The acceptable air velocity range for local air movement in the Tropics - DTU Orbit (08/10/2019)

The acceptable air velocity range for local air movement in the Tropics

The perception of locally applied airflow was studied with tropical subjects who had become passively acclimatized to hot conditions in the course of their day-to-day life. During the experiments, 24 subjects (male and female) performed normal office work in a room equipped with six workstations. They were exposed to local airflow from the front and toward the face at six air velocities (0.15, 0.3, 0.45, 0.6, 0.75, and 0.9 m/s) at ambient temperatures of 26 degrees C and 23.5 degrees C and local air temperatures of 26 degrees C, 23.5 degrees C, and 21 degrees C. Each combination was maintained for 15 minutes, during which the subjects responded to computer-administered questionnaires on their thermal and draft sensations using visual-analogue scales. The results showed that the subjects preferred air movement within a certain range, i.e., a higher percentage was dissatisfied at both low and high velocity values. Most dissatisfaction with air movement is caused by thermal sensation, with air movement perception accounting for a smaller proportion. The subjects preferred air movement to be between "just right" and "slightly breezy" and preferred their thermal sensation to be between "neutral" and "slightly cool. The study also identified an acceptable air velocity range from 0.3 up to 0.9 m/s under the experimental conditions. This velocity range is relevant for the design of personalized ventilation in practice. This preferred velocity range is higher than the maximum velocity permissible under ASHRAE Standard 55 (ASHRAE 2004) in situations where subjects have no control over local air movement.

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