

Influences of air exchange effectiveness and its rate on thermal comfort: naturally ventilated office

ABSTRACT

This article presents the effects of air exchange rate (ACH) and air exchange effectiveness (AEE) on thermal comfort level of a naturally ventilated office room. The study was conducted in an office at UPM, Malaysia. Influence of ACH and AEE on thermal comfort has not been investigated and is, therefore, not well understood. The main objective of this research is to investigate and assess these influences through the variable windows-door opening arrangements. To determine the windows-door opening performance in terms of ventilation air flow rate, 14 opening configurations have been considered. Thermal comfort variables were measured at the same time when ACH and AEE were evaluated. Through these data, the thermal comfort Fanger's indices (Predicted Mean Vote (PMV) and Predicted Percentage Dissatisfied (PPD)), ACH and AEE were calculated. These results showed that for a naturally ventilated office room three linear regression equations of PMV versus ACH and three linear regression equations of PMV versus AEE can be derived.

Keyword: Thermal comfort; Air exchange rate; Air exchange effectiveness; Natural ventilation; Objective approach; Tracer gas decay