



H1, E3 AND MIXED CONSTRUCTION

Current building designs often incorporate a mixture of construction types – both non-solid (timber-framed) and solid (such as solid timber, concrete or masonry). How is compliance with Clause H1 demonstrated for these designs?

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Compliance with Building Code Clauses E3 *Internal moisture* and H1 *Energy efficiency* must be assessed independently. However, when using the calculation method of NZS 4218:2004 *Energy efficiency – Small building envelope* for mixed construction, the E3 R-value requirement may set the minimum permissible R-value for that type of construction, irrespective of what might be calculated to show compliance with NZS 4218.

Use non-solid component R-values

For mixed construction, the R-values for all components in the reference building, whether solid or non-solid, need to be taken from the non-solid table in Building Code Clause H1 third edition – Replacement Table 1.

Using the BRANZ Schedule Method Checklist (see H1 Energy Efficiency Support page on www.branz.co.nz) with a mixed construction design, your answer will be 'no' to at least one of the questions in the solid construction section. Because of this, the schedule R-values for solid construction (Tables 2(a) or 2(b) in NZS 4218) *cannot* be used. Instead, you must use either the non-solid Table 1 with the schedule method, or use the calculation or modelling methods to show compliance with Clause H1. If using the calculation method, you will again need to use Table 1 for the reference building.

The proposed mixed construction building must be able to demonstrate equal or better performance than the reference building to comply.

Calculation method R-values

When using the calculation method, NZS 4218 clause 3.2.6 allows the R-value of any

component to be reduced by up to 40% of the schedule method non-solid construction R-values (Replacement Table 1) so long as the:

- R-values of some other component(s) are increased to compensate
- R-values of roofs and walls do not go below the minimum set by E3/AS1, which is concerned with the prevention of fungal growth.

Minimum component R-values

An example of a proposed mixed construction building follows to show how to work out the minimum R-values for building components. The proposed building is in climate zone 3 and is of 200 series concrete masonry construction to the lower level with a timber-framed wall clad with bevel-backed weatherboards to the upper level.

FIRST FLOOR FRAMED WALLS

Applying NZS 4218 3.2.6 up to 40% reduction factor in this example, the non-solid wall could not be less than R1.2 (the schedule method requirement of $R2.0 \times 0.6$). However, R1.2 is less than the minimum of R1.5 stipulated in E3/AS1. Therefore, this wall component defaults to the E3/AS1 minimum requirement of R1.5.

GROUND FLOOR SOLID MASONRY WALLS

Under the calculation method, the reference building construction R-value for the masonry wall is R2.0. NZS 4218 3.2.6 also allows the 40% reduction rule to be applied to that component in the same way as the upper level walls ($R2.0$ less 40% = R1.2). Since this R-value is above the minimum requirement of E3/AS1 for single skin normal weight masonry-based wall construction without a cavity (R0.6),

and would comply with the requirements of E3/AS1, a construction R-value of R1.2 for the lower level would be acceptable. Don't forget, though, about the need to increase the R-values of some other component(s) to compensate for that reduction.

MEETING THE THERMAL REQUIREMENTS

Readers who have mastered the revised Clause H1 may be wondering why the specific requirements of NZS 4218 Replacement Table 2(b) Note 11 have not been mentioned above. Note 11 specifically relates to solid construction and states, 'Table 2(b) allows buildings of solid construction to have lower R-values than buildings of non-solid construction, due to the benefits of appropriate use of thermal mass... Use of the R-values in Table 2(b) requires that the thermal mass is accessible, i.e. inside the insulated building envelope. If additional bulk insulation material is required to achieve the R-values in this table, this insulation must be installed on the outside of the wall.' The net effect of this rule is that strapped and lined masonry (solid) walls must be treated as non-solid construction.

Since we are not able to use the lower R-values from Replacement Table 2(b) in our reference building, there is no reason why strapping and lining of those walls cannot be adopted. A construction R-value of 1.2 can be achieved with 45 mm strapping (on DPC) at 600 mm centres and lining with insulation of at least R1.2 (see *BRANZ House insulation guide*, page 80). ◀