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Air to air fixed plate enthalpy heat exchanger, performance variation and energy analysis

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Abstract

The thermal performance of a Z shape enthalpy heat exchanger utilising 70 gsm Kraft paper as the heat and moisture transfer surface has been investigated. Effects of different inlet air humidity ratio conditions on the heat exchanger effectiveness and on the energy recovered by the heat exchanger have been the main focus of this investigation. A typical air conditioning cooling coil which incorporates an enthalpy heat exchanger has been modelled for tropical climate. Under test conditions, results have shown that latent effectiveness and the moisture resistance coefficient have strong dependency on the inlet air humidity ratio. Moreover, the latent effectiveness has been found to be strongly dependent on the moisture resistance coefficient rather than the convective mass transfer coefficient. Finally, annual energy analysis for Singapore weather conditions have also shown that energy recovered under variable inlet air conditions is 15% less than that recovered under constant inlet air conditions for the same heat exchanger. © 2013 The Korean Society of Mechanical Engineers and Springer-Verlag Berlin Heidelberg.

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