424						
6 10mm Plasterboard	0.059	0.059	0.059	0.059	0.059	0.059	0.059	0.059	0.059	0.059
7 Indoor Air-Film (Non-Reflective Surface)	0.120	0.120	0.120	0.120	0.120	0.120	0.120	0.120	0.120	0.120
Total R-Value	1.5	1.4	2.0	1.9	1.2	1.1	1.4	1.2	1.5	1.3
Total R-Value of wall materials	0.60	0.60	0.60	0.60	0.60	0.60	0.60	0.60	0.60	0.60
Added R-Value of insulation	0.89	0.79	1.4	1.3	0.60	0.45	0.76	0.63	0.87	0.73

A. Calculations and assumptions in accordance with AS/NZS 4859.1:2002, Amendment 1, 2006 on the path of the insulation, as required by BCA Vol 1, Part J and Vol 2, Section 3.12.
 B. Temperatures and parameters are based on Australian climate assumptions. Air temperature difference 12°C (36°C less 24°C) for summer conditions and 6°C difference (18°C less 12°C) for winter.
 Actual conditions may differ from standardised conditions. This will impact on the actual performance of all insulations.
 C. Thermal resistance of air films and attic spaces based on values obtained from Section K5 and K6 of AS/NZS 4859.1:2006.
 D. Building material elements based on 2000 AIRAH Handbook and attic thermal value based on AS/NZS 4859.1 App K6 table K2.
 E. Where reflective insulation is installed, a simple addition of R-values is not possible. Care must be taken to ensure the performance of reflective air spaces is not "double-counted".
 F. The emittance of the reflective surfaces are dependent on tested values and the conditions of the installation, as specified by AS/NZS 4859.1, Amendment 1, 2006.

WALLS

W1100 - CAVITY CLAY MASONRY



ICANZ System Reference W1100

Structure and Insulation Installation

Double brick wall with 50mm brick cavity with Polyweave, Double Sided Antiglare, Bubble foil or 10mm Reflective EPS board positioned mid-point of cavity (by use of spacers). Note: cavity dimensions adjusted to compensate for reflective foil laminates having a thickness greater than 1mm.

Bright side of foil facing inwards.

Non vented air space or Bulk insulation installed in cavity.

10mm plasterboard lining.

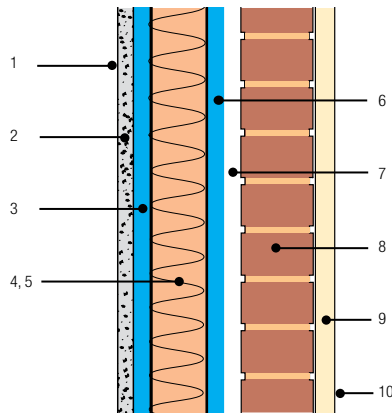
NOTE: Total R-Values can be increased by substituting bulk insulation products of higher Material R-Value. Emissivity values of foil faces may be affected by alkaline mortar solution thereby lowering Total Value results. All joints in reflective insulation joints must be taped where insulation properties rely on 2 or more airspaces. Mixing of air between airspaces will severely reduce Total R-value.

R-VALUES FOR SYSTEM W1100		R1.5 WALL BATT		10mm ANTIGLARE REFLECTIVE EPS BOARD		DOUBLE-SIDED ANTIGLARE FOIL		SINGLE-SIDED POLY WEAVE FOIL		BUBBLE/FOAM FOIL	
		NON-VENTILATED		NON-VENTILATED		NON-VENTILATED		NON-VENTILATED		NON-VENTILATED	
		W1111W	W1111S	W1107W	W1107S	W1103W	W1103S	W1101W	W1101S	W1105W	W1105S
No:	Element Description:	WINTER	SUMMER	WINTER	SUMMER	WINTER	SUMMER	WINTER	SUMMER	WINTER	SUMMER
1	Outdoor Air Film	0.040	0.040	0.040	0.040	0.040	0.040	0.040	0.040	0.040	0.040
2	110mm Brickwork	0.180	0.180	0.180	0.180	0.180	0.180	0.180	0.180	0.180	0.180
3	Unventilated 20mm Air Space			0.583	0.516					0.777	0.709
	Unventilated 22mm Air Space										
	Unventilated 25mm Air Space					0.639	0.572	0.197	0.177		
4	Reflective Insulation Material R-value			0.254	0.238	0.000	0.000	0.000	0.000	0.140	0.140
5	Unventilated 25mm Air Space					0.805	0.661	0.779	0.646		
	Unventilated 21mm Air Space									0.750	0.624
	Unventilated Reflective 20mm Air Space			0.725	0.639						
6	Bulk Wall Insulation	1.580	1.433								
7	110mm Brickwork	0.180	0.180	0.180	0.180	0.180	0.180	0.180	0.180	0.180	0.180
8	Cement Render or Direct Fix 10mm Plasterboard	0.037	0.037	0.037	0.037	0.037	0.037	0.037	0.037	0.037	0.037
9	Indoor Air-Film (Non-Reflective Surface)	0.120	0.120	0.120	0.120	0.120	0.120	0.120	0.120	0.120	0.120
Total R-Value		2.1	2.0	2.1	2.0	2.0	1.8	1.5	1.4	2.2	2.0
Total R-Value of wall materials		0.72	0.72	0.72	0.72	0.72	0.72	0.72	0.72	0.72	0.72
Added R-Value of insulation		1.4	1.3	1.4	1.2	1.3	1.1	0.82	0.66	1.5	1.3

A. Calculations and assumptions in accordance with AS/NZS 4859.1:2002, Amendment 1, 2006 on the path of the insulation, as required by BCA Vol 1, Part J and Vol 2, Section 3.12.
 B. Temperatures and parameters are based on Australian climate assumptions. Air temperature difference 12°C (36°C less 24°C) for summer conditions and 6°C difference (18°C less 12°C) for winter. Actual conditions may differ from standardised conditions. This will impact on the actual performance of all insulations.
 C. Thermal resistance of air films and attic spaces based on values obtained from Section K5 and K6 of AS/NZS 4859.1:2006.
 D. Building material elements based on 2000 AIRAH Handbook and attic thermal value based on AS/NZS 4859.1 App K6 table K2.
 E. Where reflective insulation is installed, a simple addition of R-values is not possible. Care must be taken to ensure the performance of reflective air spaces is not "double-counted".
 F. The emittance of the reflective surfaces are dependent on tested values and the conditions of the installation, as specified by AS/NZS 4859.1, Amendment 1, 2006.

WALLS

W1200 - REVERSE BRICK VENEER (With external lightweight cladding)



ICANZ System Reference W1200

Structure and Insulation Installation

External Metal Cladding, 40mm spacer, wire mesh, girt.
 Spacer installed over Foil Faced Blanket to ensure blanket recovers to nominal thickness.
 Reflective foil facing interior space.
 Wire mesh.
 Girt framing.

NOTE: Total R-Values can be increased by substituting bulk insulation products of higher Material R-Value. Reflective foil installed with no airspace to external wall cladding will claim no R-value from this airspace.

R-VALUES FOR SYSTEM W1200	SINGLE-SIDED POLY WEAVE FOIL ON BOTH SIDES OF STUD FRAME WITH R2.5 WALL BATT		SINGLE-SIDED POLY WEAVE FOIL ON BOTH SIDES OF STUD FRAME		DOUBLE-SIDED ANTIGLARE FOIL ON BOTH SIDES OF STUD FRAME		SINGLE-SIDED POLY WEAVE WITH BUBBLE/FOAM FOIL		SINGLE-SIDED POLY WEAVE FOIL WITH REFLECTIVE EPS BOARD 10mm	
	NON-VENTILATED		NON-VENTILATED		NON-VENTILATED		NON-VENTILATED		NON-VENTILATED	
	W1211W	W1211S	W1201W	W1201S	W1203W	W1203S	W1205W	W1205S	W1207W	W1207S
No: Element Description:	WINTER	SUMMER	WINTER	SUMMER	WINTER	SUMMER	WINTER	SUMMER	WINTER	SUMMER
1 Outdoor Air Film	0.040	0.040	0.040	0.040	0.040	0.040	0.040	0.040	0.040	0.040
2 8mm Compressed Fibre Cement Sheet	0.018	0.018	0.018	0.018	0.018	0.018	0.018	0.018	0.018	0.018
3 Reflective Insulation R-value	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
4 Unventilated 90mm Air Space			0.802	0.651	0.821	0.700	0.862	0.710	0.870	0.715
5 Bulk Insulation Wall Batt	2.645	2.355								
6 Reflective Insulation Material R-value	0.000	0.000	0.000	0.000	0.000	0.000	0.140	0.140	0.254	0.258
7 Unventilated Air Space	0.902	0.788	0.824	0.673	0.826	0.643	0.856	0.704	0.859	0.720
8 110mm Brickwork	0.180	0.180	0.180	0.180	0.180	0.180	0.180	0.180	0.180	0.180
9 10mm Plasterboard	0.059	0.059	0.059	0.059	0.059	0.059	0.059	0.059	0.059	0.059
10 Indoor Air-Film (Non-Reflective Surface)	0.120	0.120	0.120	0.120	0.120	0.120	0.120	0.120	0.120	0.120
Total R-Value	4.0	3.6	2.0	1.7	2.1	1.8	2.3	2.0	2.4	2.1
Total R-Value of wall materials	0.58	0.58	0.58	0.58	0.58	0.58	0.58	0.58	0.58	0.58
Added R-Value of insulation	3.4	3.0	1.5	1.2	1.5	1.2	1.7	1.4	1.8	1.5

A. Calculations and assumptions in accordance with AS/NZS 4859.1:2002, Amendment 1, 2006 on the path of the insulation, as required by BCA Vol 1, Part J and Vol 2, Section 3.12.
 B. Temperatures and parameters are based on Australian climate assumptions. Air temperature difference 12°C (36°C less 24°C) for summer conditions and 6°C difference (18°C less 12°C) for winter.
 Actual conditions may differ from standardised conditions. This will impact on the actual performance of all insulations.
 C. Thermal resistance of air films and attic spaces based on values obtained from Section K5 and K6 of AS/NZS 4859.1:2006.
 D. Building material elements based on 2000 AIRAH Handbook and attic thermal value based on AS/NZS 4859.1 App K6 table K2.
 E. Where reflective insulation is installed, a simple addition of R-values is not possible. Care must be taken to ensure the performance of reflective air spaces is not "double-counted".
 F. The emittance of the reflective surfaces are dependent on tested values and the conditions of the installation, as specified by AS/NZS 4859.1, Amendment 1, 2006.

WALLS

W1300 - METAL CLADDING (No cavities)

ICANZ System Reference W1300

Structure and Insulation Installation

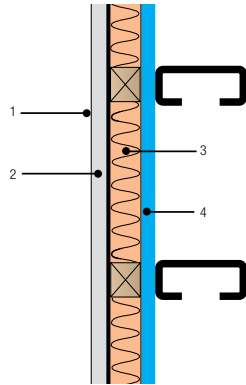
External Metal Cladding, 40mm spacer, wire mesh, girt.

Reflective foil, bright side facing inwards or bulk insulation with foil facing interior space.

Wire mesh.

Girt framing.

NOTE: Total R-Values can be increased by substituting bulk insulation products of higher Material R-Value.

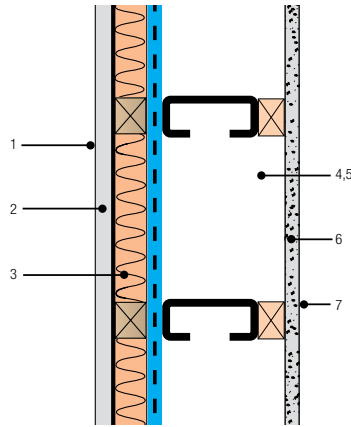


R-VALUES FOR SYSTEM W1300	FOIL FACED R1.3 BLANKET		SINGLE-SIDED POLY WEAVE FOIL OR DOUBLE-SIDED ANTIGLARE FOIL		ANTIGLARE BUBBLE/FOAM FOIL	
	VENTILATED		VENTILATED		VENTILATED	
	W1312W	W1312S	W1302W	W1302S	W1306W	W1306S
No: Element Description:	WINTER	SUMMER	WINTER	SUMMER	WINTER	SUMMER
1 Outdoor Air Film	0.040	0.040	0.040	0.040	0.040	0.040
2 Metal Wall Cladding	0.000	0.000	0.000	0.000	0.000	0.000
3 Reflective Insulation Material R-value	1.371	1.230	0.000	0.000	0.140	0.140
4 Indoor Air-Film (Reflective Surface)	0.300	0.300	0.300	0.300	0.300	0.300
Total R-Value	1.7	1.6	0.34	0.34	0.48	0.48
Total R-Value of wall materials	0.16	0.16	0.16	0.16	0.16	0.16
Added R-Value of insulation	1.8	1.4	0.18	0.18	0.32	0.32

A. Calculations and assumptions in accordance with AS/NZS 4859.1:2002, Amendment 1, 2006 on the path of the insulation, as required by BCA Vol 1, Part J and Vol 2, Section 3.12.
 B. Temperatures and parameters are based on Australian climate assumptions. Air temperature difference 12°C (36°C less 24°C) for summer conditions and 6°C difference (18°C less 12°C) for winter.
 Actual conditions may differ from standardised conditions. This will impact on the actual performance of all insulations.
 C. Thermal resistance of air films and attic spaces based on values obtained from Section K5 and K6 of AS/NZS 4859.1:2006.
 D. Building material elements based on 2000 AIRAH Handbook and attic thermal value based on AS/NZS 4859.1 App K6 table K2.
 E. Where reflective insulation is installed, a simple addition of R-values is not possible. Care must be taken to ensure the performance of reflective air spaces is not "double-counted".
 F. The emittance of the reflective surfaces are dependent on tested values and the conditions of the installation, as specified by AS/NZS 4859.1, Amendment 1, 2006.

WALLS

W1400 - METAL CLADDING (With 100-150mm cavity)



ICANZ System Reference W1400

Structure and Insulation Installation

External Metal Cladding, 40mm spacer, wire mesh, girt.

Spacer installed over Foil Faced Blanket to ensure blanket recovers to nominal thickness. Reflective foil facing interior space
Wire mesh.

100mm - 150mm Girt Framing forming a non-vented air space, batten to support internal lining.

Internal lining (e.g. Compressed Fibre Cement or Plasterboard).

NOTE: Total R-Values can be increased by substituting bulk insulation products of higher Material R-Value.

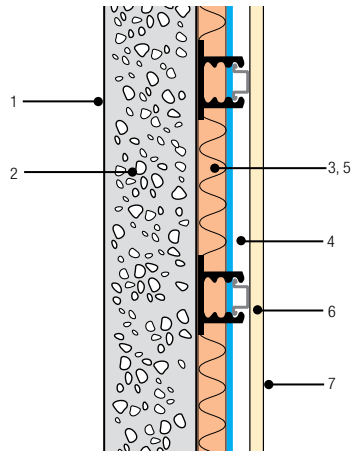
Reflective foil installed with no airspace to external wall cladding will claim no R-value from this airspace.

R-VALUES FOR SYSTEM W1400	FOIL FACED R1.3 BLANKET		R2.0 WALL BATT WITH SINGLE SIDED POLY WEAVE FOIL		ANTIGLARE BUBBLE/FOAM FOIL		SINGLE-SIDED POLY WEAVE FOIL OR DOUBLE-SIDED ANTIGLARE FOIL	
	NON-VENTILATED		NON-VENTILATED		NON-VENTILATED		NON-VENTILATED	
	W1411W	W1411S	W1413W	W1413S	W1405W	W1405S	W1401W	W1401S
No: Element Description:	WINTER	SUMMER	WINTER	SUMMER	WINTER	SUMMER	WINTER	SUMMER
1 Outdoor Air Film	0.040	0.040	0.040	0.040	0.040	0.040	0.040	0.040
2 Metal Cladding	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
3 Reflective Insulation Material R-value	1.378	1.222	0.000	0.000	0.140	0.140	0.000	0.000
4 Reflective 100-150mm Air Space	0.896	0.700			0.716	0.532	0.678	0.502
5 Bulk Insulation Wall Batt			2.104	1.914				
6 8mm Compressed Fibre Cement Sheet	0.018	0.018	0.018	0.018	0.018	0.018	0.018	0.018
7 Indoor Air-Film (Non-Reflective Surface)	0.12	0.12	0.12	0.12	0.12	0.12	0.12	0.12
Total R-Value	2.5	2.1	2.3	2.1	1.0	0.85	0.86	0.68
Total R-Value of wall materials	0.34	0.34	0.34	0.34	0.34	0.34	0.34	0.34
Added R-Value of insulation	2.1	1.8	1.9	1.8	0.70	0.51	0.52	0.34

A. Calculations and assumptions in accordance with AS/NZS 4859.1:2006, Amendment 1, 2006 on the path of the insulation, as required by BCA Vol 1, Part J and Vol 2, Section 3.12.
 B. Temperatures and parameters are based on Australian climate assumptions. Air temperature difference 12°C (36°C less 24°C) for summer conditions and 6°C difference (18°C less 12°C) for winter. Actual conditions may differ from standardised conditions. This will impact on the actual performance of all insulations.
 C. Thermal resistance of air films and attic spaces based on values obtained from Section K5 and K6 of AS/NZS 4859.1:2006.
 D. Building material elements based on 2000 AIRAH Handbook and attic thermal value based on AS/NZS 4859.1 App K6 table K2.
 E. Where reflective insulation is installed, a simple addition of R-values is not possible. Care must be taken to ensure the performance of reflective air spaces is not "double-counted".
 F. The emittance of the reflective surfaces are dependent on tested values and the conditions of the installation, as specified by AS/NZS 4859.1, Amendment 1, 2006.

WALLS

W1500 CONCRETE TILT SLAB (internally lined on battens)



ICANZ System Reference W1500

Structure and Insulation Installation

150mm tilt slab concrete, reflective insulation, bright side facing inwards or bulk insulation. 10mm plaster board interior lining.

R1.1 (38mm) Foil Faced Blanket next to slab with bright side facing 16mm air space.

R1.5 (50mm) Wall Batt in 50mm cavity.

Single Sided Poly Weave Foil next to slab with bright side facing 35mm air space.

Antiglare Bubble Foil next to slab with bright side facing 28mm air space. Original cavity is 35mm.

Foil Faced Polystyrene Board next to slab with bright side facing 25mm air space. Original cavity is 35mm.

R1.1 (38mm) Wall Batt in 38mm cavity.

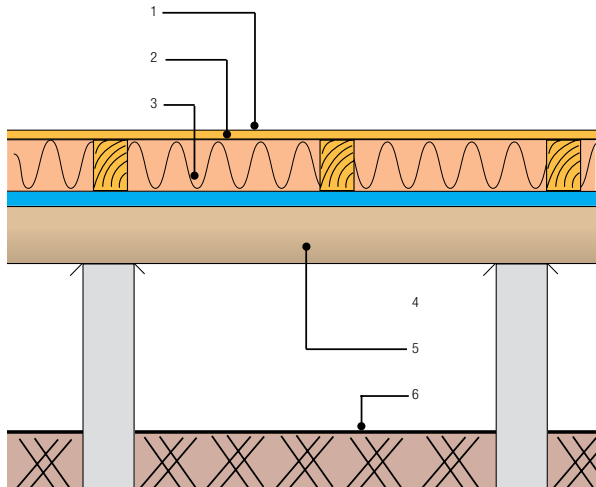
NOTE: Total R-Values can be increased by substituting bulk insulation products of higher Material R-Value.

R-VALUES FOR SYSTEM W1500	R1.1 (38mm) FOIL FACED BLANKET, 54mm FURRING CHANNEL		R1.5 (50mm) WALL BATT (50mm CAVITY)		SINGLE-SIDED POLY WEAVE FOIL		ANTIGLARE BUBBLE/FOAM FOIL		10mm ANTIGLARE REFLECTIVE EPS BOARD		R1.1 (38mm) WALL BATT	
	NON-VENTILATED		NON-VENTILATED		NON-VENTILATED		NON-VENTILATED		NON-VENTILATED		NON-VENTILATED	
	W1515W	W1515S	W1512W	W1512S	W1501W	W1501S	W1505W	W1505S	W1507W	W1507S	W1511W	W1511S
No: Element Description:	WINTER	SUMMER	WINTER	SUMMER	WINTER	SUMMER	WINTER	SUMMER	WINTER	SUMMER	WINTER	SUMMER
1 Outdoor Air Film	0.040	0.040	0.040	0.040	0.040	0.040	0.040	0.040	0.040	0.040	0.040	0.040
2 150mm Concrete Tilt Slab	0.104	0.104	0.104	0.104	0.104	0.104	0.104	0.104	0.104	0.104	0.104	0.104
3 Reflective Insulation Material R-value	1.052	1.036			0.000	0.000	0.140	0.140	0.255	0.238		
4 Unventilated Air Space	0.704	0.565			0.744	0.587	0.770	0.627	0.768	0.639		
5 Bulk Insulation Wall Batt			1.576	1.424							1.157	1.046
6 10mm Plasterboard	0.059	0.059	0.059	0.059	0.059	0.059	0.059	0.059	0.059	0.059	0.059	0.059
7 Indoor Air-Film (Non-Reflective Surface)	0.120	0.120	0.120	0.120	0.120	0.120	0.120	0.120	0.120	0.120	0.120	0.120
Total R-Value	2.1	1.9	1.9	1.8	1.1	0.91	1.2	1.1	1.4	1.2	1.5	1.4
Total R-Value of wall materials	0.48	0.48	0.48	0.48	0.48	0.48	0.48	0.48	0.48	0.48	0.48	0.48
Added R-Value of insulation	1.6	1.5	1.4	1.4	0.58	0.43	0.75	0.61	0.86	0.72	1.0	0.89

A. Calculations and assumptions in accordance with AS/NZS 4859.1:2002, Amendment 1, 2006 on the path of the insulation, as required by BCA Vol 1, Part J and Vol 2, Section 3.12.
 B. Temperatures and parameters are based on Australian climate assumptions. Air temperature difference 12°C (36°C less 24°C) for summer conditions and 6°C difference (18°C less 12°C) for winter. Actual conditions may differ from standardised conditions. This will impact on the actual performance of all insulations.
 C. Thermal resistance of air films and attic spaces based on values obtained from Section K5 and K6 of AS/NZS 4859.1:2006.
 D. Building material elements based on 2000 ARAH Handbook and attic thermal value based on AS/NZS 4859.1 App K6 table K2.
 E. Where reflective insulation is installed, a simple addition of R-values is not possible. Care must be taken to ensure the performance of reflective air spaces is not "double-counted".
 F. The emittance of the reflective surfaces are dependent on tested values and the conditions of the installation, as specified by AS/NZS 4859.1, Amendment 1, 2006.

FLOORS

F0100 - SUSPENDED TIMBER



ICANZ System Reference F0100

Structure and Insulation Installation

Timber floor consisting of standard 19mm Tongue and Groove wood composite panels fixed directly over 90mm floor joist. Reflective foil laminate fixed to under side of 90mm joist. Other fixing methods can be adopted ensuring a min. 90mm air cavity is maintained between the floor boards and foil.

R1.5 batt placed on breather foil.

Unventilated floor: Enclosed subfloor perimeter - BCA ventilation rate based on 6000mm²/m. Subfloor height based on 0.5m.

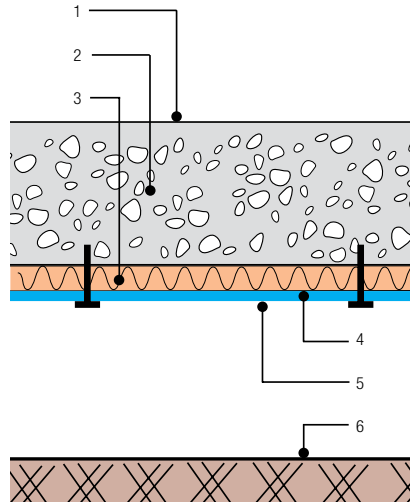
NOTE: Total R-Values can be increased by substituting bulk insulation products of higher Material R-Value. Contribution to Total R-value is highly dependent on workmanship and maintaining a still air space between the floor and the reflective insulation product. The thermal performance of any unsealed air compartment that allows draughts, and/or convection movements to by-pass the membrane will be severely compromised.

R-VALUES FOR SYSTEM F0100	R1.5 BATT				R1.5 BATT WITH BREATHER SINGLE-SIDED POLY WEAVE FOIL				BREATHER DOUBLE-SIDED ANTIGLARE FOIL				BUBBLE/FOAM FOIL				10mm ANTIGLARE REFLECTIVE EPS BOARD			
	NON-VENTILATED		VENTILATED		NON-VENTILATED		VENTILATED		NON-VENTILATED		VENTILATED		NON-VENTILATED		VENTILATED		NON-VENTILATED		VENTILATED	
	F0113W	F0113S	F0114W	F0114S	F0111W	F0111S	F0112W	F0112S	F0103W	F0103S	F0104W	RF0104S	F0105W	F0105S	F0106W	F0106S	F0107W	F0107S	F0108W	F0108S
No: Element Description:	WINTER	SUMMER	WINTER	SUMMER	WINTER	SUMMER	WINTER	SUMMER	WINTER	SUMMER	WINTER	SUMMER	WINTER	SUMMER	WINTER	SUMMER	WINTER	SUMMER	WINTER	SUMMER
1 Indoor Air Film	0.160	0.110	0.160	0.110	0.160	0.110	0.160	0.110	0.160	0.110	0.160	0.110	0.160	0.110	0.160	0.110	0.160	0.110	0.160	0.110
2 19mm T&G Timber Floor	0.120	0.120	0.120	0.120	0.120	0.120	0.120	0.120	0.120	0.120	0.120	0.120	0.120	0.120	0.120	0.120	0.120	0.120	0.120	0.120
3 Unventilated 90mm Air Space or Batts	1.568	1.445	1.568	1.445	1.568	1.445	1.568	1.445	0.872	0.379	0.830	0.340	0.870	0.383	0.830	0.340	0.872	0.386	0.872	0.386
4 Reflective Insulation Material R-value					0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.140	0.140	0.140	0.140	0.253	0.240	0.253	0.240
5 Subfloor Air Film	0.160	0.110	0.080	0.080	0.800	0.230	0.080	0.080	0.800	0.230	0.080	0.080	0.800	0.230	0.080	0.080	0.800	0.230	0.080	0.080
6 Ground Thermal Resistance (R _{gx})	0.580	0.560			0.580	0.560			0.580	0.560			0.580	0.560			0.580	0.560		
Total R-Value	2.6	2.3	1.9	1.8	3.2	2.5	1.9	1.8	2.5	1.4	1.2	0.65	2.7	1.5	1.3	0.79	2.8	1.6	1.5	0.94
Total R-Value of floor materials	1.0	0.90	0.40	0.34	1.0	0.90	0.40	0.34	1.0	0.90	0.40	0.34	1.0	0.90	0.40	0.34	1.0	0.90	0.40	0.34
Added R-Value of insulation	1.6	1.4	1.5	1.4	2.2	1.6	1.5	1.4	1.5	0.50	0.75	0.31	1.7	0.90	0.89	0.45	1.8	0.75	1.0	0.60

A. Calculations and assumptions in accordance with AS/NZS 4859.1:2002, Amendment 1, 2006 on the path of the insulation, as required by BCA Vol 1, Part J and Vol 2, Section 3.12.
 B. Temperatures and parameters are based on Australian climate assumptions. Air temperature difference 12°C (36°C less 24°C) for summer conditions and 6°C difference (18°C less 12°C) for winter.
 Actual conditions may differ from standardised conditions. This will impact on the actual performance of all insulations.
 C. Thermal resistance of air films and attic spaces based on values obtained from Section K5 and K6 of AS/NZS 4859.1:2006.
 D. Building material elements based on 2000 AIRAH Handbook and attic thermal value based on AS/NZS 4859.1 App K6 table K2.
 E. Where reflective insulation is installed, a simple addition of R-values is not possible. Care must be taken to ensure the performance of reflective air spaces is not "double-counted".
 F. The emittance of the reflective surfaces are dependent on tested values and the conditions of the installation, as specified by AS/NZS 4859.1, Amendment 1, 2006.

FLOORS

F0200 - CONCRETE SUSPENDED SLAB



ICANZ System Reference F0200

Structure and Insulation Installation

150mm Concrete suspended floor slab, no floor covering. Reflective foil laminate fixed to under side of 50mm batten. Other fixing methods can be adopted ensuring a min. 50mm air cavity void is maintained between the slab and foil, alternatively R1.5 foil-faced blanket pinned to under side of slab, RFL facing downwards.

Unventilated floor: Enclosed subfloor perimeter - BCA ventilation rate based on 6000mm²/m. Subfloor height based on 0.5m.

Any ventilated case (i.e. Naturally or mechanically ventilated) may be used to represent carpark ceiling construction.

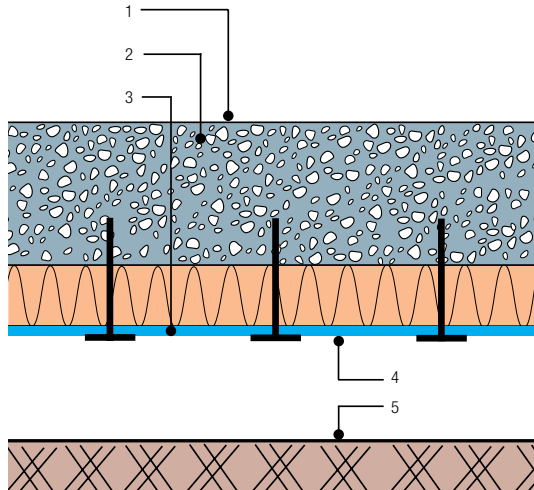
NOTE: Total R-Values can be increased by substituting bulk insulation products of higher Material R-Value.

R-VALUES FOR SYSTEM F0200		R1.5 BATT WITH PERFORATED DOUBLE-SIDED ANTIGLARE				PERFORATED DOUBLE-SIDED ANTIGLARE FOIL				BUBBLE//FOAM FOIL				10mm ANTIGLARE REFLECTIVE EPS BOARD (BRIGHT SIDE DOWNWARDS)			
		NON-VENTILATED		VENTILATED		NON-VENTILATED		VENTILATED		NON-VENTILATED		VENTILATED		NON-VENTILATED		VENTILATED	
		F0211W	F0211S	F0212W	F0212S	F0203W	F0203S	F0204W	F0204S	F0205W	F0205S	F0206W	F0206S	F0207W	F0207S	F0208W	F0208S
No:	Element Description:	WINTER	SUMMER	WINTER	SUMMER	WINTER	SUMMER	WINTER	SUMMER	WINTER	SUMMER	WINTER	SUMMER	WINTER	SUMMER	WINTER	SUMMER
1	Indoor Air Film	0.160	0.110	0.160	0.110	0.160	0.110	0.160	0.110	0.160	0.110	0.160	0.110	0.160	0.110	0.160	0.110
2	150mm Concrete Slab	0.104	0.104	0.104	0.104	0.104	0.104	0.104	0.104	0.104	0.104	0.104	0.104	0.104	0.104	0.104	0.104
3	Unventilated 50mm Air Space					0.733	0.365	0.696	0.326	0.735	0.365	0.696	0.326	0.733	0.365	0.696	0.326
4	Reflective Insulation Material R-value	1.554	1.480	1.554	1.480	0.000	0.000	0.000	0.000	0.140	0.140	0.140	0.140	0.253	0.239	0.253	0.239
5	Unventilated Subfloor Reflective Air Film	0.800	0.230	0.080	0.080	0.800	0.230	0.080	0.080	0.800	0.230	0.080	0.080	0.800	0.230	0.080	0.080
6	Ground Thermal Resistance (R _g)	0.580	0.560			0.580	0.560			0.580	0.560			0.580	0.560		
Total R-Value		3.2	2.5	1.9	1.8	2.4	1.4	1.0	0.62	2.5	1.5	1.2	0.8	2.6	1.6	1.3	0.86
Total R-Value of floor materials		1.0	0.90	0.40	0.34	1.0	0.90	0.44	0.34	1.0	0.90	0.40	0.34	1.00	0.90	0.44	0.34
Added R-Value of insulation		2.2	1.6	1.5	1.4	1.4	0.47	0.60	0.28	1.5	0.61	0.74	0.42	1.6	0.71	0.85	0.52

A. Calculations and assumptions in accordance with AS/NZS 4859.1:2002, Amendment 1, 2006 on the path of the insulation, as required by BCA Vol 1, Part J and Vol 2, Section 3.12.
 B. Temperatures and parameters are based on Australian climate assumptions. Air temperature difference 12°C (36°C less 24°C) for summer conditions and 6°C difference (18°C less 12°C) for winter. Actual conditions may differ from standardised conditions. This will impact on the actual performance of all insulations.
 C. Thermal resistance of air films and attic spaces based on values obtained from Section K5 and K6 of AS/NZS 4859.1:2006.
 D. Building material elements based on 2000 AIRAH Handbook and attic thermal value based on AS/NZS 4859.1 App K6 table K2.
 E. Where reflective insulation is installed, a simple addition of R-values is not possible. Care must be taken to ensure the performance of reflective air spaces is not "double-counted".
 F. The emittance of the reflective surfaces are dependent on tested values and the conditions of the installation, as specified by AS/NZS 4859.1, Amendment 1, 2006.

FLOORS

F0300 - AUTOCLAVED AERATED CONCRETE FLOOR PANEL (AAC)



ICANZ System Reference F0300

Structure and Insulation Installation

75mm AAC suspended floor panel 510kg/m³, 5% moisture, no floor covering.

Reflective foil laminate fixed to under side of panel (no air gap).

Alternatively R1.5 foil faced glasswool board pinned to under side of panel, RFL bright side facing downwards.

Unventilated floor: Enclosed subfloor perimeter - BCA ventilation rate based on 6000mm²/m.

Subfloor height based on 0.5m.

Any ventilated case (i.e. Naturally or mechanically ventilated) may be used to represent carpark ceiling construction.

NOTE: Total R-Values can be increased by substituting bulk insulation products of higher Material R-Value.

R-VALUES FOR SYSTEM F0300	R1.5 FOIL FACED GLASSWOOL BOARD				BUBBLE/FOAM FOIL				SINGLE-SIDED POLY WEAVE FOIL			
	NON-VENTILATED		VENTILATED		NON-VENTILATED		VENTILATED		NON-VENTILATED		VENTILATED	
	F0311W	F0311S	F0312W	F0312S	F0305W	F0305S	F0306W	F0306S	F0301W	F0301S	F0302W	F0302S
No: Element Description:	WINTER	SUMMER	WINTER	SUMMER	WINTER	SUMMER	WINTER	SUMMER	WINTER	SUMMER	WINTER	SUMMER
1 Indoor Air Film	0.160	0.110	0.160	0.110	0.160	0.110	0.160	0.110	0.160	0.110	0.160	0.110
2 75mm AAC Panel	0.490	0.490	0.490	0.490	0.490	0.490	0.490	0.490	0.490	0.490	0.490	0.490
3 Reflective Insulation Material R-value	1.559	1.466	1.559	1.466	0.140	0.140	0.140	0.140	0.000	0.000	0.000	0.000
4 Subfloor Reflective Air Film	0.800	0.230	0.080	0.080	0.800	0.230	0.080	0.080	0.800	0.230	0.080	0.080
5 Ground Thermal Resistance (R _g)	0.580	0.560			0.580	0.560			0.580	0.560		
Total R-Value	3.6	2.9	2.3	2.1	2.2	1.5	0.87	0.82	2.0	1.4	0.73	0.68
Total R-Value of floor materials	1.4	1.3	0.65	0.60	1.40	1.3	0.65	0.60	1.40	1.3	0.65	0.60
Added R-Value of insulation	2.2	1.6	1.6	1.5	0.78	0.26	0.22	0.22	0.60	0.12	0.08	0.08

A. Calculations and assumptions in accordance with AS/NZS 4859.1:2002, Amendment 1, 2006 on the path of the insulation, as required by BCA Vol 1, Part J and Vol 2, Section 3.12.
 B. Temperatures and parameters are based on Australian climate assumptions. Air temperature difference 12°C (36°C less 24°C) for summer conditions and 6°C difference (18°C less 12°C) for winter. Actual conditions may differ from standardised conditions. This will impact on the actual performance of all insulations.
 C. Thermal resistance of air films and attic spaces based on values obtained from Section K5 and K6 of AS/NZS 4859.1:2006.
 D. Building material elements based on 2000 AIRAH Handbook and attic thermal value based on AS/NZS 4859.1 App K6 table K2.
 E. Where reflective insulation is installed, a simple addition of R-values is not possible. Care must be taken to ensure the performance of reflective air spaces is not "double-counted".
 F. The emittance of the reflective surfaces are dependent on tested values and the conditions of the installation, as specified by AS/NZS 4859.1, Amendment 1, 2006.

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