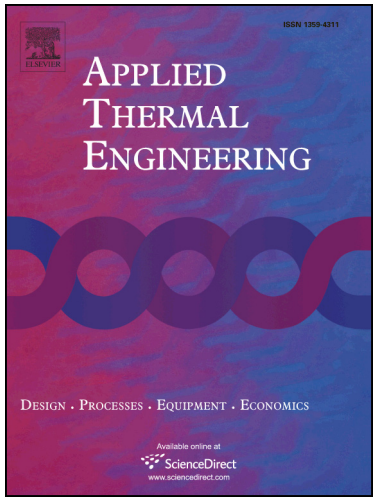

Research Paper

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PII: S1359-4311(16)31083-3
DOI: http://dx.doi.org/10.1016/j.applthermaleng.2016.06.169
Reference: ATE 8580

To appear in: *Applied Thermal Engineering*

Received Date: 17 February 2016
Revised Date: 14 June 2016
Accepted Date: 26 June 2016

Please cite this article as: D. Cano, C. Funéz, L. Rodriguez, J.L. Valverde, L. Sanchez-Silva, Experimental investigation of a thermal storage system using phase change materials, *Applied Thermal Engineering* (2016), doi: http://dx.doi.org/10.1016/j.applthermaleng.2016.06.169

EXPERIMENTAL INVESTIGATION OF A THERMAL STORAGE SYSTEM USING PHASE CHANGE MATERIALS

D. Cano[1], C. Funéz[2], L. Rodriguez[2], J.L. Valverde[1], L. Sanchez-Silva[1]*

[1]Department of Chemical Engineering, University of Castilla-La Mancha, Avda. Camilo José Cela, 12; 13071 Ciudad Real, Spain

[2]National Hydrogen Centre (CNH2), Prolongación Fernando el Santo, s/n; 3-13500 Puertollano (Ciudad Real), Spain

*Corresponding author phone: +34 926 295300 ext. 6307; fax: +34 926 29 52 56; e-mail: marialuz.sanchez@uclm.es

Abstract

A home-made heat exchanger (HE), used in the evaluation of the performance of different phase change materials (PCMs), was designed, mounted and operated. The HE unit was used as a heat thermal storage system for recovering the residual energy coming from a hydrogen cycle, which could be in turn used in building air-conditioning facilities. Four PCMs (Rubitherm® RT28, Rubitherm® RT48, Rubitherm® RT55 and Mikrocaps PCM35; the latter supplied as a slurry of microcapsules) was selected for their suitable thermal properties. Water was used as the heat transfer fluid (HTF) while the PCM was tightly stored inside the shell. Among all the studied PCMs, Rubitherm® RT48 presented the best thermal performance since it accumulated the maximum amount of energy. The influence of the HTF flow rate on the thermal performance of the shell and tube HE was also evaluated. Low HTF flow rates led to high values of heat transferred. Finally, different operation modes (watertight and countercurrent PCM flow) were compared by using Mikrocaps PCM35. PCM countercurrent flow system showed to be the best experimental set-up configuration system for energy transfer,