



Assessment of thermal comfort in the mosque in Sarawak, Malaysia

S.H. Ibrahim, A. Baharun, Nawi M.N.M., Junaidi E.

Department of Civil Engineering, Faculty of Engineering, University Malaysia Sarawak (UNIMAS),
94300 Kota Samarahan, Sarawak, Malaysia.

Abstract

In hot-humid climate, the mosque should be provided with an acceptable level of thermal comfort in order to seek serenity and focus for worship. The purpose of this study is to investigate the thermal comfort conditions in the Masjid Al-Muttaqin located in Kota Samarahan, Sarawak. The data were analysed using Corrected Effective Temperature (CET) index. The analysis shows that although the air velocity in the mosque is acceptable, due to the influence of high air temperature, thermal comfort is not achieved. A retrofit design by adding new materials and installing insulations on the existing roof are proposed and the results show significant improvement of thermal comfort inside the mosque.

Copyright © 2014 International Energy and Environment Foundation - All rights reserved.

Keywords: Thermal comfort; Hot-humid climate; Mosque; Corrected Effective Temperature (CET); Retrofit design.

1. Introduction

Mosque is a place of great importance for muslim for worship, therefore feeling comfortable and calm is crucial in order to seek a feeling of peace and serenity. Thus, thermal comfort and energy requirements should be investigated thoroughly in order to fulfill the requirements. However, only a limited number of studies have been conducted especially in Saudi Arabia to deal with these requirements of mosques and focusing on extreme climates [1, 2].

Thermal comfort considerations are vital in most buildings involving people occupancy. In hot-humid climate, the main concern is to get rid of heat from the space and those affecting body heat gains and losses. Air temperature, air velocity, air humidity, mean radiant temperature (MRT) as well as human clothing and activity levels are factors that determine the heat balance of a human body in a given thermal environment.

Most of researchers, reported that the range of air temperatures within which thermal conditions may be considered comfortable are between 16°C to 29°C [3, 4]. According to ASHRAE Standards [5] a recommended comfort temperature for people living under climatic condition such as those found in Malaysia is approximately 24°C±1°C. The actual requirement for a comfort temperature for people living in the South East Asian region was found to be higher [6]. The effect of air movement is critical as it helps to increase the efficiency of sweat evaporation and thus avoid discomfort due to moisture on the skin. In hot humid climate the most suitable air velocity for day comfort is in the range of 0.10 to 0.40 m/s and, indoor air velocities of 1.0 m/s are very pleasant and are acceptable up to 1.5 m/s, above that they are unacceptable [7]. Humidity affects comfort in a number of ways both directly and indirectly. As