2.3 Thermal Performance/Passive Solar Design

Thermal Performance

Requirements for thermal performance of domestic dwellings are set out in NZS 4218:2009, *Thermal Insulation - Housing and Small Buildings*.

This standard is cited by MBIE as part of the acceptable solution within the New Zealand Building Code, Clause H1/AS1.

Concrete masonry construction R-values shall be determined by either the schedule, calculation or modelling method of the above standard.

Schedule Method

The schedule method shall only be used if the glazed area is ≤ 30% of the total wall area.

R-values are determined by Table 2 or Table 4. Table 2 requires R-values between 1.9 and 2.0 depending on the climate zone where the building is set. R-values required by Table 4 vary between 0.8 and 1.2 again in dependence on the buildings climate zone.

Table 2 can be used in any case. Table 4 can only be used if:

(a) the concrete masonry wall is openly exposed to the interior, and

(b) the density of the wall is ≥ 215 kg/m^2.

Comment: Fully filled, 150 mm concrete masonry walls are usually ≥ 215k g/m^2 but confirmation of the manufacturer is required for final assessment.

See NZS 4218, section 4.1 for further details.

Calculation Method

The calculation method shall only be used if the glazed area is ≤ 40% of the total wall area.
The advantage of this method over the schedule method is that a reduction of some building element's R-values can be compensated by increasing the R-values of other building elements.

For further details see NZS 4218, section 4.2.

Modelling Method

The modelling method can be used for any building but shall be used if the glazed area is larger than 40% of the total wall area.

The sum of the modelled and calculated heating and cooling load of the proposed building shall not exceed the reference building where R-values of Table 2 (or 4 if high mass) have been used.

The advantage again is that a reduction of some building element's R-values can be compensated by increasing the R-values of other building elements.

For further details see NZS 4218, section 4.3.

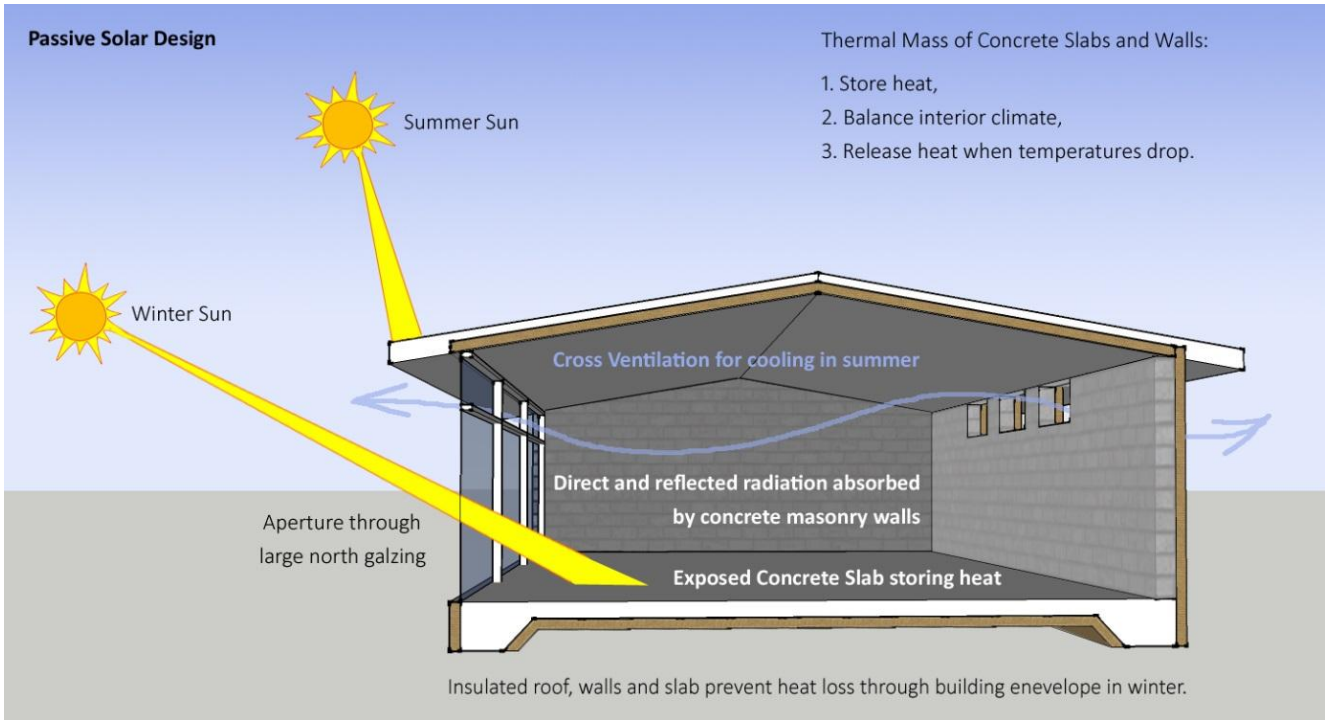
Passive Solar Design

The principles of passive solar design are:

1. Thermal mass
2. Large north glazing, no or minimal south glazing
3. Thermal insulation
4. Air sealage
5. External summer shading
6. Providing for cross ventilation

Image: *Cranko Architects using principles of passive solar design for a residence in Wellington.*

For further information see the 'Designing Comfortable Homes' Book, free download online at: www.CCANZ.org.nz/files/DCH_Book_WEB.pdf.



Principles of passive solar design illustrated:

Large glazing to the north to gain the sun's heating energy in winter plus roof overhangs to block the sun in the summer avoiding overheating are evident for passive solar design.

Concrete masonry walls together with an exposed concrete slab capture direct and reflected radiant heat and balance the interior climate by cutting off daily peaks, highest and lowest temperatures.