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THE RIGHT INSULATION MATTERS

# INSULATION HANDBOOK

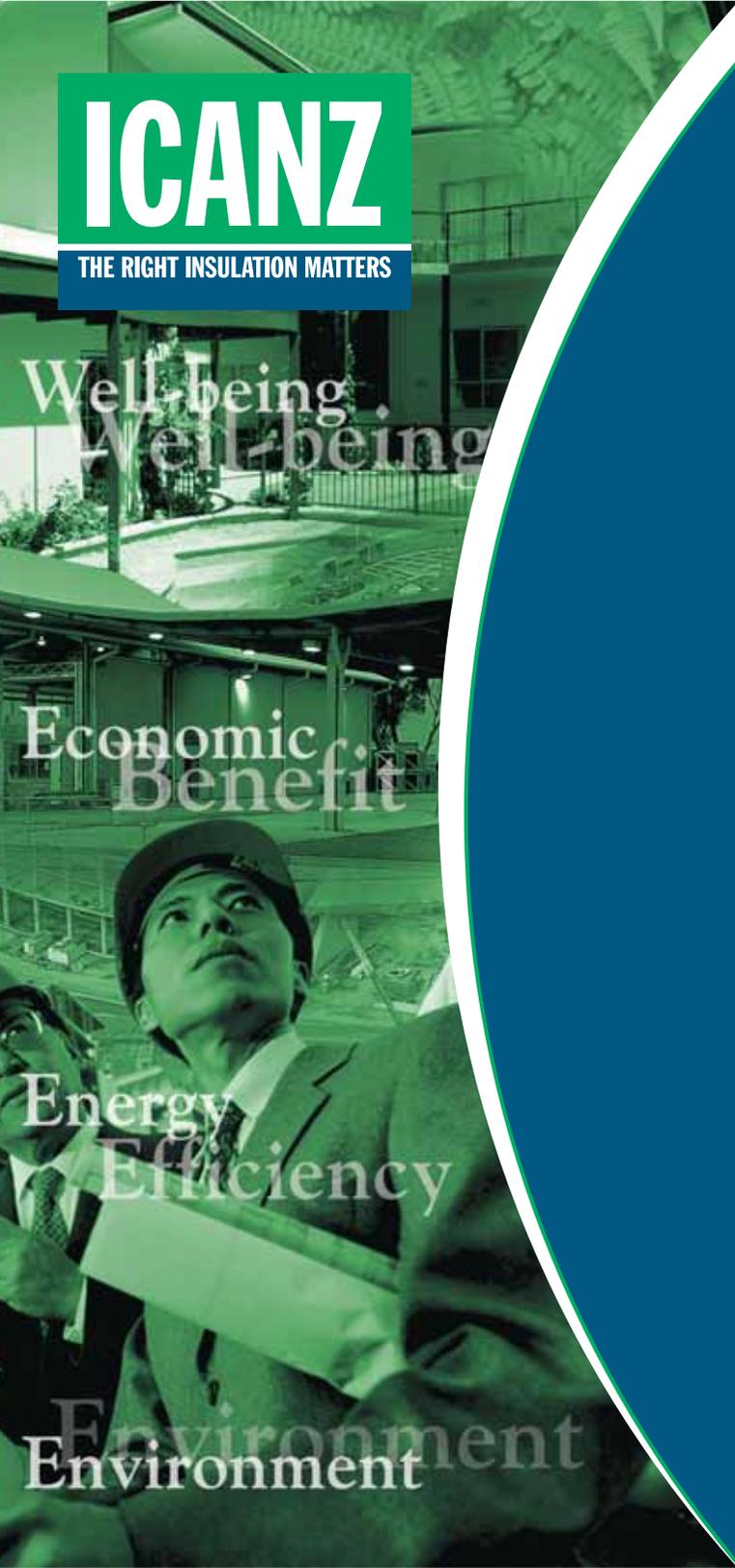
## Part 1: Thermal Performance

Total R-Value calculations for  
typical building applications

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

June 2009

RRP \$24.95





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Well-being  
Well-being

Economic  
Benefit

Energy  
Efficiency

Environment

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typical building applications

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# 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 taken into account in accordance with the 2006 amendment to AS/NZS 4859.1.

In addition to the Total R-Value of the structure, the un-insulated R-Values are also provided to demonstrate the thermal resistance without reflective foil: these are shown for 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.

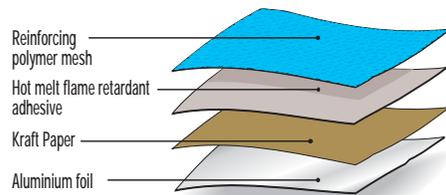
### Social benefits:

- 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.



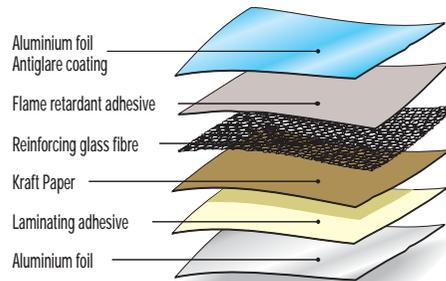
# TYPES OF INSULATION

Six types of insulation products are used throughout this Handbook.



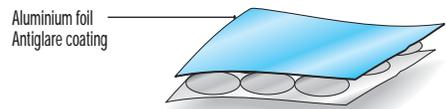
## 1. Single Sided Poly Weave Foils

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).



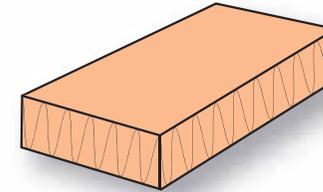
## 2. Double Sided Antiglare Foils

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).



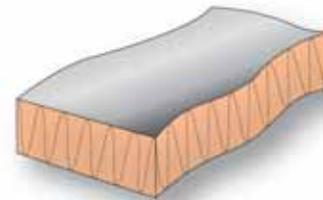
## 3. Bubble Foil

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



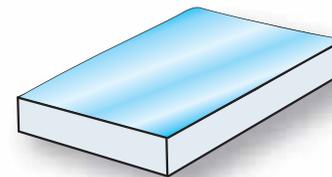
## 4. Ceiling and Wall Batts

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).



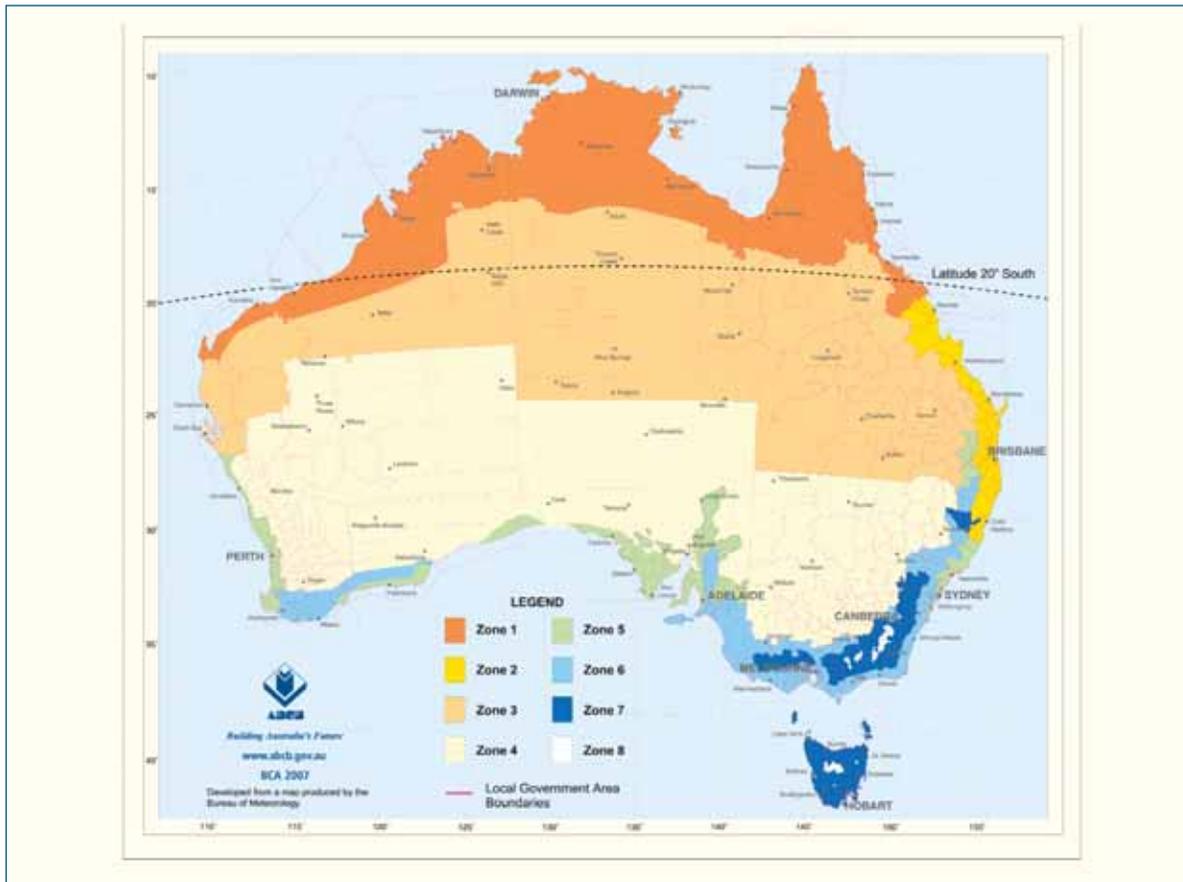
## 6. Antiglare Reflective EPS Board

Foil-faced polystyrene foam boards consist of expanded polystyrene 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

# 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.** From the table, determine the design conditions ('Summer' heat flow in or 'Winter' heat flow out) according to the building class and climate zone for your project.  
Note: Building classes are defined by the BCA and are summarised on the following page.
- Step 3.** Refer to the roof, wall or floor system applicable to your construction type to determine Total R-value.

**NOTE:** Some applications may achieve Total R-values sufficient to comply with the minimum performance levels of the Deemed to Satisfy requirements contained in the Energy Efficiency Provision of the BCA.

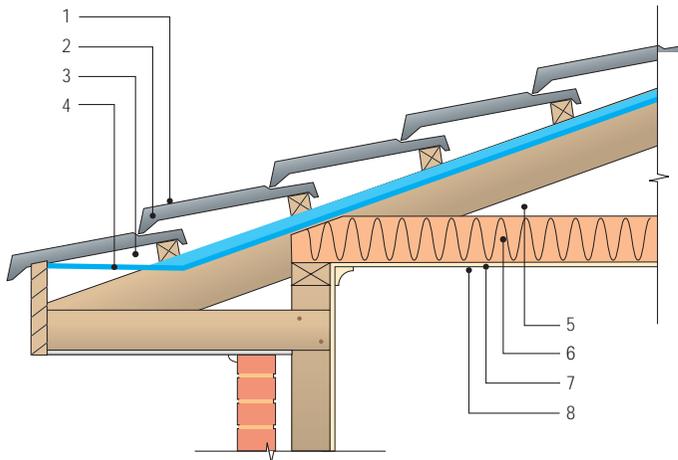
Climate Zone		1	2	3	4	5	6	7	8
			Below 300m	Above 300m					
ROOF/WALLS	Class 1-10,2,3,4,9c	Summer		Winter					
	Class 5,6,7,8,9a,9b	Summer						Winter	
FLOORS	Class 1-10	Summer		Winter					
	Class 2,3,4,5,6,7,8,9a,9b,9c	Summer			Winter				

# BUILDING CODE OF AUSTRALIA – CLASSES OF BUILDING

<b>CLASS 1</b>	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 <sup>2</sup> 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.	
<b>CLASS 2</b>	A Building containing 2 or more sole occupancy units each being a separate dwelling.	
<b>CLASS 3</b>	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.	
<b>CLASS 4</b>	A dwelling in a building that is Class 5, 6, 7, 8 or 9 if it is the only dwelling in the building.	
<b>CLASS 5</b>	An office building used for professional or commercial purposes, excluding buildings of Class 6, 7, 8 or 9.	
<b>CLASS 6</b>	A shop or other building for the sale of goods by retail or the supply of services direct to the public.	
<b>CLASS 7</b>	A building which	
	Class 7A	Is a carpark
	Class 7B	Is for storage or display of goods or produce for sale by wholesale
<b>CLASS 8</b>	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.	
<b>CLASS 9</b>	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
<b>CLASS 10</b>	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.

# ROOFS

## R0100 - PITCHED TILED ROOF WITH FLAT CEILING



### ICANZ System Reference R0100

#### Structure

Concrete or Terracotta tiled roof between 18° and 35° pitch, 40mm battens, reflective foil insulation, reflective 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/NZ4200.2.

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

R3.5 batts positioned between joists on ceiling lining.

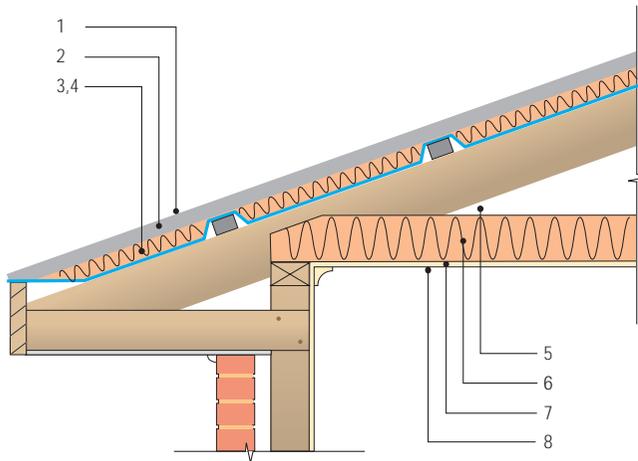
**NOTE:** Total R-Values can be increased by substituting bulk insulation products of higher Material R-Value.

R-VALUES FOR SYSTEM R0100		SINGLE-SIDED POLY WEAVE WITH R3.5 BATTS				R3.5 CEILING BATTS				SINGLE-SIDED POLY WEAVE				BUBBLE 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	Unventilated 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
<b>Total R-Value</b>		<b>4.6</b>	<b>4.9</b>	<b>4.4</b>	<b>5.2</b>	<b>3.9</b>	<b>4.1</b>	<b>3.9</b>	<b>4.1</b>	<b>0.97</b>	<b>1.5</b>	<b>0.75</b>	<b>1.8</b>	<b>1.2</b>	<b>1.9</b>	<b>1.0</b>	<b>2.1</b>	<b>1.1</b>	<b>1.7</b>	<b>0.87</b>	<b>2.0</b>
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.  
 C. Thermal resistance of air films and attic spaces based on values obtained from Section K5 and K6 of AS 4859.1:2006.  
 D. Building material elements based on 2000 AIRAH Handbook and attic thermal value based on AS4859.1 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

#### Structure

Metal roof between 18° and 35° pitch, 40mm battens, reflective insulation, attic space, 10mm plasterboard flat ceiling. Foil products are fitted under battens or draped over battens to create an average 40mm air space facing metal roof.

#### Insulation installation

Foil faced blanket product shall be installed with foil facing attic space with the blanket compressed over battens. Blanket must be allowed to recover to its full thickness. Reflective insulation shall be draped over battens to create a 40mm air space, antiglare side facing outwards. All joins in foil should be lapped 150mm and tears or gaps in foil sealed with a suitable reflective foil tape.

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

R3.5 batts positioned between joists on ceiling lining.

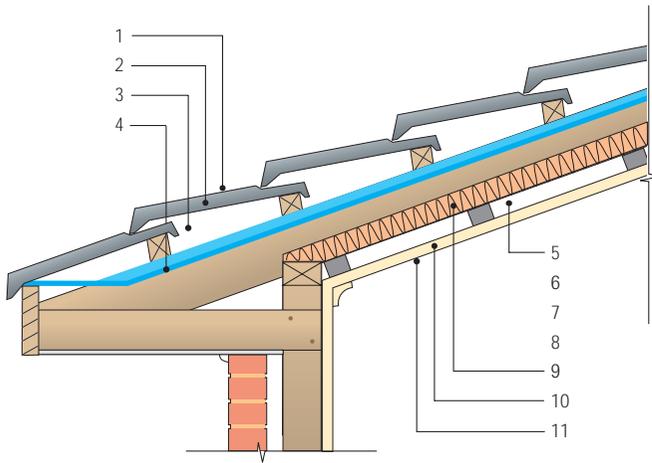
**NOTE: Total R-Values can be increased by substituting bulk insulation products of higher Material R-Value.**

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 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
<b>Total R-Value</b>		<b>5.8</b>	<b>5.9</b>	<b>5.6</b>	<b>6.2</b>	<b>2.1</b>	<b>2.6</b>	<b>1.9</b>	<b>2.8</b>	<b>4.1</b>	<b>3.9</b>	<b>3.9</b>	<b>4.1</b>	<b>1.3</b>	<b>2.1</b>	<b>1.1</b>	<b>2.3</b>	<b>1.2</b>	<b>1.9</b>	<b>0.96</b>	<b>2.2</b>
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.  
 C. Thermal resistance of air films and attic spaces based on values obtained from Section K5 and K6 of AS 4859.1:2006.  
 D. Building material elements based on 2000 AIRAH Handbook and attic thermal value based on AS4859.1 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 190mm RAFTERS



### ICANZ System Reference R0300

#### Structure

Pitch tiled roof between 18° and 35° pitch, with products under 40mm battens with Antiglare side facing outwards, 190mm deep rafters below battens with 10mm plasterboard fixed on battens to rafters.

#### Insulation installation

Reflective insulation shall be draped under battens to create a 40mm air space. All joints should be lapped 150mm in accordance with AS/NZS 4200.2. To maintain effectiveness as insulation 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 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 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
<b>Total R-Value</b>	<b>4.2</b>	<b>4.1</b>	<b>0.95</b>	<b>1.7</b>	<b>2.5</b>	<b>3.8</b>	<b>1.2</b>	<b>2.0</b>	<b>1.1</b>	<b>1.9</b>
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 4859.1:2002, 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.

C. Thermal resistance of air films and attic spaces based on values obtained from Section K5 and K6 of AS 4859.1:2006.

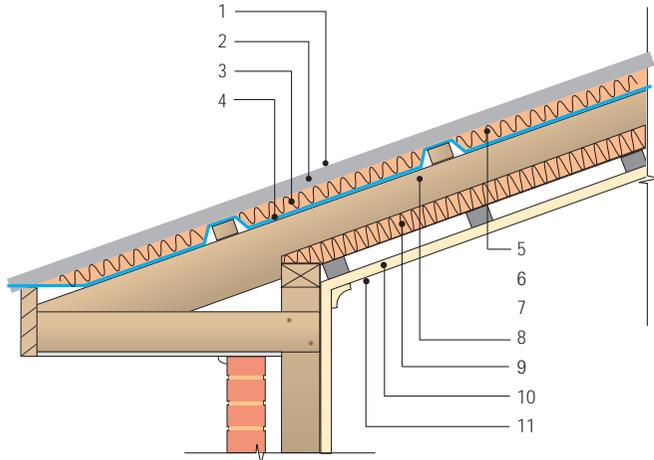
D. Building material elements based on 2000 AIRAH Handbook and attic thermal value based on AS4859.1 app K6 table K2.

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 RAFTERS



### ICANZ System Reference R0400

#### Structure

Metal cathedral roof at 22.5° pitch with foil faced blanket product over 40mm battens with 190mm deep rafters ceiling insulation, battens with 10mm plasterboard fixed below.

#### Insulation Installation

Reflective insulation shall be draped over or under battens to create a 40mm air space. All joins should be lapped 150mm in accordance with AS/NZS 4200.2. To maintain effectiveness as insulation 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.

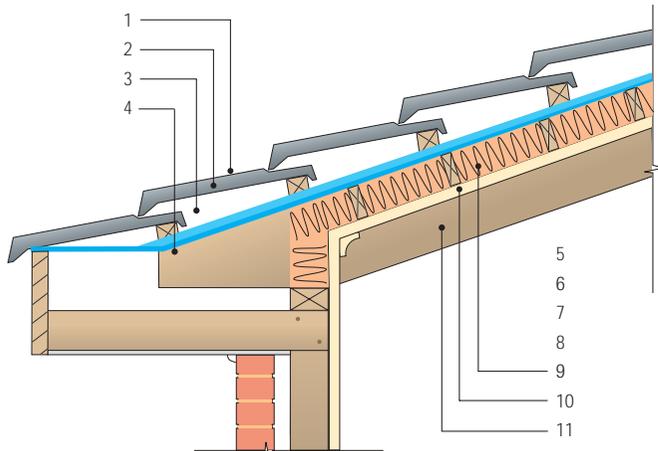
**NOTE: Total R-Values can be increased by substituting bulk insulation products of higher Material R-Value.**

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 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
<b>Total R-Value</b>		<b>5.4</b>	<b>5.2</b>	<b>4.4</b>	<b>4.5</b>	<b>2.7</b>	<b>4.2</b>	<b>1.3</b>	<b>2.3</b>	<b>1.2</b>	<b>2.1</b>
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.  
 C. Thermal resistance of air films and attic spaces based on values obtained from Section K5 and K6 of AS 4859.1:2006.  
 D. Building material elements based on 2000 AIRAH Handbook and attic thermal value based on AS4859.1 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

#### Structure

Tiled cathedral roof at 22.5° pitch, with foil draped under tile batten providing 40mm air space with bright side of foil facing downward. Tile battens fixed over counter batten providing minimum 70mm air space. 10mm plasterboard ceiling fixed under counter batten but over exposed roof rafter.

#### Insulation Installation

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

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. Bulk insulation on the ceiling lining.

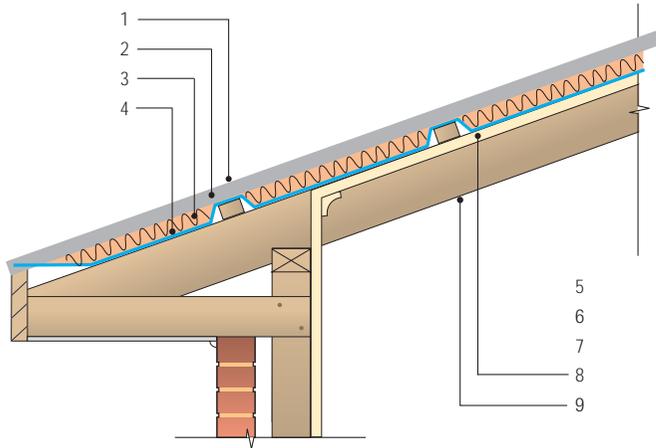
**NOTE: Total R-Values can be increased by substituting bulk insulation products of higher Material R-Value.**

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 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
<b>Total R-Value</b>		<b>2.6</b>	<b>2.5</b>	<b>0.98</b>	<b>1.6</b>	<b>2.3</b>	<b>2.5</b>	<b>1.3</b>	<b>1.9</b>	<b>1.1</b>	<b>1.8</b>
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.  
 C. Thermal resistance of air films and attic spaces based on values obtained from Section K5 and K6 of AS 4859.1:2006.  
 D. Building material elements based on 2000 AIRAH Handbook and attic thermal value based on AS4859.1 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



### ICANZ System Reference R0600

#### Structure

Metal cathedral roof between 18° and 35° pitch with R1.8 roofing blanket adhered to RFL vapour barrier foil product draped over 110mm high battens which are located over ceiling lining and roof rafter. Foil facing downwards to minimum 15mm air space, 10mm plasterboard ceiling fixed between batten and exposed rafter.

#### Insulation Installation

Option 1: Double sided antiglare foil over minimum 110mm batten. Remaining 70mm air space below double sided antiglare foil replaced with 20mm air space and R1.5 - 50mm, bulk insulation. Bulk insulation positioned over 10mm plasterboard ceiling fixed between batten and exposed roof rafter.

Option 2: Double sided antiglare foil over minimum 110mm batten. Reflective EPS board positioned at mid height of remaining 70mm air space providing 20mm air space above and below reflective EPS board.

Option 3: Polyweave or double sided antiglare 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 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
<b>Total R-Value</b>	<b>2.6</b>	<b>2.5</b>	<b>2.8</b>	<b>2.9</b>	<b>2.6</b>	<b>2.9</b>	<b>1.3</b>	<b>2.0</b>	<b>1.2</b>	<b>1.9</b>
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 4859.1:2002, 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.

C. Thermal resistance of air films and attic spaces based on values obtained from Section K5 and K6 of AS 4859.1:2006.

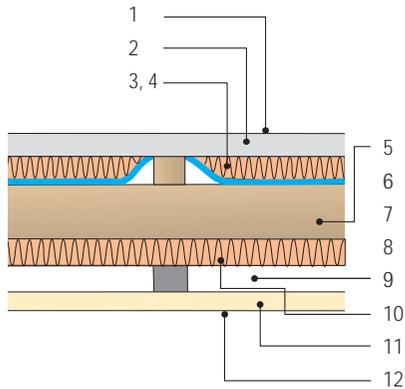
D. Building material elements based on 2000 AIRAH Handbook and attic thermal value based on AS4859.1 app K6 table K2.

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

#### Structure

Flat metal roof between 0° and 5° pitch with foil draped over or under roof battens providing 40mm air space with antiglare of foil facing the metal roof. Rafter size to allow minimum 190mm air space with 10mm plasterboard fixed directly to base of rafters or on battens to rafters (no thermal gain allowed for by plaster batten space). Above foil 40mm air space, below foil 190mm air space.

#### Insulation Installation

Option 1: Foil faced blanket (R1.3 blanket) draped over battens or under batten with foil facing downwards. Assume foil faced blanket example sagged but no air space above bulk. Assume minimum 25mm air space below foil prior to batt surface. In all cases R3.0 batt positioned between joists or plaster ceiling.

Option 2: Where R3.0 batts are used they are placed between rafters on ceiling lining. R3.0 batts installed with 25mm air space between foil above and top of batts.

Option 3: For 30mm reflective EPS board: 40mm air space above double sided antiglare foil, antiglare side facing metal, 30mm reflective EPS board positioned to span between rafters and located at mid height of air space providing 80mm air space above and below reflective polystyrene.

Option 4: Polyweave or double sided antiglare or bubble foil draped foil over or under roof battens providing 40mm air space (bright side of foil facing down) between cladding and foil.

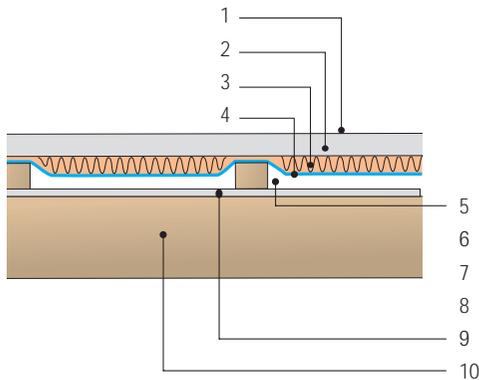
**NOTE: Total R-Values can be increased by substituting bulk insulation products of higher Material R-Value.**

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 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 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 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			0.430	0.592	0.421	0.592	0.175	0.171	0.402	0.592	0.397	0.592
4 Reflective Insulation Material R-value	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 Unventilated Reflective 190mm Air Space							0.519	1.688	0.538	1.755	0.532	1.740
6 Unventilated Reflective 80mm Air Space					0.620	1.777						
7 Foil-faced Polystyrene Board R-value					0.759	0.718						
8 Unventilated Reflective 80mm Air Space					0.607	1.740						
9 Unventilated Reflective 25mm Air Space	0.556	0.783	0.551	0.778								
10 Ceiling Insulation	3.134	2.907	3.145	2.894								
11 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
12 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
<b>Total R-Value</b>	<b>5.3</b>	<b>5.2</b>	<b>4.3</b>	<b>4.5</b>	<b>2.6</b>	<b>5.1</b>	<b>0.9</b>	<b>2.1</b>	<b>1.3</b>	<b>2.7</b>	<b>1.1</b>	<b>2.6</b>
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 4859.1:2006, 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.  
 C. Thermal resistance of air films and attic spaces based on values obtained from Section K5 and K6 of AS 4859.1:2006.  
 D. Building material elements based on 2000 AIRAH Handbook and attic thermal value based on AS4859.1 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

#### Structure

Flat metal roof between 0° and 5° pitch with R1.8 foil faced blanket product draped over minimum 110mm high batten which is located over ceiling lining and roof rafter. Foil facing downwards to minimum 15mm air space, 10mm plasterboard ceiling fixed between batten and exposed rafter.

#### Insulation Installation

Option 1: Double side antiglare foil positioned over minimum 110mm batten. 70mm air space below double sided antiglare foil replaced with 20mm air space and R1.5 - 50mm bulk insulation. Bulk insulation laid over ceiling lining.

Option 2: Double sided antiglare foil draped over minimum 110mm batten providing 40mm air space with antiglare side of foil facing metal roof. Reflective EPS board positioned at mid height of remaining 70mm air space providing 20mm air space above and below reflective EPS board.

Option 3: Polyweave or double sided antiglare or bubble foil draped over 90mm batten providing 40mm air space between metal roofing and foil. 50mm air space between foil and plaster ceiling.

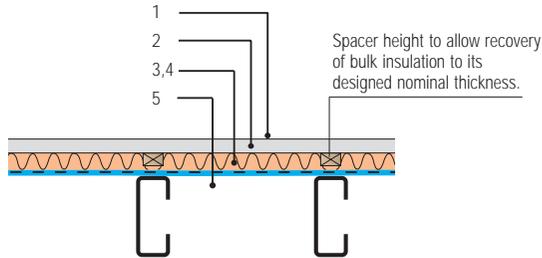
**NOTE: Total R-Values can be increased by substituting bulk insulation products of higher Material R-Value.**

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 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
<b>Total R-Value</b>	<b>2.6</b>	<b>2.6</b>	<b>2.7</b>	<b>3.0</b>	<b>2.4</b>	<b>2.9</b>	<b>0.89</b>	<b>1.7</b>	<b>1.3</b>	<b>2.3</b>	<b>1.1</b>	<b>2.1</b>
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.  
 C. Thermal resistance of air films and attic spaces based on values obtained from Section K5 and K6 of AS 4859.1:2006.  
 D. Building material elements based on 2000 AIRAH Handbook and attic thermal value based on AS4859.1 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

#### Structure

Flat metal roof at 0 to 5° pitch, with R<sub>m</sub>2.5 foil faced blanket laid over safety mesh with a spacer installed directly under metal sheeting.

#### Insulation Installation

Foil faced blanket insulation laid over safety mesh. Laps in foil should be 150mm, any tears or holes in the reflective foil should be repaired with foil tape. Where foil faced blanket is used, it should be allowed to recover to its nominal thickness by dishing the safety mesh or by providing a suitable spacer. Foil side of blanket should face into the air space below.

Foil sarking only insulation laid over safety mesh. Laps in foil should be 150mm. Any tears or holes in the reflective foil should be repaired with foil tape. Bright side of foil to face into the air space downward.

Tight safety mesh denotes no air space between reflective insulation and flat metal roof. Hence no contribution from an air space. Alternatively a spacer must be provided as per air space dimensions nominated.

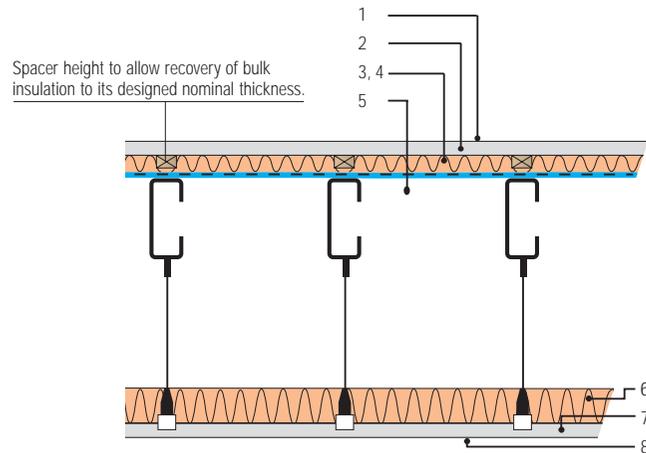
**NOTE: Total R-Values can be increased by substituting bulk insulation products of higher Material R-Value.**

R-VALUES FOR SYSTEM R0900	FOIL FACED R2.5 BLANKET ON TIGHT SAFETY MESH		ANTI GLARE BUBBLE FOIL ON TIGHT SAFETY MESH (NO AIR SPACE ABOVE FOIL)		DOUBLE-SIDED ANTI GLARE FOIL ON TIGHT SAFETY MESH (NO AIR SPACE ABOVE FOIL)		ANTI GLARE BUBBLE FOIL ON 40mm TIGHT SAFETY MESH		DOUBLE-SIDED ANTI GLARE FOIL ON 40mm 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
<b>Total R-Value</b>	<b>2.9</b>	<b>3.2</b>	<b>0.41</b>	<b>0.98</b>	<b>0.27</b>	<b>0.84</b>	<b>0.79</b>	<b>1.6</b>	<b>0.64</b>	<b>1.4</b>
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 4859.1:2006, 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.  
 C. Thermal resistance of air films and attic spaces based on values obtained from Section K5 and K6 of AS 4859.1:2006.  
 D. Building material elements based on 2000 AIRAH Handbook and attic thermal value based on AS4859.1 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

#### Structure

Flat metal roof at 0° to 5° pitch with foil faced blanket over safety mesh. Purlins may be at various centres. 10mm plasterboard ceiling fixed to the suspended ceiling grid to form a 100-600mm ventilated air space.

#### Insulation Installation

Foil faced blanket insulation laid over safety mesh. Laps in foil should be 150mm, any tears or holes in the reflective foil should be repaired with foil tape. Where foil faced blanket is used, it should be allowed to recover to its nominal thickness by dishing the safety mesh or by providing a suitable spacer. Foil side of blanket should face into the air space below.

Foil sarking only insulation laid over safety mesh. Laps in foil should be 150mm. Any tears or holes in the reflective foil should be repaired with foil tape. Bright side of foil to face into the air space downward.

Tight safety mesh denotes no air space between reflective insulation and flat metal roof. Hence no contribution from an air space. Alternatively a spacer must be provided as per air space dimensions nominated.

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

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 FOIL ON TIGHT SAFETY MESH (NO AIR SPACE ABOVE FOIL)		ANTIGLARE BUBBLE FOIL ON 40mm TIGHT SAFETY MESH		DOUBLE-SIDED ANTIGLARE ON 40mm 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
<b>Total R-Value</b>		<b>4.8</b>	<b>5.8</b>	<b>2.7</b>	<b>3.8</b>	<b>0.71</b>	<b>1.9</b>	<b>0.87</b>	<b>2.1</b>	<b>0.71</b>	<b>1.9</b>	<b>1.3</b>	<b>2.8</b>	<b>1.1</b>	<b>2.6</b>
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.

C. Thermal resistance of air films and attic spaces based on values obtained from Section K5 and K6 of AS 4859.1:2006.

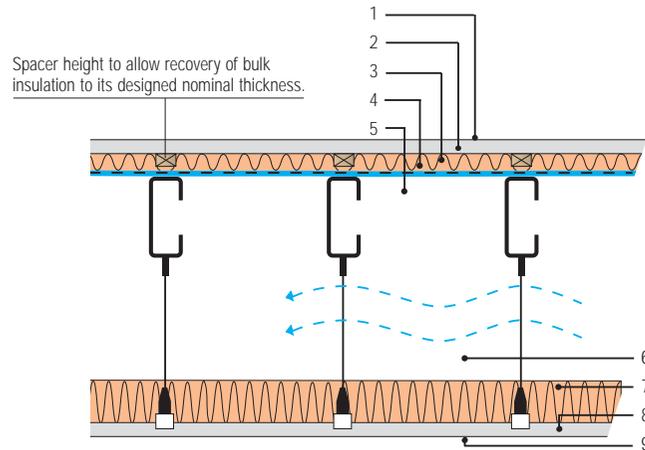
D. Building material elements based on 2000 AIRAH Handbook and attic thermal value based on AS4859.1 app K6 table K2.

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

#### Structure

Metal roof at 0 to 5° pitch, with foil faced blanket over safety mesh. Purlins may be at various centres. 10mm plasterboard ceiling fixed to the suspended ceiling grid to form a 100-600mm ventilated air space. i.e. Ceiling void used as a return air plenum.

#### Insulation Installation

Foil faced blanket insulation laid over safety mesh. Laps in foil should be 150mm, any tears or holes in the reflective foil should be repaired with foil tape. Where foil faced blanket is used, it should be allowed to recover to its nominal thickness by dishing the safety mesh or by providing a suitable spacer. Foil side of blanket should face into the air space below.

Foil sarking only insulation laid over safety mesh. Laps in foil should be 150mm. Any tears or holes in the reflective foil should be repaired with foil tape. Bright side of foil to face into the air space downward.

Tight safety mesh denotes no air space between reflective insulation and flat metal roof. Hence no contribution from an air space. Alternatively a spacer must be provided as per air space dimensions nominated.

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

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 FOIL ON TIGHT SAFETY MESH		DOUBLE-SIDED ANTIGLARE FOIL 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 Ventilating 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
<b>Total R-Value</b>	<b>2.0</b>	<b>1.8</b>	<b>3.3</b>	<b>3.0</b>	<b>0.26</b>	<b>0.26</b>	<b>0.12</b>	<b>0.12</b>	<b>0.63</b>	<b>0.85</b>	<b>0.48</b>	<b>0.72</b>
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.

C. Thermal resistance of air films and attic spaces based on values obtained from Section K5 and K6 of AS 4859.1:2006.

D. Building material elements based on 2000 AIRAH Handbook and attic thermal value based on AS4859.1 app K6 table K2.

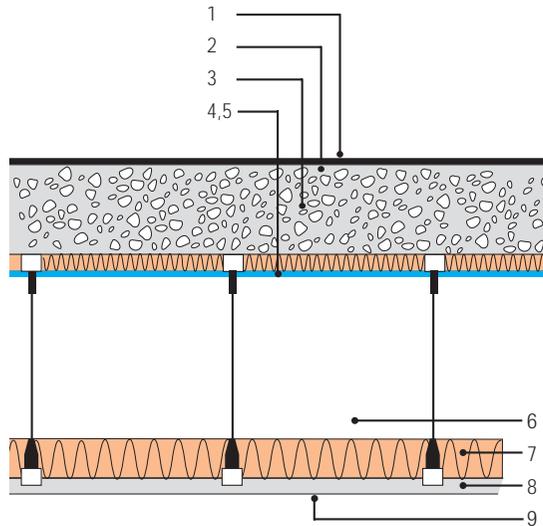
E. Where reflective insulation is installed, a simple addition of R-values is not possible. Care must be taken to ensure the performance of reflective air spaces is not "double-counted".

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.

G. Due to the ceiling void being used as a return plenum, elements including the ceiling void air space and below cannot be considered in the calculations. These elements have nil affect on maintaining temperature leakage as the conditioned room temperature is assumed to be the same within the ceiling void. Any insulation sitting on the ceiling only has insulation benefit when the HVAC system is off.

# ROOFS

## R1200 - FLAT CONCRETE ROOF WITH UNVENTILATED CEILING



### ICANZ System Reference R1200

#### Structure

150 mm concrete slab with exterior waterproofing membrane. Reflective insulation fixed below slab. 600mm air space below slab with 10mm plasterboard fixed to suspended ceiling.

#### Insulation Installation

Foil faced blanket underpinned to under side of concrete roof allowing full recovery of nominal thickness of blanket. Foil facing downwards.

In all cases air space below foil assumed to be unventilated reflective 100mm - 600mm air space.

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

R-VALUES FOR SYSTEM R1200	FOIL FACED R1.3 BLANKET WITH R2.5 CEILING BATT		30mm ANTIGLARE REFLECTIVE EPS BOARD		FOIL FACED R1.3 BLANKET	
	NON-VENTILATED		NON-VENTILATED		NON-VENTILATED	
	R1233W	R1233S	R1221W	R1221S	R1231W	R1231S
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	0.763	0.706	1.373	1.214
6 Unventilated Reflective Air Space (>100mm, <600mm)	0.587	1.878	0.550	1.768	0.562	1.809
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
<b>Total R-Value</b>	<b>5.0</b>	<b>5.9</b>	<b>1.7</b>	<b>2.9</b>	<b>2.3</b>	<b>3.4</b>
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	1.1	2.3	1.8	2.9

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.

C. Thermal resistance of air films and attic spaces based on values obtained from Section K5 and K6 of AS 4859.1:2006.

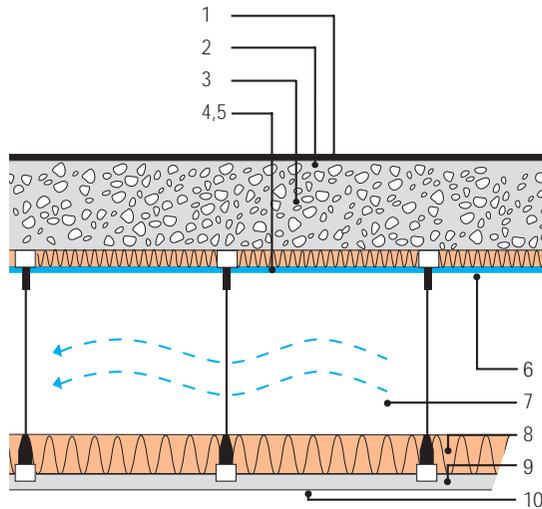
D. Building material elements based on 2000 AIRAH Handbook and attic thermal value based on AS4859.1 app K6 table K2.

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

#### Structure

150 mm concrete slab with exterior weatherproof membrane. Insulation product fixed directly to under side of slab. Reflective side of foil facing downwards.

#### Insulation Installation

Foil faced blanket underside of concrete roof. Foil facing downwards. R1330 allow for R2.5 batt positioned on suspended ceiling grid.

Fix reflective polystyrene 30mm to underside of concrete. R2.5 batts positioned on suspended ceiling grid.

In all cases air space below foil assumed to be ventilated acting as a return plenum, 100mm - 600mm air space. Reflective bright side of foil faces downwards.

i.e. Ceiling void used as a return air plenum.

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

R-VALUES FOR SYSTEM R1300	30mm ANTIGLARE REFLECTIVE EPS BOARD WITH R2.5 CEILING BATT		FOIL FACED R1.3 BLANKET WITH R2.5 CEILING BATT		FOIL FACED R3.0 BLANKET	
	VENTILATED		VENTILATED		VENTILATED	
	R1320W	R1320S	R1330W	R1330S	R1340W	R1340S
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	0.759	0.719	1.366	1.245	3.154	2.868
6 Top Air Film Bounding Ceiling Plenum	0.080	0.080	0.080	0.080	0.080	0.080
7 Ventilated 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
<b>Total R-Value</b>	<b>1.0</b>	<b>1.0</b>	<b>1.7</b>	<b>1.5</b>	<b>3.4</b>	<b>3.2</b>
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	0.76	0.72	1.4	1.2	3.2	2.9

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.

C. Thermal resistance of air films and attic spaces based on values obtained from Section K5 and K6 of AS 4859.1:2006.

D. Building material elements based on 2000 AIRAH Handbook and attic thermal value based on AS4859.1 app K6 table K2.

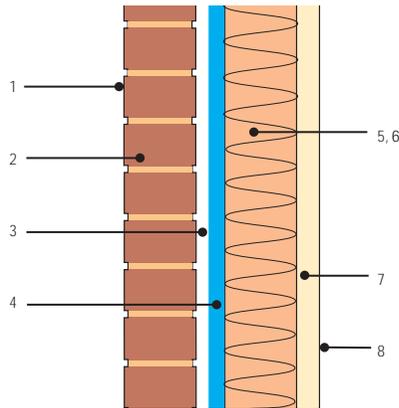
E. Where reflective insulation is installed, a simple addition of R-values is not possible. Care must be taken to ensure the performance of reflective air spaces is not "double-counted".

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.

G. Due to the ceiling void being used as a return plenum, elements including the ceiling void air space and below cannot be considered in the calculations. These elements have nil affect on maintaining temperature leakage as the conditioned room temperature is assumed to be the same within the ceiling void. Any insulation sitting on the ceiling only has insulation benefit when the HVAC system is off.

# 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.

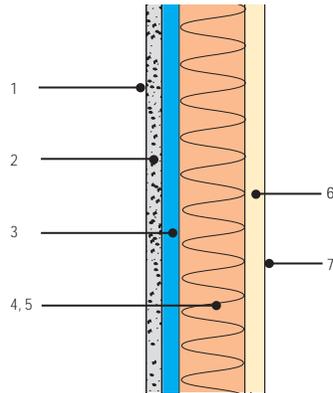
**NOTE: Total R-Values can be increased by substituting bulk insulation products of higher Material R-Value.**

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 FOIL		DOUBLE SIDED 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:	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	110mm Brickwork	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	Unventilated 40mm Air Space									0.659	0.568				
	Unventilated 43mm Air Space											0.646	0.539		
	Unventilated 50mm Air Space	0.200	0.187	0.665	0.598	0.199	0.177	0.197	0.171					0.621	0.535
4	Reflective Insulation Material R-value	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	Unventilated 90mm Air Space							0.737	0.641	0.800	0.647	0.792	0.652	0.779	0.671
6	Bulk Insulation Wall Batt	2.626	2.374	2.621	2.373	1.576	1.424								
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	0.120	0.120	0.120	0.120	0.120	0.120	0.120	0.120	0.120
<b>Total R-Value</b>		<b>3.2</b>	<b>3.0</b>	<b>3.7</b>	<b>3.4</b>	<b>2.2</b>	<b>2.0</b>	<b>1.3</b>	<b>1.2</b>	<b>2.1</b>	<b>1.9</b>	<b>2.0</b>	<b>1.7</b>	<b>1.8</b>	<b>1.6</b>
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.  
 C. Thermal resistance of air films and attic spaces based on values obtained from Section K5 and K6 of AS 4859.1:2006.  
 D. Building material elements based on 2000 AIRAH Handbook and attic thermal value based on AS4859.1 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.

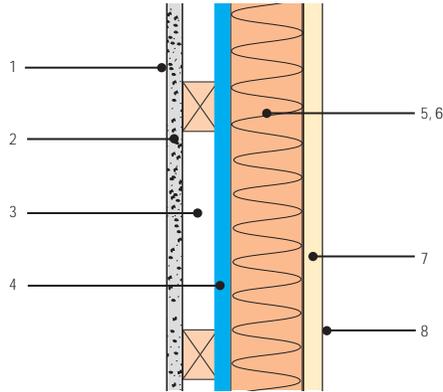
**NOTE: Total R-Values can be increased by substituting bulk insulation products of higher Material R-Value.**

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
<b>Total R-Value</b>		<b>3.0</b>	<b>2.7</b>	<b>3.0</b>	<b>2.7</b>	<b>1.0</b>	<b>0.88</b>	<b>1.0</b>	<b>0.88</b>
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 4859.1:2002, 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.  
 C. Thermal resistance of air films and attic spaces based on values obtained from Section K5 and K6 of AS 4859.1:2006.  
 D. Building material elements based on 2000 AIRAH Handbook and attic thermal value based on AS4859.1 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 WALL BATTS		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		SINGLE-SIDED POLY WEAVE FOIL		DOUBLE-SIDED ANTIGLARE FOIL		ANTIGLARE BUBBLE 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													0.640	0.547
	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		
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							0.728	0.579	0.775	0.614	0.787	0.620	0.793	0.645
6	Bulk Insulation Wall Batt	2.627	2.374	2.621	2.379	1.576	1.424								
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
<b>Total R-Value</b>		<b>3.2</b>	<b>2.9</b>	<b>3.6</b>	<b>3.3</b>	<b>2.1</b>	<b>1.9</b>	<b>1.2</b>	<b>1.1</b>	<b>1.8</b>	<b>1.5</b>	<b>1.9</b>	<b>1.7</b>	<b>2.0</b>	<b>1.8</b>
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.

C. Thermal resistance of air films and attic spaces based on values obtained from Section K5 and K6 of AS 4859.1:2006.

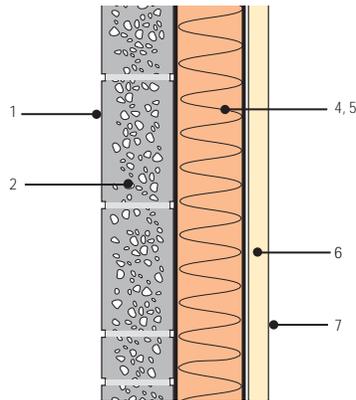
D. Building material elements based on 2000 AIRAH Handbook and attic thermal value based on AS4859.1 app K6 table K2.

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.

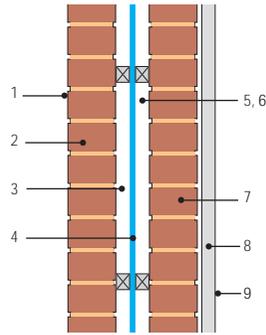
**NOTE: Total R-Values can be increased by substituting bulk insulation products of higher Material R-Value.**

R-VALUES FOR SYSTEM W0800	R1.0 WALL BATT		R1.5 (50mm) WALL BATT (50mm CAVITY)		SINGLE-SIDED POLY WEAVE FOIL		ANTIGLARE BUBBLE 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	0.040	0.040	0.040	0.040	0.040	0.040	0.040	0.040	0.040	0.040
2	0.219	0.219	0.219	0.219	0.219	0.219	0.219	0.219	0.219	0.219
3					0.000	0.000	0.140	0.140	0.255	0.237
4							0.783	0.652	0.777	0.655
					0.762	0.612				
5	1.051	0.949	1.576	1.424						
6	0.059	0.059	0.059	0.059	0.059	0.059	0.059	0.059	0.059	0.059
7	0.120	0.120	0.120	0.120	0.120	0.120	0.120	0.120	0.120	0.120
<b>Total R-Value</b>	<b>1.5</b>	<b>1.4</b>	<b>2.0</b>	<b>1.9</b>	<b>1.2</b>	<b>1.1</b>	<b>1.4</b>	<b>1.2</b>	<b>1.5</b>	<b>1.3</b>
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.  
 C. Thermal resistance of air films and attic spaces based on values obtained from Section K5 and K6 of AS 4859.1:2006.  
 D. Building material elements based on 2000 AIRAH Handbook and attic thermal value based on AS4859.1 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.

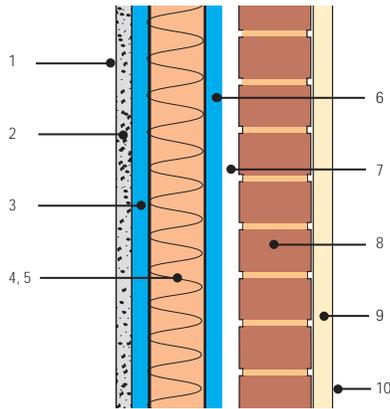
**NOTE: Total R-Values can be increased by substituting bulk insulation products of higher Material R-Value. Emissivity values of foil faces may be affected by alkaline mortar solution thereby lowering Total Value results.**

R-VALUES FOR SYSTEM W1100		SINGLE-SIDED POLY WEAVE FOIL		DOUBLE-SIDED ANTIGLARE FOIL		BUBBLE FOIL		10mm ANTIGLARE REFLECTIVE EPS BOARD		R1.5 WALL BATT	
		NON-VENTILATED		NON-VENTILATED		NON-VENTILATED		NON-VENTILATED		NON-VENTILATED	
		W1101W	W1101S	W1103W	W1103S	W1105W	W1105S	W1107W	W1107S	W1111W	W1111S
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		
	Unventilated 22mm Air Space					0.777	0.709				
	Unventilated 25mm Air Space	0.197	0.177	0.639	0.572						
4	Reflective Insulation Material R-value	0.000	0.000	0.000	0.000	0.140	0.140	0.254	0.238		
5	Unventilated 25mm Air Space	0.779	0.646	0.805	0.661						
	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
<b>Total R-Value</b>		<b>1.5</b>	<b>1.4</b>	<b>2.0</b>	<b>1.8</b>	<b>2.2</b>	<b>2.0</b>	<b>2.1</b>	<b>2.0</b>	<b>2.1</b>	<b>2.0</b>
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		0.82	0.66	1.3	1.1	1.5	1.3	1.4	1.2	1.4	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.  
 C. Thermal resistance of air films and attic spaces based on values obtained from Section K5 and K6 of AS 4859.1:2006.  
 D. Building material elements based on 2000 AIRAH Handbook and attic thermal value based on AS4859.1 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

8mm Fibre Cement Sheet external cladding fixed directly to stud.

a) Breather Foil to outside of stud frame, bright foil facing stud cavity.

90mm non vented stud frame cavity or cavity filled with bulk insulation.

b) Reflective foil positioned against inside edge of stud frame, bright foil facing brick work cavity.

40mm non vented brick cavity.

110mm bricks.

10mm plasterboard external lining.

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

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 FOIL WITH BUBBLE 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
<b>Total R-Value</b>		<b>4.0</b>	<b>3.6</b>	<b>2.0</b>	<b>1.7</b>	<b>2.1</b>	<b>1.8</b>	<b>2.3</b>	<b>2.0</b>	<b>2.4</b>	<b>2.1</b>
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.

C. Thermal resistance of air films and attic spaces based on values obtained from Section K5 and K6 of AS 4859.1:2006.

D. Building material elements based on 2000 AIRAH Handbook and attic thermal value based on AS4859.1 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

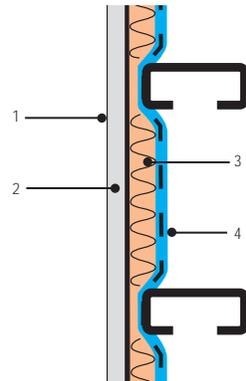
External Metal Cladding.

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.**

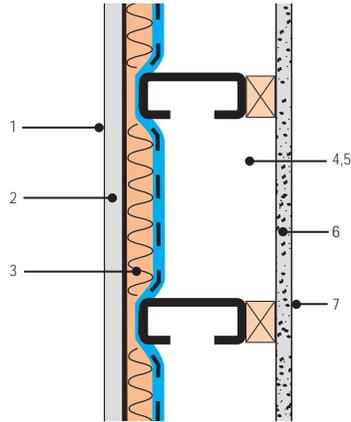


R-VALUES FOR SYSTEM W1300	FOIL FACED R1.3 BLANKET		SINGLE-SIDED POLY WEAVE FOIL OR DOUBLE-SIDED ANTIGLARE FOIL		ANTIGLARE BUBBLE FOIL		
	VENTILATED		VENTILATED		VENTILATED		
	W1312W	W1312S	W1302W	W1302S	W1306W	W1306S	
No:	Element Description:	WINTER	SUMMER	WINTER	SUMMER	WINTER	SUMMER
1	Outdoor Air Film	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
<b>Total R-Value</b>		<b>1.7</b>	<b>1.6</b>	<b>0.34</b>	<b>0.34</b>	<b>0.48</b>	<b>0.48</b>
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.  
 C. Thermal resistance of air films and attic spaces based on values obtained from Section K5 and K6 of AS 4859.1:2006.  
 D. Building material elements based on 2000 AIRAH Handbook and attic thermal value based on AS4859.1 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.

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

Wire mesh.

8mm Fibre cement sheet lining fixed to 100-150mm girts forming a non-vented air space. (Item 6 can be substituted with plasterboard)

Note: no air space between cladding and foil.

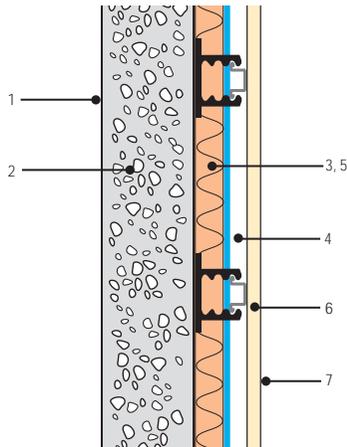
**NOTE: Total R-Values can be increased by substituting bulk insulation products of higher Material R-Value.**

R-VALUES FOR SYSTEM W1400		FOIL FACED R1.3 BLANKET		R2.0 WALL BATT WITH SINGLE SIDED POLY WEAVE FOIL		ANTI GLARE BUBBLE FOIL		SINGLE-SIDED POLY WEAVE FOIL OR DOUBLE-SIDED ANTI GLARE 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
<b>Total R-Value</b>		<b>2.5</b>	<b>2.1</b>	<b>2.3</b>	<b>2.1</b>	<b>1.0</b>	<b>0.85</b>	<b>0.86</b>	<b>0.68</b>
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 4859.1:2002, 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.  
 C. Thermal resistance of air films and attic spaces based on values obtained from Section K5 and K6 of AS 4859.1:2006.  
 D. Building material elements based on 2000 AIRAH Handbook and attic thermal value based on AS4859.1 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.

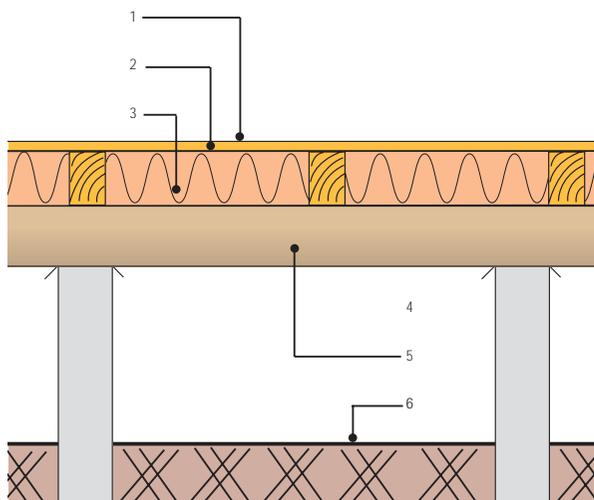
**NOTE: Total R-Values can be increased by substituting bulk insulation products of higher Material R-Value.**

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 FOIL		10mm ANTIGLARE REFLECTIVE EPS BOARD		R1.1 (38mm) WALL BATT	
		NON-VENTILATED		NON-VENTILATED		NON-VENTILATED		NON-VENTILATED		NON-VENTILATED		NON-VENTILATED	
		W1513W	W1513S	W1515W	W1515S	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	0.951			0.000	0.000	0.140	0.140	0.255	0.238		
4	Unventilated Air Space	0.704	0.665			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
<b>Total R-Value</b>		<b>2.1</b>	<b>1.9</b>	<b>1.9</b>	<b>1.8</b>	<b>1.1</b>	<b>0.91</b>	<b>1.2</b>	<b>1.1</b>	<b>1.4</b>	<b>1.2</b>	<b>1.5</b>	<b>1.4</b>
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.  
 C. Thermal resistance of air films and attic spaces based on values obtained from Section K5 and K6 of AS 4859.1:2006.  
 D. Building material elements based on 2000 AIRAH Handbook and attic thermal value based on AS4859.1 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 perforated foil.

Unventilated floor: Enclosed subfloor perimeter - BCA ventilation rate based on 6000mm<sup>2</sup>/m. Subfloor height based on 0.5m.

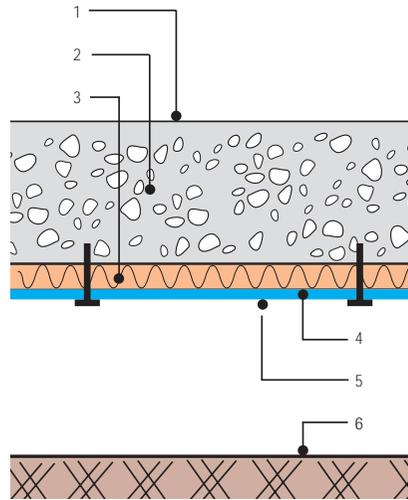
**NOTE: Total R-Values can be increased by substituting bulk insulation products of higher Material R-Value.**

R-VALUES FOR SYSTEM F0100	R1.5 BATT				R1.5 BATT WITH PERFORATED DOUBLE-SIDED ANTIGLARE				PERFORATED DOUBLE-SIDED ANTIGLARE FOIL				BUBBLE 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 Batt	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 <sub>gx</sub> )	0.580	0.560			0.580	0.560			0.580	0.560			0.580	0.560			0.580	0.560		
<b>Total R-Value</b>	<b>2.6</b>	<b>2.3</b>	<b>1.9</b>	<b>1.8</b>	<b>3.2</b>	<b>2.5</b>	<b>1.9</b>	<b>1.8</b>	<b>2.5</b>	<b>1.4</b>	<b>1.2</b>	<b>0.65</b>	<b>2.7</b>	<b>1.5</b>	<b>1.3</b>	<b>0.79</b>	<b>2.8</b>	<b>1.6</b>	<b>1.5</b>	<b>0.94</b>
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.  
 C. Thermal resistance of air films and attic spaces based on values obtained from Section K5 and K6 of AS 4859.1:2006.  
 D. Building material elements based on 2000 AIRAH Handbook and attic thermal value based on AS4859.1 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 6000mm<sup>2</sup>/m. Subfloor height based on 0.5m.

Any ventilated case may be used to represent carpark ceiling construction.

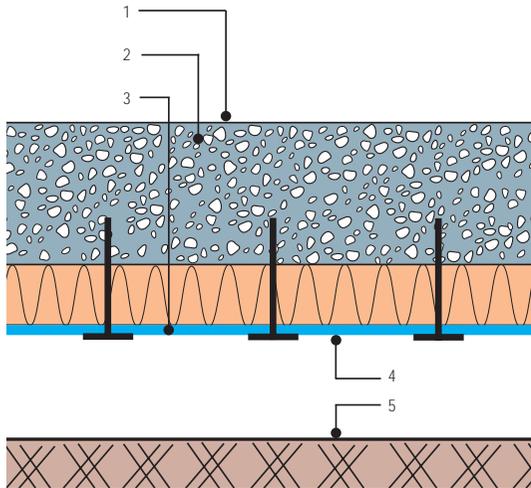
**NOTE: Total R-Values can be increased by substituting bulk insulation products of higher Material R-Value.**

R-VALUES FOR SYSTEM F0200	R1.5 BATT WITH PERFORATED DOUBLE-SIDED ANTIGLARE				PERFORATED DOUBLE-SIDED ANTIGLARE FOIL				BUBBLE 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	RF0204S	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 <sub>gx</sub> )	0.580	0.560			0.580	0.560			0.580	0.560			0.580	0.560		
<b>Total R-Value</b>	<b>3.2</b>	<b>2.5</b>	<b>1.9</b>	<b>1.8</b>	<b>2.4</b>	<b>1.4</b>	<b>1.0</b>	<b>0.62</b>	<b>2.5</b>	<b>1.5</b>	<b>1.2</b>	<b>0.8</b>	<b>2.6</b>	<b>1.6</b>	<b>1.3</b>	<b>0.86</b>
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.  
 C. Thermal resistance of air films and attic spaces based on values obtained from Section K5 and K6 of AS 4859.1:2006.  
 D. Building material elements based on 2000 AIRAH Handbook and attic thermal value based on AS4859.1 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/m<sup>3</sup>, 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 6000mm<sup>2</sup>/m.

Subfloor height based on 0.5m.

Any ventilated case 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 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 <sub>g</sub> )	0.580	0.560			0.580	0.560			0.580	0.560		
<b>Total R-Value</b>		<b>3.6</b>	<b>2.9</b>	<b>2.3</b>	<b>2.1</b>	<b>2.2</b>	<b>1.5</b>	<b>0.87</b>	<b>0.82</b>	<b>2.0</b>	<b>1.4</b>	<b>0.73</b>	<b>0.68</b>
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.  
 C. Thermal resistance of air films and attic spaces based on values obtained from Section K5 and K6 of AS 4859.1:2006.  
 D. Building material elements based on 2000 AIRAH Handbook and attic thermal value based on AS4859.1 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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