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Annual operating energy savings of liquid desiccant and evaporative-cooling-assisted 100% outdoor air system

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Abstract

The purpose of this research is to investigate the annual operating energy performance of a desiccant and evaporative-cooling-assisted 100% outdoor air system. The seasonal mode of operation of the proposed system is also suggested and used for estimating the energy saving potentials. The TRNSYS 16 program integrated with a commercial equation solver is used for the energy simulation of the proposed system, and then two existing air handling alternatives: a conventional variable air volume (VAV) system and an existing evaporative-cooling-assisted system are compared with the proposed system.

The proposed system shows operating energy savings of 82% over the conventional VAV system during the summer, and 54% and 37% in the winter and the intermediate season operations, respectively. Ultimately, the proposed system provides 68% annual operating energy saving over the conventional VAV system, and 23% savings compared to the

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