2.4.5 Энергетические системы и комплексы (технические науки)

STUDY ON IMPROVING THE THERMAL PERFORMANCE OF THE HEAT STORAGE LAYER IN SOLAR AIR COLLECTORS

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Abstract. *The unreasonable filling of phase-change materials (PCM) leads to uneven heat-storage of the thermal-storage layer, which seriously reduces the thermal performance of the PCM-based solar air collector. To solve this problem and obtain the optimal filling position of PCM, two PCM filling schemes are designed in this experiment: Type I is a solar air collector model filled with PCM on the upper part, and Type II is a solar air collector model filled with PCM on the lower part. Then, two kinds of solar air collector models are compared. The results show that the phase-change heat-storage stage of Type I collector is completed within 1h, and 1.505× 10^6 J of heat-energy is stored, which indicates that the heat-storage rate of Type I collector is the best. When the solar energy supply is terminated, the continuous heat-release time of the Type I collector is 15 h, which indicates that it has a long heat-release time, which is conducive to meeting the needs of users for continuous heating. The output-temperature of Type I collector is lower in the solar day and higher in the night, which indicates that Type I collector has a small output temperature fluctuation range, which can improve indoor thermal comfort. In summary, The upper fill PCM is a high-quality filling solution that meets the needs of building users, which providing a reference for the technical update of solar heating products.*

Keywords: *phase change materials; solar air collector; building heating; thermal performance; compared test method*

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