



## Insulation

(Updated to Dec. 16, 2009)

Insulation reduces the heat flow into and out of your home. The temperature inside is therefore more stable, and requires less heating and cooling. Insulating your home is one of the most important things you can do to make it warmer in winter and cooler in summer, thereby reducing your heating / cooling bills and greenhouse gas emissions.

Insulation is obviously best installed in a building during construction with easy access to ceiling, floor and wall spaces. However if you live in an un-insulated house, even just installing ceiling insulation can make a huge difference to the comfort levels of your house and your energy bills. Retrofitting wall and floor insulation is trickier but this is still worth doing, particularly if you are renovating.

There are two types of insulation: bulk and reflective. Bulk insulation (e.g. fibreglass, rockwool, wool, or polyester batts) reduces energy flow by conduction, and is primarily used in ceilings. Reflective insulation reduces the transfer of heat by radiating it back to where it came from. Reflective foils are often used in walls and under floors. Composite bulk and reflective materials are available that combine some features of both types. Examples include foil backed blankets, foil backed batts and foil faced boards.

### Insulation R values

When looking at insulation you will come across the term 'R' value. This refers to the thickness of the insulation and its ability to insulate. An insulation batt with an R rating of 3.5 will be more effective at keeping heat in than a batt with a 1.5 R value. Different R values are

recommended for different parts of your house.

*Ceilings:* Up to 35% of heat loss is through the ceiling if it is not insulated in the roof space - so you don't have insulation in your ceiling then this is your first priority. The building code for Australia, Part 3.12 (for Tasmania) recommends R3.5 in ceilings and R4.0 for houses in alpine areas, above 900 metres.

*Walls:* Up to 25% of heat loss is through the walls. A minimum of R2.0 is recommended in wall cavities.

*Floors:* Up to 20% of heat loss is through the floor. A minimum of R1.5 underneath wooden floors is recommended (placed between the joists). Concrete slab edges should be insulated with polystyrene sheets.

### Bulk Insulation

The options for bulk insulation are fibreglass, rockwool, polyester or wool batts, or loose fill made from cellulose fibre. Whenever bulk insulation is used, however, it is essential to maintain at least a 25mm air gap between the insulation and external walls to avoid moisture migrating through the insulation. This can be done by running a series of string lines horizontally between the studs. The bulk insulation can then rest against the horizontal rows of string line.

*Fibreglass:* Fibreglass batts are a cheap way to insulate your house. These batts are composed of tiny glass fibres spun together to form a thick matt. There have been concerns in the past about glass fibres coming loose and causing irritation of the skin, eyes, throat and lungs. In new fibreglass batts this risk is much reduced

due to improvements in the way the fibre is 'spun'. However, if you are installing batts yourself, ensure that you wear protective clothing and a face mask.

*Polyester:* Polyester insulation are made from polyester threads spun into a matt, and come in batts or in 'rolls' that can be cut to shape. Recycled varieties are available. There are no known health risks and as it doesn't create dust or have loose fibres it is considered safe for installing yourself.

*Wool:* Made from spun sheep's wool, treated against vermin and rot. Available with a polyester blend to reduce settling & compression. Check the fire resistance of the product.

*Rockwool:* Made from volcanic rock melted at high temperatures and then spun into a fine fibre mat. It is denser than fibreglass batts so the R value per unit thickness is higher. It is more expensive than fibreglass insulation and exposure to fine particles has the potential for skin and upper respiratory tract irritation. For this reason full protective clothing and a face mask must be worn during installation.

*Cellulose fibre:* Usually made of newspaper cellulose fibre recycled into a fine fluffy 100% fireproof material that has been treated with borax and boric acid to repel insects and vermin and blown into place. It has a minimum R2.6 rating and is only suitable for horizontal roof and ceiling spaces where it is usually blown into the roof cavity. It has been reported to settle over time or shift around the roof cavity if you have draughts. New manufacturing processes, however, have eliminated these problems by using a clear sealer over the surface to bind the top layer.

### **Insulation Boards**

Used primarily in walls and cathedral ceilings, they are rigid waterproof boards that come in two forms:

*Extruded polystyrene:* Made from closed cell polystyrene with a high compressive strength and a very high R value per unit thickness. They contain fire-retardants but it is recommended to only use them between non-combustible surfaces. Generally more expensive than other types of insulation.

*Foil-faced expanded polystyrene:* Made from polystyrene beads with reflective foil attached to both sides. Has a lower R value than extruded polystyrene.

### **Reflective insulation**

Reflective insulation is usually shiny aluminium foil laminated onto paper, plastic or board and is available as sheets or 'concertina' foil batts.

If the foil is reflective on one side only, this side should face inwards to reflect heat back in to the house.

Ensure that there is an air gap between the reflective side and the roof or wall cladding of at least 25mm. Also, dust settling on the reflective surface will greatly reduce performance, so ensure the foil is clean when installed. Some foil products are reflective on both sides, and this will have an even greater insulating effect.

*Multi-cell reflective foil products\*:* These are two or three layers of laminated foil separated by partitioning to provide a one, two or three-layered cell structure. The R value is dependent on the number of cells and the presence of still air layers between the insulation and other materials.

*Expandable concertina-style foil\*:* This is double sided reflective foil formed into an expandable concertina that is primarily used under timber flooring and between wall studs.

*Foil bonded to bulk insulation:* This consists of reflective foil bonded to batts, blankets or insulation boards.

\* To the best of our knowledge these products are not available from Tasmanian

suppliers. See the contact details for a Melbourne supplier at the end of this guide.

### Other factors

**Windows:** Up to 35% of heat can be lost through windows. There is not much point in insulating the opaque parts of your house if you do nothing with your windows. Double-glazing is an effective, but expensive option, and can reduce heat loss by 60%. There are a couple of cheaper 'secondary glazing' products you can use to retrofit single glazed windows. Thick lined curtains and pelmets can also make a huge difference, reducing heat loss by up to 45%. See our separate Sustainable Living Guide on Windows for more info.

**Draughts:** Draughts can account for up to 25% of heat loss, so good draft sealing is important. Use draught tape to seal gaps around doors and windows, fit a draught seal under external doors, and use draught 'snakes' under internal doors. Also ensure that disused chimneys are blocked off.

### DIY installation

Other than loose fill cellulose fibre insulation that needs to be installed professionally, most insulation comes in batts. Following the manufacturer's installation procedures, it is possible to install them yourself. However to avoid itching and respiratory irritation it is advisable to wear: A dustmask, goggles, long-sleeved shirt and closed shoes. In fact, protective clothing be worn when installing any insulation as dust may be disturbed when working in the roof space.

### Retro-insulating existing homes

When retro-fitting existing homes to improve the insulating capacity of the walls it is essential to maintain an air gap cavity between the internal and external walls. The purpose of the cavity is to prevent the migration of moisture from the

outside to the interior of the building. If the cavity is compromised moisture can deteriorate the inner lining, such as plaster and cause the growth of mould. (See the SLT guide *Mould and Moisture in the Home*) This applies to both brick cavity walls and timber walls. The extent of the moisture problem very much depends upon the extent that the external wall is exposed to wet and damp. If the wall is well sheltered and protected by overhanging eaves the moisture problem would be minimal. If directly exposed to the elements, however, it will be essential to maintain an air gap.

**External cavity brick walls:** If the cavity is not insulated the interior wall can be too cold in the winter and too warm in the summer if exposed to the sun in heat-wave conditions. Provided the external wall is protected against wet, as previously mentioned, this can be eliminated by sealing the bottom of the cavity and pumping in loose fill to a measured density. The fill can be either polystyrene balls coated in a non-toxic bonding agent or mineral fibres (moisture repellent gypsum isover mineral wool) blown into the cavity. This must be done by a professional installer.

**Brick veneer walls:** external veneer brick cladding over a timber stud frame is a very inefficient insulator. The brick veneer absorbs heat in summer and radiates it back into the home until late in the evening. In winter they stay cold and draw heat from the home. Insulating the wall is essential to stop temperature extremes but maintaining an air gap between the brick veneer and the internal wall is essential.

**Timber cladded external walls:** Being of low mass construction, insulation is essential to maintain acceptable temperatures inside. With timber framed walls sometimes, (such as during renovations) loose fill insulation is pumped into the voids between the studs and nogginns THIS IS TO BE AVOIDED if you

want to avoid the moisture migration problem. If bulk insulation is being used it is essential to maintain an air gap.

A better method than pumping in bulk insulation would be to remove the interior lining or external cladding and install insulation between the stud frames. Reflective foil insulation can be fitted between studs by cutting off pieces from the roll or using concertina or multi-cell foil batts. When installing batts in conjunction with foil, maintain at least a 25mm air space between the batt and the foil. Also consider the use of foil backed plasterboard if replacing the interior lining.

**Roofing:** It is important that for new homes, or existing ones being renovated with new roofing, a foil condensation / radiant heat barrier is placed directly under the roofing sheet and above the roof rafters. This insulation blocks moisture from collecting in the roof space in the winter and radiant heat buildup in the summer. Chicken wire (or similar) is necessary between the rafters to prevent sagging of the foil insulation. For extra insulation, an additional layer of multi-celled foil insulation could also be attached to under the roof rafters leaving an air space between the two layers. For ceramic tiled roofs double sided foil or foil batts can be placed between the roof rafters, if space to do so is available. Loose fill or batts should be placed above the ceilings. Putting in batts is easy and be done by the DIY home owner. Many older Tasmanian homes with galvanized sheet metal roofs do not have a foil condensation / radiant heat barrier directly under the roofing sheet. If this is the case, it may be possible to remove the roofing, install foil insulation between the roofing and the rafters, then re-install the roofing sheets without damage. This work should be done by a licensed insulation / roofing contractor.

By taking these steps heating and cooling costs can be reduced by as much as 45%.

**Underfloor insulation:** Raised timber floors should have a soil-clearance of at least 400mm below the floor joists. If space is available for access, foil or insulation batts with at least an R1.0 rating will work well but chicken wire, stapling or packing tape must be used to prevent sagging.

### **The Home Insulation Rebate Program**

For home owners, landlords and tenants the federal government is providing a program that offers up to a \$1,200 rebate for homes that have no or negligible ceiling insulation. The program commenced on the 3<sup>rd</sup> of February 2009 and will cease on the 31<sup>st</sup> of December 2011 or until the date that all the funds have been allocated. For information and eligibility requirements go to the government website:

<http://www.environment.gov.au/energyefficiency/insulation/homeowners/index.html>

### **Suppliers (see your local yellow pages for a full listing)**

**Insulate Tasmania**, 24 Jackson St. Glenorchy. Ph: 6271 3434

[www.insulatetasmania.net](http://www.insulatetasmania.net) Suppliers of DIY Polyester acoustic and thermal insulation batts.

**Cool or Cosy Natural Insulation**, 111-113 Howard Road, Goodwood, Ph:6272 1699 Suppliers and or installers of polyester batts, fiberglass batts, blown in place fiber (loose fill) insulation, underfloor insulation (Etherm and polyester batts), hot water cylinder blankets, draft stoppers.

**Environmentally Safe Natural Insulation** (Launceston) 1300 767 722  
[www.naturalinsulation.com.au](http://www.naturalinsulation.com.au)

Suppliers and or installers of Cellulose fibre, polyester batts, ventilation systems, etc.

**Statewide Insulation Services**, 1/121 Gormonston Rd. Derwent Park  
Mob: 0418 322 834 . Suppliers and or installers of pink batts, poly batts, acoustic batts, building blankets, sisalation, etc.

**Thermowool**, Rosetta, Ph: 6272 3189,  
Mob: 0407 870 595.  
[www.ontas.com.au/thermowool](http://www.ontas.com.au/thermowool) ,  
Suppliers and or installers of natural wool and polyester insulation.

**Foamular Extruded Polystyrene Insulation** Tasmanian agent: Tony Caldwell, Sandy Bay, Mob: 0438 124 339  
<http://www.foamular.com.au/>

For insulation products not available in Tasmania

**Insulation Melbourne**, Mitcham, Victoria  
Mobile 0406500449  
<http://www.insulationaustralia.com.au/>

**Enviroflex**  
61 (03) 9753 3811  
Email: [enviro@enviroflex.com.au](mailto:enviro@enviroflex.com.au)  
<http://www.enviroflex.com.au/>

### For more information:

\* *Energy Smart Housing Manual – Chapter 7: Insulation*. A publication of the Sustainable Energy Authority Victoria  
<http://www.sustainability.vic.gov.au/resources/documents/ESHousingManualCh07.pdf>

\* Section 1.6a and 1.6b of ‘*Your Home Technical Manual*’ Available from [www.yourhome.gov.au](http://www.yourhome.gov.au) . or from the SLT bookshop and library.

\* *Making Your Home Sustainable: A Guide to Retrofitting* by Derek Wrigley.

Copies available from the SLT bookshop and library

\* *CHOICE Buying guide*:

<http://www.choice.com.au/viewArticle.aspx?id=105246&catId=100519&tid=100008&p=1&title=Buying+guide%3a+Home+insulation>

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