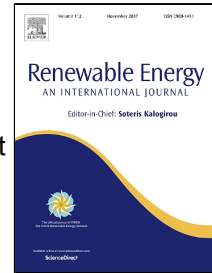


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Comparative study of the thermal performance of four different shell-and-tube heat exchangers used as latent heat thermal energy storage systems

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1 **Comparative study of the thermal performance of four different shell-**
2 **and-tube heat exchangers used as latent heat thermal energy storage**
3 **systems**

4
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12

13 **Abstract**

14
15 In this paper, the influence of the addition of fins and the use of two different heat transfer fluids
16 (water and a commercial silicone) have been experimentally tested and compared in four latent
17 heat thermal energy storage systems, based on the shell-and-tube heat exchanger concept, using
18 paraffin RT58 as phase change material. Three European institutions were involved under the
19 framework of the MERITS project. A common approach (temperature and power profiles), and
20 five different key performance indicators have been defined and used for the comparison:
21 energy charged, average power, 5-min peak power, peak power to energy ratio, and time. For
22 the same heat transfer fluid, results showed that finned designs (4.7-9.4 times more heat transfer
23 surface) showed an improvement of up to 40 %. On the contrary, for the same design, water
24 (which has a specific heat 3 times higher and a thermal conductivity 4.9 times higher than
25 silicone Syltherm 800), yielded results up to 44 % higher.
26

27 *Key-words:* Thermal energy storage, Phase change material, Shell-and-tube; Heat exchanger;
28 Key performance indicators.
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31

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