

# BUILDER'S MATE

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SPECIAL EDITION

This **SPECIAL EDITION** of *Builder's Mate* is being published to explain the new energy efficiency rules for houses. Some of our regular features don't appear in this special – they will return in the December *Builder's Mate*.



**New insulation requirements for housing and small buildings are coming into force. In some cases it will mean not just changes to the amount of insulation we use, but also to the way we build houses.**

The new insulation levels have come with a new version of the New Zealand Building Code Clause H1 *Energy Efficiency*. They are in force now in the South Island and the Central Plateau of the North Island (Zone 3). From 30 June 2008 they will apply to the rest of the North Island up to Coromandel-Thames and Franklin Counties (Zone 2). From 30 September 2008 they will apply to Auckland, Northland and Coromandel (Zone 1).

The higher levels of insulation required are significant. It is estimated that they will reduce whole house heat losses by about 20-30%.

The decision about how to comply with the new requirements is in the designer's hands, but for those working on-site the changes will mean insulation with higher R-values will need to be installed, more use of double glazing, and perhaps changes to the construction of floor slabs. It will now

be much more difficult to demonstrate compliance "after the fact" if mistakes in insulation design or installation have been made, or if lower performance products have been substituted. Sort out H1 compliance at the design stage.

In some cases, the thicker insulation for the higher R-values will require deeper framing. The new edition of the *BRANZ House Insulation Guide* has two options for many common construction methods. With masonry veneer walls, for example, one option has 90 mm framing, but R-2.8 insulation is likely to be the thickest you can install. Another option of 140 mm >

# QUICK ANSWERS

## WHAT IS AN R-VALUE?

“R-value” is the resistance to heat flow of a given component of a building element. The building element itself – a roof or wall, for example – also has an R-value of its own. The “construction R-value” is the combined R-values of the different components – the insulation, wall cladding etc – less the effect of thermal bridging of the framing. In many cases the construction R-value is lower than the R-value of the insulation.

## WHAT IS “ZONE 1”, “ZONE 2”, “ZONE 3”?

New Zealand is divided into three zones in NZS 4218: 2004 *Energy efficiency – small building envelope*. Zone 1 is Auckland, Northland and Coromandel; Zone 2 is the rest of the North Island, excluding the Central Plateau; Zone 3 is the North Island Central Plateau and the South Island. You can find a more detailed description of the zones in the H1 Third Edition document on the DBH website ([www.dbh.govt.nz](http://www.dbh.govt.nz)).

## WHAT IS A THERMAL BRIDGE?

A “thermal bridge” occurs where heat is more easily able to move from one place to another. For example, the framing in a non-solid wall is a “thermal bridge” which transfers heat away from the warm interior. This applies to both timber and steel framing – steel is a significant thermal bridge.

## WHAT IS A THERMAL BREAK?

A “thermal break” prevents heat moving from one place to another. For example, aluminium window frames are excellent conductors of heat: they transfer heat from a warm interior to the outside. Some aluminium frames have an element of rubber or plastic included which is a poor conductor of heat. This “thermal break” reduces the loss of heat through the frame.

A thermal break must also be installed between steel framing and exterior cladding, and must be located on the outside of the framing.

If thermal breaks are not used, condensation may form on interior surfaces or framing.

## WHAT IS AN IGU?

“Insulating Glazing Units” or “Insulating Glass Units” are double- or triple-glazed windows.

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framing allows for thicker insulation to be installed and a higher R-value achieved. This makes it easier for the house to meet or exceed the new requirements – and makes it warmer for the occupants.

Similarly for roofs, using 190 mm rafters in a skillion roof with profiled steel cladding allows insulation materials of up to R-5.0 to be installed. With 140 mm rafters, R-3.6 is the highest insulation level which can be properly installed, and this may not be enough to meet the minimum requirements.

Under the existing rules, most designers show compliance with H1 by using the schedule method of NZS 4218: *Energy Efficiency – Housing and small building envelope*. The new version of H1 modifies the schedule method tables in the standard. Double glazing is required if designers use the schedule method, and the amount of glazing in east, west and south walls is limited to 30% of the wall area. Designers who want to use some (or all) single glazing in a house, or have a larger area of glass, will need to use other methods to show that they comply.

It is possible to use single glazing in Zones 1 and 2 by greatly increasing the level of insulation in the roof, wall and floor, but this will be very difficult to do in Zone 3. That means that most new homes in Zone 3 (the South Island, and the North Island Central Plateau), are likely to require double glazing.

Most double glazing sold in New Zealand today just has the standard aluminium frame. This is the lowest performance frame, because heat is lost to the outside through the metal frame. More efficient types have a plastic or rubber “thermal break” incorporated, or use timber or PVC framing. Performance of the double glazing can also be increased by using “low-e” glass (this is coated glass which reduces heat transfer), or having argon gas in the space between the glass panes.

There are increased minimum R-values for solid wall construction, and insulation is now required for all solid wall types. If designers use the schedule method, the regulations specifically require that insulation on solid walls is on the outside, to allow benefits from thermal mass to contribute to heating.

Strapped and lined construction is now considered as non-solid, so must achieve the same R-values as framed timber walls. The new BRANZ *House Insulation Guide* gives an option for adding greater insulation to the inside of solid walls, beyond the traditional 45 mm strapping and lining. The new option is to construct a self-supporting false wall using 90 mm studs. This allows insulation materials of up to R-2.4 to be used – double what can be practically used with 45 mm strapping.

While minimum required R-values for heated floors have increased, for ordinary floors the requirements have remained unchanged at R-1.3. This means that floor slab construction methods which don't include a heating system don't have to change. However, BRANZ research has found an easy way to improve the slab R-value for traditional slab construction with a perimeter foundation wall, by using a piece of treated timber to act as a thermal break between the slab floor and the perimeter wall, in conjunction with under-slab insulation. Details are given in BUILD 100 (June/July 2007) and the *House Insulation Guide* shows the R-values of many options.

## GO BETTER THAN CODE MINIMUM

Remember that the new Building Code requirements are just minimums. For new houses, additions, or substantial renovations, BRANZ recommends that designers specify as much insulation as practicable be installed. It is easier and cheaper to do this when building work is in progress than it is at a later date.

## MORE INFORMATION

BRANZ *House Insulation Guide* (2007)

BRANZ Bulletin 474 June 2006, *WERS – Window Efficiency Rating System*

BRANZ Bulletin 471 April 2006, *Insulating Glass Units*

[www.branz.co.nz](http://www.branz.co.nz)

[www.level.org.nz](http://www.level.org.nz)

The new Building Code Clause H1 *Energy efficiency* can be downloaded free of charge from [www.dbh.govt.nz](http://www.dbh.govt.nz)

For Standards, see [www.standards.co.nz](http://www.standards.co.nz)

# INSTALLATION IS THE KEY

Insulation will be of little use if it isn't installed properly. Consider this fact: a gap of just 5 mm around the edges of insulation (see Figure 1) can slash the R-value in half!

The effectiveness of insulation can also be largely lost where an unsealed air gap exists between the insulation and the building element beside it (Figure 2). For example, if you get a breeze blowing through the gap between underfloor polystyrene and the floorboards, the effectiveness of the polystyrene can be

slashed. Where there is an air gap, it needs to be sealed to maintain a still air space.

Insulation needs to be fitted snugly, with no gaps, creases or folds. It shouldn't be crushed. For example, if you force glasswool (fibreglass) insulation into a space too tight for it, its R-value will be reduced.

To be most effective, insulation should also be fitted into the small spaces between framing members at wall intersections (see Figure 3.) Better still, wall intersections

should be designed to avoid multiple studs where practicable.

Common insulation materials are safe to work with if appropriate protective equipment is used, but if you are stapling foil insulation you should take care that no staple goes through a live wire. If this happens, the whole sheet can become live. Several deaths have been reported as a result of this happening.

# WHAT ABOUT EXISTING HOUSES?

The new rules only apply to existing houses where they are undergoing significant renovations or extensions. But that doesn't mean you shouldn't upgrade the insulation of an existing house where you get the chance. You can expect improvements in energy efficiency, comfort levels, and the health of the occupants. As with insulation in new homes, the quality of installation is crucial.

Exactly what you do will depend on the individual house. If you have access to the

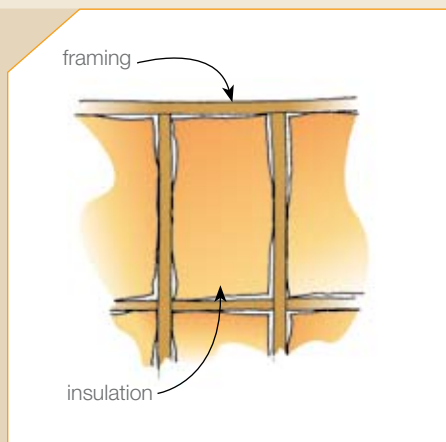
roof space then that is the best place to start. As Figure 4 shows, over a third of the heat loss in an average uninsulated house is through the roof.

If you are replacing interior linings, then installing insulation into walls which don't have any will be easier. If you are working on an old villa with timber sarking on walls and no dwangs, removing every second or third piece of sarking may be enough for you to push insulation into the space. Make sure

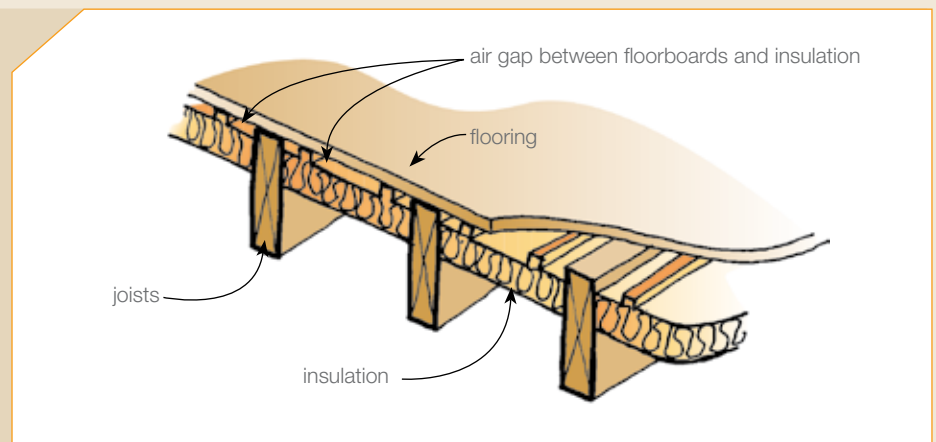
there is underlay between the insulation and the outside wall. The sarking boards can be replaced before the wall is lined.

If you are re-roofing, it is easy to install insulation into skillion roofs.

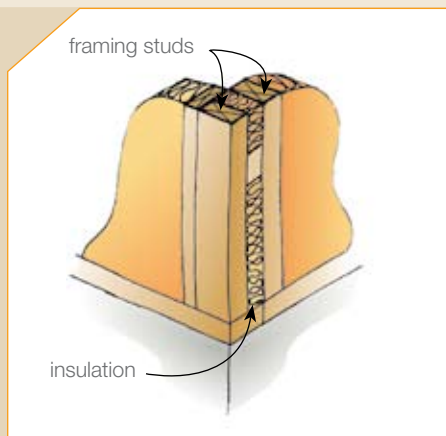
If replacing existing windows, consider replacing with insulating glazing units – particularly on south-facing walls.



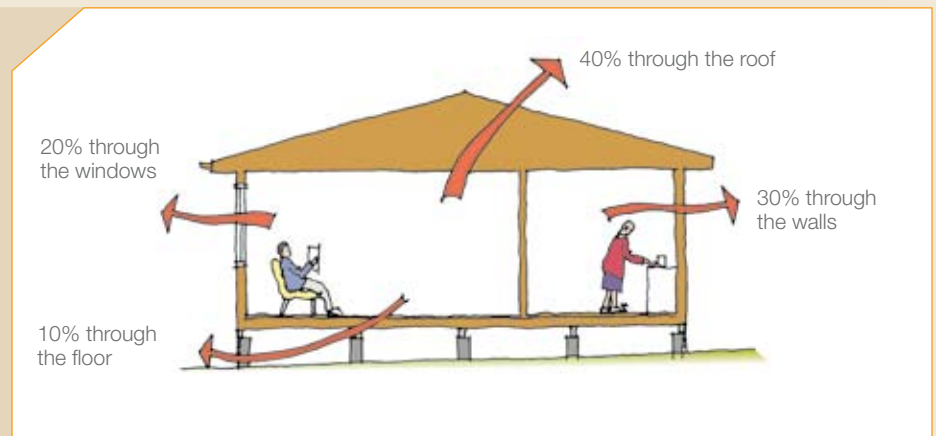
**Figure 1:** Poorly fitted insulation won't work as well as it should.



**Figure 2:** Where an air gap between the insulation and a building element is intentional, the gap should be sealed so that the air remains still.



**Figure 3:** For maximum energy efficiency, fill the gaps between framing members with insulation.



**Figure 4:** Approximate heat loss from an average uninsulated house

The new 3rd Edition of the BRANZ *House Insulation Guide* has been completely revised, updated and reformatted. It takes into account new H1 changes for insulation zones providing an easy way to show compliance.

The BRANZ *House Insulation Guide* is a 'must-have' for all designers, builders, Building Consent Authorities and insulation suppliers.



Third Edition

# HOUSE INSULATION GUIDE

**\$59.95**  
plus \$8 p&p

## H1 Insulation Changes SEMINAR

A joint presentation from the  
Department of Building and  
Housing and BRANZ

- Are you involved in the design and consent of buildings?
- Do you understand what the H1 changes mean for insulation requirements?
- Are you ready to change your practice to meet the new requirements?

Revised regulations requiring higher levels of insulation in housing and small buildings came into effect on 31 October 2007. Unlike previous revisions of H1, these changes are major and will require substantial changes in practice. You will not get consents unless designs meet the new H1 requirements. Aimed at architects, designers and building officials, the seminar will be held around the country between 26 November and 10 December.

This seminar has been accredited for 15 CPD points by the Registered Architects Board.

See the BRANZ website ([www.branz.co.nz](http://www.branz.co.nz), click on "Seminars") for further details and to register online.

[www.branz.co.nz](http://www.branz.co.nz)  
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Tel: 04 498 5991 or [www.standards.co.nz](http://www.standards.co.nz).