

Options available for insulating your home

There are several insulation materials on the market, and this document covers only the ones that are commonly available. When choosing any product ask for an independent test report (such as from BRANZ or the BIA) and for a guarantee. Also, the R-values quoted here are estimates. A more exact R-value for a product can be obtained from the supplier.

Fibreglass and rockwool (approximately R 2.4 for 100mm thickness)

This is the most commonly used insulation material, available as batts, blankets and loose fill insulation. Its technical performance is well proven and it outperforms most other materials in R-values for a given thickness. Fibreglass does not burn, but it can melt in the intense heat of a house fire. It tends to be cheaper than alternative options. However, fibreglass is a non-renewable resource and concerns have been raised about health impacts on installers and occupants. It is the size of the fibres that causes concern to some scientists, and comparisons to asbestos have been made. The World Health Organisation, has recently removed glass wool insulation from its list of possible carcinogens into the category labeled as "not classifiable as to its carcinogenicity to humans". Nevertheless, fibreglass can cause irritation of the skin and respiratory tract. If you install fibreglass or rockwool yourself, wear gloves, full shirtsleeves, long trousers, and a mask while installing it.

Wool and wool blends (approximately R 2.5 for 100 mm of loose fill - less for batts and blankets)

Wool is a natural New Zealand resource and it is pleasant to handle, making it a good choice for DIY installation. However current wool products do not perform as well as fibreglass technically (as highlighted in a recent Consumer magazine article). Wool products are also currently 10-20% more expensive.

Manufacturers claim that wool will balance the moisture content in the air by absorbing moisture and giving it off later. Some also say that wool has the ability to absorb indoor pollutants, such as those resulting from furniture or flooring glues. A lot of research and development is now taking place in the wool insulation industry and products are likely to keep improving. All wool products on the market have been treated to discourage mould and pests. Wool will burn if it comes into direct contact with a flame, but will not ignite through heat or aid a fire to spread. There are two different types of wool products available. Some are sprayed with a resin to bind the fibres and provide strength, while others are blended with polyester. Wool is cheaper as loose fill insulation.

Polyester (approximately R 2 for 100mm blanket or batt)

The performance of polyester is not as good as fibreglass. It is a non-renewable resource (made from mineral oil) and is more expensive than fibreglass. However the health concerns raised about fibreglass do not apply to polyester insulation. Polyester will not burn easily, but it will give off dense smoke. It comes in batts and blankets.

Recycled paper (approximately R 2.2 for 100mm loose fill)

Recycled paper treated with a fire retardant can be used as loose fill insulation in ceilings. Like all loose fill materials its performance depends on the quality of the installation, so ask to see test results and request a written guarantee. The ceiling cavity has to be dry, because wet paper will sink and the R-value will be reduced.

Polystyrene (approximately R 1.4 for 50 mm sheet)

Polystyrene is used increasingly in new buildings. It can be used in sheets on framing and then plastered, or under concrete floors. Hollow polystyrene blocks that are filled with reinforced concrete give very good R-values. Polystyrene is a product of the petro-chemical industry and therefore a non-sustainable resource. It gives off toxic fumes in a fire, though not if it is sealed under a concrete floor slab. Its insulation properties are excellent. Note however that polystyrene products must not come into contact with electrical wiring as a chemical reaction may occur which can cause the PVC sheath to become brittle.

Pumice (approximately R 1.4 for 100mm)

Pumice can also be used as insulation under concrete floors. It is a naturally occurring material and has good insulating properties. It is an economical option where pumice is locally available. The pumice can replace some of the fill required under a concrete slab.

Foil (R value dependent on air gap*)

Reflective foil is an inexpensive under-floor insulation. It generally consists of paper coated in bitumen and aluminium foil. It can also be used behind heaters to reflect heat back into the room. Foil needs to be stapled in place.

Extreme care must be taken to avoid stapling into existing wiring. For this reason, this job is best done by a qualified tradesperson.

Foam products (R value varies but similar to polystyrene*)

These are products that are injected into cavities and expand. Many are propelled by CFCs and HCFCs, which deplete the ozone layer. Foams, such as urea formaldehyde and polyurethane foams, can release small amounts of toxic substances over time contributing to indoor air pollution. Organisations such as BRAZ and Consumer have recommended caution in regard to the installation of air foam in timber framed houses. The potential problems are perceived as being

- Foam products expand and press building paper against weather boards potentially reducing the ability of the paper to dry, potential building rot.
- Potential for obstructions in the building cavity such as unexpected dwangs to cause some areas to be missed from being filled with foam, reducing effectiveness.
- After 3-5 years some foams shrink, small gap = big heat losses.

Insulation

- The rigidity of the foam makes future wiring or plumbing difficult in the walls.

Payback periods

All the insulation measures discussed here will pay off over the lifetime of the building. At current prices (2009), you can expect very fast payback periods for ceiling insulation (2-7 years), hot water cylinder wraps (1 year) and pipe lagging (6-18 months). Apart from the savings on your energy bill, you will be much warmer and more comfortable as well as helping to reduce CO₂ emissions and global warming.

Source: EECN and Waitakere City Council



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