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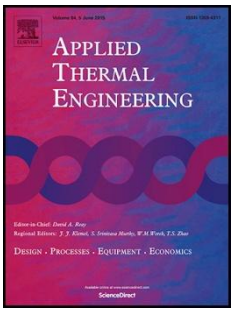

Title: Experimental investigation of parabolic trough collector system under tunisian climate: design, manufacturing and performance assessment

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Experimental investigation of parabolic trough collector system under Tunisian climate: design, manufacturing and performance assessment

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HIGHLIGHTS

- A new parabolic trough collector system was designed, manufactured and evaluated.
- A test methodology of the PTC according to ASHRAE 93-1986 standard was conducted.
- Thermal performances under sunny and cloudy days are presented.

Abstract

Nowadays, there are many forms of renewable energy resources, among which there is the solar energy which is the most used one. Parabolic trough collector (PTC) is one of the building blocks of solar energy technology. A PTC system with aperture area of 10.8 m^2 was designed, manufactured and evaluated in this paper. The experimental study was conducted and realized in the Research and Technology Center of Energy (CRTEn) in Tunisia. In order to evaluate the thermal performance of the PTC, many experimental tests were carried out in keeping with the ASHRAE 93-1986 standard. The thermal efficiency, the heating and cooling time constants and the incidence angle modifier of the collector were measured. The intercept and the slope given by the efficiency curve of the collector were found to be 0.551 and 0.316, respectively. The time constants for heating and cooling are 137 and 205 s, respectively. In this context, an experimental performance investigation of typical days (sunny and cloudy days) is presented. The final cost for the experimental device has been calculated. The sum total pricing is found to be 4346 $. Measurements are taken from 9:00 h to 16:00 h.