



TECHNICAL NOTE #14

SANS 10400XA: Energy Usage in Buildings

A concise explanation of the provisions made for Clay Brick masonry walling as outlined in the National Building Regulations SANS 10400 Part XA for Energy Usage in Buildings. The compliance route is assumed to be the Prescriptive or Deemed-to-Satisfy route as followed by the appointed professional.

TECHNICAL CONTRIBUTOR

Technical Committee
Clay Brick Association of SA





SANS 10400XA: ENERGY USAGE IN BUILDINGS

Compliance for Clay Brick Masonry Walling

SA National Standard 10400 Part XA: Energy Usage in building has been developed to serve the XA amendments made to the RSA National Building Regulations.

Both the Regulations and the Standard provide for a Prescriptive route to compliance [sometimes referred to as the Deemed-to-Satisfy provisions]. The Prescriptive route provides for simplified performance-based solutions for common building elements, such as the walling of any structure.

SANS 10400XA - PROVISIONS FOR WALLING

Masonry comprising of a double brick composition is deemed-to-satisfy in the National Building Regulations, as per paragraph 4.4.3 below:

4.4.3 External Walls

4.4.3.1 Non-masonry walls shall achieve a minimum total R-value of:

- a) Climatic Zones 1 and 6: 2,2
- b) Climatic Zones 2, 3, 4 and 5:1,9.

4.4.3.2 The following types of masonry walling comply with the R-value requirements:

- a) Double-skin masonry with no cavity, plastered internally, or rendered externally; or

NOTE: The cavity and grouted cavity walling systems exceed the minimum R-value of 0,35.

- b) Single-leaf masonry walls with a nominal wall thickness greater than or equal to 140mm (excluding plastering and rendering), plastered internally and rendered externally. The requirements refer to the external walls of the habitable portions of the building fabric only.

4.4.3.3 For masonry walling types not covered in 4.4.3.2, such walls shall achieve a minimum total R- value of 0,35. The total R-value shall be determined by means of a test conducted in accordance with ASTM C1363, ASTM C518 or ASTM C177. Surface film resistance shall be in accordance with SANS 6946.

4.4.3.4 Other walling requirements shall be in accordance with SANS 10400-K.

The physical testing of the thermal resistance of solid masonry walling by the Clay Brick Association shows that double-skin masonry plastered internally achieves a thermal resistance of greater than 0.35m²K/W.



WHICH WALLING SYSTEMS ARE COMPLIANT?

The following walling systems comply with the Regulations:

- i. Non-masonry walls with an R-value of not less than either 1.9 or 2.2m²K/W depending on the geographic location of the structure.
- ii. Masonry walls will comply if they comprise of a double brick construction irrespective of brick dimensions.
- iii. Single leaf through-the-wall 140mm hollow concrete blocks which are plastered internally also comply.
- iv. Other [single skin] masonry walls should have an R-value which is greater than 0.35m²K/W.

CR-VALUES AND THERMAL PERFORMANCE OF WALLING

The thermal performance of walling as indicted by the CR-value corresponds with the property of thermal diffusivity, which is the **product** of thermal conductivity, density and specific heat of any material. The thermal diffusivity brings the time for transfer of heat through a building element into consideration.

The tool in SANS 204 provides only for double brick cavity wall constructions. However, by calculation (Rational Design) building professionals can achieve CR-values as shown below

Typical CR-Values	
Wall Type: <i>Double-Skin Brick</i>	CR Product: <i>Hours</i>
2 x 106mm with no air cavity	40
2 x 106mm with 50mm air cavity	60
2 x 106mm with 50mm air cavity and with R=0,5 cavity insulation	90
2 x 106mm with 50mm air cavity and with R=1 cavity insulation	130

Building designers can calculate the CR-values of various combinations of high mass walling and thermal insulation products, using the online CR-value calculator available at: www.claybrick.org.

The most energy efficient walling systems can be specified for South African climatic conditions by making use of the CR-value tool (Table 3) in SANS 204.

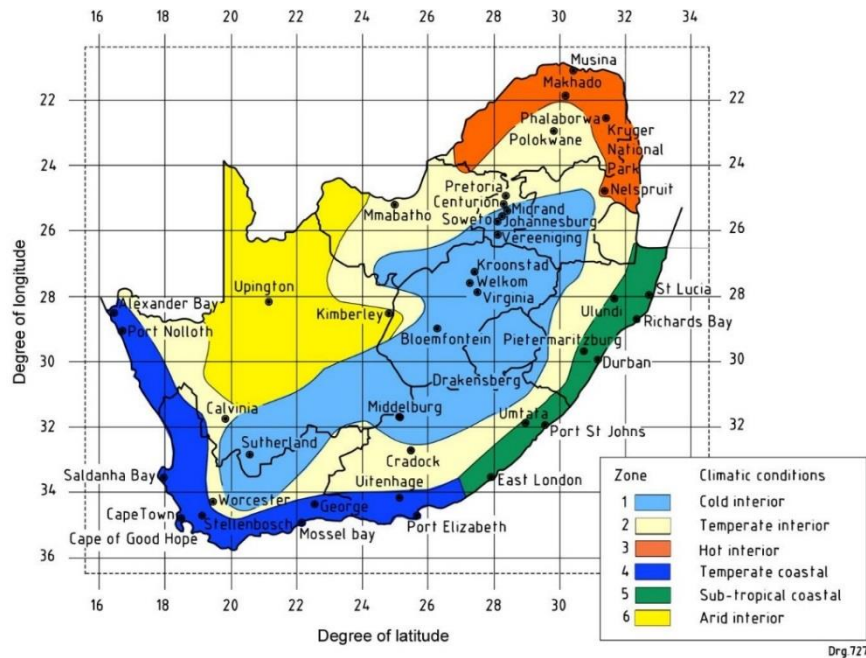


Minimum Thermal Capacity & Resistance (CR-Value) in Hours, for External Walling

Occupancy Group	Climatic Zone					
	1	2	3	4	5	6
Residential E1-3,H1-5	100	80	80	100	60	90
Office & Institutional A1-4,C1-2,B1- 3,G1	80	80	100	100	80	80
Retail D1-4, F1-3, J1-3	80	80	120	80	60	100
Unclassified A5, J4	NR	NR	NR	NR	NR	NR

NR = No Requirement

CLIMATE ZONES OF SOUTH AFRICA



Zone	Description	Major centre
1	Cold interior	Johannesburg, Bloemfontein
2	Temperate interior	Pretoria, Polokwane
3	Hot interior	Makhado, Nelspruit
4	Temperate coastal	Cape Town, Port Elizabeth
5	Sub-tropical coastal	East London, Durban, Richards Bay
6	Arid interior	Upington, Kimberley

For further information:

The Clay Brick Association of South Africa

Website: www.claybrick.org