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Applied Solar Energy (English translation of Geliotekhnika)
Volume 50, Issue 4, 1 October 2014, Pages 238-243

Design and construction of a Fresnel linear distiller (Article)

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Abstract

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It was designed a Fresnel linear distiller based on optical calculations obtained from taking into account Lima's latitude value, Earth inclination angle and heat absorber cavity's dimensions. The 5.6 m^2 reflective surface concentrator of the distiller was constructed with 32 plane rectangular mirrors; the heat absorber cavity was made with a rectangular blackened aluminum tube 1 m long and installed 2.5 m over the plane of mirrors. The Fresnel linear distiller was installed at the University of Lima and experimental tests were performed during no cloudy summer days. There were measured ambient temperature, heat absorber cavity temperature, radiant flux and fresh water volume. From this, it was obtained a production of 0.89 liters/hour and 0.79 L/m^2, and it was calculated a total performance of 34.5% in desalting sea water. Finally, it is presented a comparison between Fresnel linear distiller (FLD) and parabolic trough distiller (PTD) with similar dimensions and characteristics. It is obtained that the last one produced almost 32% more fresh water than the former, but at the same time, the FLD is almost 20% cheaper than PTD. However, water cost production with both distillers using is almost the same.

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Engineering controlled terms: Desalination | Mirrors | Seawater

Engineering uncontrolled terms: Cavity temperature | Design and construction | Experimental test | Inclination angles | Optical calculations | Parabolic trough | Reflective surfaces | Total performance

Engineering main heading: Water

ISSN: 0003701X
CODEN: ASOEA
Source Type: Journal
Original language: English

DOI: 10.3103/S0003701X14040136
Document Type: Article
Publisher: Allerton Press Incorporation

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