

Insulation case studies

This Fact Sheet outlines examples of insulation materials being used in Australian homes in various climates around the country.

The case studies are provided by Insulation Solutions P/L.

The comments at the end of each case study are recommended strategies for ensuring best practice is achieved in each climate zone. [\[See: Insulation Overview; Insulation Installation\]](#)

Although the focus here is on new construction, insulation can be fitted to most existing homes. It is always preferable to install insulation at the time of construction because it is usually more difficult to retrofit - particularly in walls and roofs with integrated ceilings or exposed rafters.

VICTORIA



Construction type

This home on Phillip Island is a weatherboard timber frame construction with a metal roof and suspended timber floor. The builder is Swerrick Building Constructions.

Climate

Phillip Island has largely a 'heating' climate. The performance of this home could be substantially improved by enclosing the sub-floor to keep out the cold winds to which the island is subjected.

Insulation used

Roof and ceiling: R2.5 Pink Batts™ (bio-soluble glass fibre) and reflective foil laminate (Sisalation™).

External walls: R1.5 Pink Batts™ and reflective foil laminate.

Comments

In this climate, raised floor construction that is not enclosed would benefit greatly from bulk underfloor insulation of around R1.5 value.

Up to 20 percent of heat loss occurs through uninsulated floors in cool and cold climates. In this case the addition of insulation below the timber floor would be relatively simple and would greatly improve thermal performance.

[\[See: Insulation Overview; Insulation Installation\]](#)

QUEENSLAND



Construction Type

This brick veneer timber frame house with a tiled roof on a concrete ground slab is in a Brisbane suburb. The builder is Metropolitan Homes.

Climate

Brisbane has a 'mixed' climate, but a substantial amount of cooling is required and the main need is to keep heat out rather than in.



Insulation used

Roof and ceiling: Reflective foil laminate under the roof and R2.5 Pink Batts™ in the ceiling. The recommended level of ceiling insulation in these climates depends on whether natural ventilation or air-conditioning is being used.

[\[See: Insulation Overview\]](#). Good design for passive cooling is also required in this climate. [\[See: Passive Cooling\]](#)

External walls: Reflective foil laminate house wrap. Although it is common practice to use solid foils in walls, they should be perforated or breather foils with the anti-glare coating facing outwards. Their purpose is to prevent moisture entering the wall cavity from outside while still allowing any water vapour from inside to escape.

Comments

Appropriate window shading or glazing to reduce summer heat gain would improve the thermal performance of this home. In Brisbane, preventing unwanted heat from entering the building is a primary concern.

Inadequate control of direct solar radiation can generate excessive heat loads which can be trapped inside the building. Good insulation is essential but should be accompanied by sound passive design practices. [\[See: Shading; Passive Solar Heating; Passive Cooling\]](#)

NORTHERN TERRITORY



Construction Type

These split level stand alone townhouses are steel framed, with metal roof and wall cladding. They are manufactured as two halves which can be disassembled for easy transport and reassembly. High cathedral ceilings are designed to encourage flow through ventilation.

Climate

Darwin has a 'cooling' climate where the most important requirement is to keep heat out.

Insulation used

Roof and ceiling: Composite R1.5 Permapstop™ fibreglass and foil blanket.



External walls: R1.5 pink wall batts™ with reflective foil laminate sarking as a vapour barrier. In hot climates the vapour barrier is usually placed on the outside of the insulation rather than the inside as this is where the condensation forms, particularly when internal spaces are air conditioned.



The eaves are also insulated in this climate to reduce radiation transfer through windows and walls.

Comments

Good design is required to allow houses in hot humid climates such as this to cool naturally at night. [See: [Passive Cooling](#)]

The foil side of the blanket faces upwards as this is where the condensation forms. It should be placed under the roofing battens to create an air gap between the roof cladding and the reflective surface. This prevents corrosion and condensation leakage. Antiglare coatings and dust settling on the upper surface can all but eliminate its role in reflecting radiant heat back to the outside.

In a hot climate like Darwin, resistance to radiant heat gain would be further improved by adding a second layer of reflective foil laminate beneath the blanket to reduce the emission of radiant heat that passes through the blanket. This layer requires an adjacent air gap on the underside of at least 25mm to be effective as an insulation material.

It is also advisable to include a second layer of reflective foil to allow for future installation of air-conditioning. In an air conditioned space, condensation forms where the humid external air comes into contact with the cooled surface of the foil, that is, the upper face. To avoid saturation of the bulk insulation, an air gap should also be maintained above this foil layer.

Air conditioned spaces have different insulation requirements to non air-conditioned spaces. Air-conditioning in humid climates can create significant condensation problems and each insulation strategy should allow for this.

TASMANIA



Construction type

This is an established timber frame weatherboard home in Hobart. The owner wanted to install insulation to increase comfort and reduce heating bills in this heating climate.

Climate

Hobart has a 'heating' climate, where winters are cold and summers are mild. The dominant requirement is to keep heat inside. Bulk insulation is suitable for this purpose.

If reflective foil is used as a vapour barrier, it should be located on the warm side of the bulk insulation (inside) as this is where the 'dew point' occurs, forming condensation.

Insulation used

Roof and ceiling: R3.8 Pink Batts™.

Underfloor: R1.5 Pink Batts™.

Comments

This house would benefit greatly from wall insulation. However, installing insulation in existing walls, especially timber framed, can be a difficult and expensive job requiring removal of the cladding material.

In Hobart's climate the energy savings in the long term would make this a viable investment. It is always best to fit insulation at the time of construction.

WESTERN AUSTRALIA

Construction type

This timber frame brick veneer home on a concrete slab with a metal roof was built by Ross Squires Homes in Northam, a town about 100 km inland east of Perth.

Climate

The area has hot dry summers and cool winters and is therefore a 'mixed' climate for insulation purposes.



Insulation used

Roof and ceiling: R2.5 Pink Batts™ and reflective foil laminate.

External walls: R1.5 Pink Batts™ and reflective foil laminate.

The vast majority of this builder's clients see the benefits of insulation and do not ask for it to be left out to save money on construction costs. This is particularly the case after the difficulty of insulating areas such as walls after the home has been built is pointed out.

Comments

The reflective foil laminate used in walls in an application such as this one is usually only effective as a vapour barrier. For this product to be fully effective as an insulation material, the inward face must have a 25mm air gap maintained between it and the batts. This allows the low emissivity properties of the foil to reduce radiation from external heat gains in summer and also reflects heat back inside in winter.

Whilst somewhat difficult, this is still achievable in some cases. The batts can be kept 25mm clear of the reflective surface with fishing line stapled to the frame 25mm from the foil surface. Where 100mm frames are used in conjunction with R1.5 batts, this arrangement permits an air gap without compressing the batts. However, with narrower frames or higher insulation levels this solution is not possible unless the reflective foil is fixed over 25mm thick battens extending into the cavity.

SOUTH AUSTRALIA



Construction type

This home is brick veneer timber frame construction with a tile roof and a suspended timber floor. Built by G.A Griffiths, it is located in a new suburb in Adelaide.

Climate

Adelaide has a 'mixed' climate, and needs insulation to keep heat inside in winter and outside in summer.



Insulation used

Roof and ceiling: R3.8 Pink Batts™ and reflective foil laminate. Although insulation usually increases in increments of 0.5 (i.e. R1.5, 2.0, 2.5 etc), some manufacturers also make other values such as these R3.8 batts.

External walls: R2.0 Pink Batts™.

These batts are specially designed to fill the standard 90 mm cavity to maximise the level of wall insulation. R1.5 batts are recommended for 75 mm cavities. This avoids compression of the insulation so that it does not lose any of its effectiveness.

Underfloor: R3.3 Pink Batts™. Although this is well in excess of the minimum recommended level of insulation for this climate, the floor construction method meant a thicker batt was easier to install. Sound transmission was reduced as a result of this insulation.

Internal walls: R2.0 Pink Batts™. Although not necessary for thermal insulation, all internal wall cavities were insulated to reduce transmitted sound between rooms. Internal wall insulation can be useful to thermally isolate heated areas from non-heated areas.

Comments

The higher insulation levels used in this home will improve comfort. As is often the case, a higher insulation level does not necessarily lead to an equivalent rise in cost.

Appropriate window shading or glazing on all elevations to reduce summer heat gain would improve the thermal performance of this home.

ADDITIONAL KEY REFERENCES

The above case studies should be read in conjunction with the fact sheets: Introduction to Insulation and Insulation Installation. Other references are included in those sheets.

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