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Abstract

This study assesses the applicability of thermal mass as a passive design strategy in naturally ventilated office spaces in composite climate of India. The research is an experimental study of two high thermal mass office buildings with different thermal properties, operated under natural ventilation mode for the year 2015-2016 in Jaipur city, India. The part of field measurement data is used to generate indoor-outdoor correlations and validated on remaining data to predict indoor temperatures inside high mass offices buildings. In addition, developed correlations showed a good correlation coefficient ($R^2 \geq 0.92$) when applied to predict indoor temperatures of similar constructed passive buildings. Developed correlations are further used to predict the potential of using high thermal mass in avoiding thermal discomfort during summer and winter season of a year. To show the contrast composite climate zone specific adaptive comfort zone i.e. ACZ and existing ASHRAE Standard 55-2013 comfort zone has been considered. Analysis of results showed that an additional 40% and 98% of the total thermal discomfort time can be avoided with the use of thermal mass in building envelope for the summer and winter season, respectively. Moreover, the percentage of time thermal comfort achieved as calculated by using ASHRAE Standard 55-2013 comfort zone was far less as compared to composite climate specific ACZ.

Keywords: **Thermal mass, Indoor temperature modeling, Thermal comfort, Adaptive comfort zone, Composite climate**

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