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Deemed To Satisfy (DTS) requirements for energy
efficient walling in South Africa

WSP Energy Management

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Contents

1	Background	1
2	Deemed to Satisfy Requirements for External Walling	2
3	Notes	3

1 Background

Edition 1 of the SANS 204 series of standards contains Deemed-to-satisfy (DTS) requirements that make a distinction between walls based on minimum “surface density”, requirements, quantified as “kg/m²”. The DTS requirements are in terms of minimum thermal resistance values (R-values), which should apply in each of six geographic regions.

The concerns about these provisions are as follows: that the scope of the current requirements excludes the majority of occupancy types, “surface density” is a rough approximation of thermal mass and is not scientifically determined, and that the minimum R values were determined through processes described by the researchers as “sub-optimal”, in that they were borrowed from the Building Code of Australia without an optimisation check. The Clay Brick Association (CBA) has commissioned work to address these concerns.

The first part of this further research resulted in the proposed Edition 2 of the SANS 204 series containing a more comprehensive set of DTS requirements, as well as notes and guides. The second, and more substantial, part of the research has resulted in the following proposal for DTS requirements for external walling in South Africa (for an abbreviated description of the research outcomes and methodology see the Executive Summary forwarded to SC59G).

The research has produced a more scientifically accurate and optimal approach whereby DTS requirements can be expressed in terms of minimum thermal capacity and thermal resistance (CR) product values.

The CR product requirements are developed from minimum Life Cycle Cost evaluations, after determination of the lowest energy consumption results for a series of buildings of different occupancy class in six climatic regions of South Africa.

Applying the proposed set of deemed to satisfy requirements for external walls will ensure, given other energy efficiency interventions in the building as per SANS 204, that the energy consumed by environmental controls of the building will be at levels required by the Department of Energy, in support of the 2015 energy reduction targets set out in the RSA Energy Strategy.

2 Deemed to Satisfy Requirements for External Walling

The following definitions should be added to SANS 204 and SANS 10400-X:

C-VALUE

the thermal capacity (kJ/m².K) of a component

TOTAL C-VALUE

the sum of the C-values of the individual component layers in a composite element including the air space

CR PRODUCT

the time constant property (hours) of a composite element, being the arithmetical product of total C-value and total R-value

The following table and notes sets out the minimum CR product DTS requirements and their application:

Minimum thermal capacity & resistance CR product, in hours, for external walling						
Occupancy Group / Climate Zone	1	2	3	4	5	6
Residential E1-3,H1-5	100	80	80	100	60	100
Office & Institutional A1-4,C1-2,B1-3,G1	80	80	90	80	80	80
Retail F1-3,J3	80	120	120	90	80	120

3 Notes

1. External walls are defined as the complete walling system, as measured from the outer skin exposed to the environment, to the inside of the inner skin exposed to the interior of the building, and does not include glazing. The requirements for glazing are included elsewhere in this standard.
2. For the CR product values of walls, contact the relevant manufacturer/s. The table below provides typical values for clay masonry walls with or without additional insulation.

Wall Type	106mm Double Brick (DB)	DB with 50mm air cavity	DB with R=0.5 cavity insulation	DB with R=1 cavity insulation
CR (hours)	40	60	90	130

Note: The R=0.5 and R=1.0 refers to thermal resistance (m^2K/W)

3. Thermal resistance added to masonry walling to achieve higher CR values should be placed in the cavity between leaves of brickwork. Thermal resistance should not be added to the inside skin of a masonry wall.
4. Wall systems that have low thermal capacity and / or resistance will not meet the DTS requirements. In such cases a rational design approach is required.
5. Designers should consider that interstitial condensation occurs in walling systems which are not able to prevent or accommodate moisture migration. The selection of vapour barriers and appropriate construction materials, including insulation, is important for the thermal efficiency of walling in climate zones where damp and high relative humidity is experienced.
6. Internal walls, in buildings with external walling as above, should ideally have CR product values of at least 20 hours. However, this is not a requirement for compliance.

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