

Thermal performance of heavy-weight and light-weight steel frame construction approaches in the central Pretoria climate

T Kumirai and DCU Conradie

Built Environment, Council for Scientific and Industrial Research
PO Box 395, Pretoria, 0001
South Africa
tkumirai@csir.co.za

ABSTRACT

The purpose of this paper is to analyse the thermal performance of two buildings. The one has a large thermal mass and the other a highly insulated low thermal mass. A typical 120 m² suburban building was modelled in *Ecotect*. As part of the model infiltration rate, wind sensitivity and a central Pretoria weather file were used. New material composites were introduced in the materials database to represent typical building materials used in the construction of heavy and light-weight buildings in South Africa. The thermal characteristics of these new materials were then calculated within *Ecotect*. *Ecomat* was used to calculate thermal lag which was used as an additional input into *Ecotect*. The research indicates that a low thermal mass and highly insulated building have been shown to use 18.3% less annual space heating and cooling energy when compared to the high thermal mass building. The good thermal performance results of the light-weight building will help in clearing scepticism to adopting this construction technology in southern Africa where high thermal mass masonry is still predominant.