# PASSIVE SOLAR ENERGY-EFFICIENT BUILDING DESIGN IN KENYA



BY

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This is my original work and has not been presented for a degree in any other University.

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## ABSTRACT

This work aims at providing thermal comfort specifications for buildings in Kenya without the use of expensive / active conditioning devices. It utilizes a computer program, ARCHIPAK, together with the climatic data for nine stations representing Kenya fairly well climatically by virtue of their geographical locations.

An initial climate analysis on the climatic data has been done to arrive at generalized advice for the climatic design of houses, based on the 'Mahoney Tables' method. Comparison of the computer -aided analytical data (CAAD) on the basis of the Mahoney tables shows that this analysis yields excellent comfort zones for the warmer climates in the country. However, with minor adjustment of the Mahoney's tables indicators, it was possible to predict pre-design guidelines for the entire country fairly well.

A more thorough climate analysis has been done based on the Psychrometric chart. The comfort zone plots (as function of climate), plots of the 12 monthly climatic lines and calculations for the foT (fraction of time over-temperature) and foH (fraction of time over-humid) have also been done. A series of control potential zones (cpz) have been compared with the climatic plot and the comfort zone and the appropriate control techniques selected on the basis of which control potential zone overlap with most of the climate falling outside the comfort zone. This detail analysis based on the psychrometric chart shows that the only passive control methods with some promise of success in Kenya are: Air movement effect, passive solar heating and mass effect/mass effect with night ventilation.