



# THERMAL INSULATION CHANGES IN NZS 4218

The new thermal insulation standard uses the same compliance methods as before but incorporates some significant changes, particularly to definitions.

By Michael Camilleri, BRANZ Energy Efficiency Scientist

The new standard NZS 4218:2009 *Thermal insulation – Housing and small buildings* incorporates the recent changes to Clause H1, some new requirements, additional guidance and improvements in usability. It uses the same compliance methods as the previous version (schedule, calculation and modelling), but some requirements and definitions have changed.

This overview covers some of the most significant changes, but a thorough read of the standard is still recommended.

## Use NZS 4218:2009 as an Alternative Solution

Building Code Clause H1 *Energy efficiency* third edition currently calls up parts of NZS 4218:2004 with modifications as an Acceptable Solution (H1/AS1), so NZS 4218:2009 is not currently an Acceptable Solution.

BRANZ suggests that NZS 4218:2009 be used now as an Alternative Solution for Clause H1.

## Definitions changed

The two most significant definition changes are to construction R-values and to building elements.

Construction R-values define how the R-value of a building element (for example, wall or roof) is calculated. It allows some simplified methods to be used (such as the BRANZ *House insulation guide*).

The definitions for the various building elements (for example, roof, skylight, wall, glazing, door, floor) and their areas have been changed to better match design and specification practice. It is important to understand these definitions or some areas may be calculated incorrectly (for example, glazing area excludes skylights).

The terms 'solid' and 'non-solid' construction are no longer used in the standard. Instead, there are alternative requirements for buildings with 'solid timber' or 'high thermal mass' walls. The requirements for solid timber are little changed, but the requirements for high thermal mass are new and substantially different.

## High thermal mass designs

There is now a minimum level of accessible wall thermal mass required, at a density of 215 kg/m<sup>3</sup> or greater, and the thermal mass must be exposed to the interior. In practice, this means that some of the lighter types of masonry and concrete construction will not qualify as 'high thermal mass' and, therefore, may need additional insulation to be acceptable.

Interior insulation of exterior walls (for example, strapping and lining) is not acceptable for solid timber or high thermal mass walls. These new requirements will help to ensure that high thermal mass designs achieve their intended level of performance.

## New allowances in schedule method

The schedule method has been rewritten to improve clarity and usability, with some new allowances added.

### SKYLIGHTS

The skylight area allowance is more generous than currently in H1, at 1.5 m<sup>2</sup> or 1.5% of the total roof area (whichever is greater).

### DECORATIVE GLAZING AND LOUVRES

Previously, all vertical glazing was required to meet the R0.26 or R0.31 requirements of the schedule method. This has caused problems with various types of decorative glazing, and there have been anecdotal reports of small single-glazed panels in doors needing to be double glazed for Building Code compliance. To resolve these problems, there is an allowance for decorative glazing and louvres of up to 3 m<sup>2</sup> that do not need to meet the insulation requirements for glazing.

The definition of decorative glazing and louvres is fairly broad (it pays to read the definitions), so could cover leadlights of any type, coloured or other types of decorative glazing, and specifically includes glazed or opaque louvres. Note that this allowance is only for vertical glazing and louvres, so excludes skylights.

### CHANGE FOR SLAB FLOORS AND DRAPED FOIL

The new standard has removed the special status of slab-on-ground floors and 100 mm draped foil with closed perimeter. They no longer automatically meet the schedule method requirements so their construction R-value must be determined. If it is less than the schedule minima (R1.3 or 1.5, depending on the table used), the calculation or modelling methods must be used instead.

In practice, many uninsulated slab floors and suspended timber floors will fail to meet the schedule method minimum requirements. For slab floors, insulation and/or a thermal break would be required. For suspended timber floors, a lining under the foil or bulk insulation is needed. Alternatively, the calculation or modelling methods could be used (although it would be good practice to increase the R-values anyway).

### MIXED CONSTRUCTION

To assist designers, there are easy-to-follow options for 'mixed construction'

where there is a mix of high thermal mass, solid timber or other wall types. These deal with situations such as a small feature timber-framed wall in an otherwise high thermal mass building, or a multi-storey building with different wall constructions by floor.

### Calculation and modelling methods

The major change in the calculation method is the decrease in the glazing area limit to 40% of total wall area. Any design with more glazing than this will need to use the modelling method. The clauses have been extensively revised, but these changes are mainly to improve usability.

For example, the reference equations are now written out in full with all the R-values inserted, and the calculation process for mixed construction (for example, a mix of high thermal mass and timber-framed construction) has been well specified. To further support the user, there are three worked examples. These cover all the clauses, with a variety of common design situations. Overall, the calculation method should be easier to understand and apply.

The modelling method has been extensively revised. We recommend a thorough read before use.

### Alterations still an issue

Alterations have been a major issue since H1 third edition came into effect, and as yet, there is no definitive guidance on how to demonstrate compliance.

The new standard has an informative appendix giving guidance on applying NZS 4218:2009 to alterations. This (basically) allows the various compliance methods of NZS 4218:2009 to be applied only to the alteration, or to the entire building, with no requirement to increase the R-values in the old part of the building. This appendix has no status as a compliance method under H1, but it does provide some simple and practical guidance.

### Doing better

NZS 4218:2009 sets a minimum performance level, but it is still possible to do better. The main areas to look for improvement are in applying passive design principles and increasing the R-values of the floor, glazing and solid (opaque) doors (see *Build 105* April/May 2008, pages 16–17).

*NZS 4218:2009 can be purchased from [www.standards.co.nz](http://www.standards.co.nz).* ◀