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Research Article

Performance of phase changing material in an artificially created cold region to promote latent heat thermal energy storage

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ABSTRACT

In the present contribution, the authors investigate the peculiarity of Phase Changing Material for accumulating heat in the region equivalent to the hilly area by creating its atmosphere, having 20°C DBT and 18°C WBT. A water cooler is used in 5*7 feet bathroom to conceive the above-intimated temperature, measured by a sling psychrometer. In particular, in this study, trials are carried out in the LHTES tank where water is charged from ambient temperature to 55°C with the aid of an Immersion water heater rod of 1000W,230V thereby liquifying PCM and then discharging to ambient temperature. Two Orientations namely, Circular and Cross are appropriated into the study, where Circular Orientation poses better results articulating the charging in an hour and discharging in 25 long hours, whereas Crossed Orientation represents charging in an hour and discharging in 23 hours. The volume of PCM and the net heat transfer surface have been kept constant in both cases, to compare them in the same operative conditions. The reason for the detour is manifested.

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INTRODUCTION

Renewable sources such as solar, wind, biogas, tidal may be harnessed to store energy to a greater extent since energy saving has become a primary priority for future generations. Since renewable sources are a source of intermittent supply, enriching existing technology of storing heat in the LHTES form has become a common concern of discussion due to its advantages of storing a large amount of heat even with small temperature changes and high storage density. More particularly, LHTES incorporated with PCM has been a popular approach for TES application but, PCMs are limited by their low thermal conductivity which is generally less than 0.5 W/mK. To enhance the heat transfer from the heat source to the PCM, many methods like using acetamide [1], tetradecane[2], heat exchanger pipes[3,4] commercial paraffin [5–8] as PCM have been developed. Many applications also use a single fin[9–13] or multiple aluminum fins

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