

Thermal comfort of an air-conditioned office through different windows-door opening arrangements.

ABSTRACT

This paper investigates the thermal comfort level of an office room through various windows-door opening arrangements in hot and humid climate. To determine the windows-door opening performance, 14 opening configurations have been considered and the combination of opening arrangements was carried out in an air-conditioned office at UPM, Malaysia. After conducting objective measurement for each condition, Predicted Mean Vote (PMV) and Predicted Percentage of Dissatisfied (PPD) were calculated. The concentrations of carbon dioxide (CO₂) were also monitored. Subjective survey involved questions on the thermal environmental perception and indoor air quality for office occupants for this study. Objective data analysis showed that in most of conditions office had thermal conditions falling within the comfort zone of ASHRAE standard 55, and in all of conditions neutral temperatures are higher than ASHRAE standard requirements. Subjective results revealed that staff has higher thermal comfort level as compared to what PMV has predicted. Practical application: It is believed that the results in this paper will contribute to knowledge that international standards are not applicable in hot and humid climate. Fanger equations would give the results for European conditions, people in hot- humid climate have some cultural preferences that are different from the Europeans hence modifying these equations and standards for this climate are necessary. In terms of the use of climatic control to modify the indoor environment it is found that when the occupants have the freedom to modify the environment, and make necessary adjustment, they always use windows-door opening arrangements to compensate for the less comfortable thermal condition and increase air movement.

Keyword: Air conditioning; Air quality; Carbon dioxide; Indoor air pollution; Thermal confort.