

Experimental Investigation of Two Solar Air Heaters, with and without Employing PCM

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Abstract

In the present study, an experimental test was conducted to investigate the energetic performance of a novel designed solar air heater (SAH), with and without phase change material (PCM). Two identical in dimensions SAHs were constructed and tested to compare their performance between them, the first is a jacket tube solar air heater (SAH 1), and the second SAH is similar to the first, filled with PCM (SAH 2). Experimental results showed that increasing air flow rate increases the thermal efficiency,. Thermal energy during day hours can be stored in the PCM and used after sunset. SAH 2 gave additional operating time after sunset for 4 hours at 0.01 kg/s, 2.5 hours at 0.035 kg/s, and one hour at 0.06 kg/s. Maximum improvement in the daily thermal efficiency was 15% at SAH 2, more than SAH 1 at 0.01 kg/s air flow rate. Employing PCM, as so as increasing air flow rate can reduce the daily thermal losses..

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