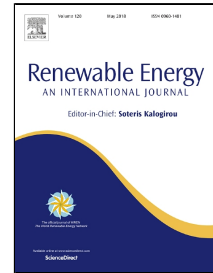


Accepted Manuscript

Evaluation of thermo hydraulic effect on offset finned absorber solar air heater

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PII: S0960-1481(18)30120-4
DOI: 10.1016/j.renene.2018.01.110
Reference: RENE 9715
To appear in: *Renewable Energy*
Received Date: 21 July 2016
Revised Date: 22 January 2018
Accepted Date: 26 January 2018

Please cite this article as: Shalini Rai, Prabha Chand, S.P. Sharma, Evaluation of thermo hydraulic effect on offset finned absorber solar air heater, *Renewable Energy* (2018), doi: 10.1016/j.renene.2018.01.110

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1 Evaluation of thermo hydraulic effect on offset finned absorber solar air 2 heater

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7
8 **Abstract:** In this study, an evaluation of thermo-hydraulic effect on offset finned absorber solar
9 air heater has been investigated theoretically. A parametric study was done to investigate the
10 effect of variation of system and operating parameters i.e. fin spacing (1cm to 5cm), fin height
11 (1.8cm to 5.8cm), fluid mass flow rate (0.0139 kg/s to 0.083 kg/s) and insolation (750 W/m^2 and
12 950 W/m^2) on the thermal and thermohydraulic (effective) efficiencies. Results indicate that the
13 thermal efficiency increases continuously with increase in fluid mass flow rate, whereas
14 thermohydraulic efficiency increases upto a inception value of fluid mass flow rate, attains a
15 maximum and then decreases sharply for a given fin spacing and fin height. For higher value of
16 the fluid temperature rise parameter, the effective efficiency values closely follow the thermal
17 efficiency values. It is found that attaching offset fins below the absorber plate at lower fluid
18 mass flow rate can lead to appreciable enhancement of the thermal and thermohydraulic
19 efficiencies.

20
21 **Keyword:** Flat plate collector, offset fins, thermal performance, pressure drop, effective
22 efficiency.

23 1. INTRODUCTION

24 Solar air heaters are simple gambits that utilize incident solar radiation to obtain solar energy for
25 wide utilization. The solar collector converts this radiation to the heat in air and distributes the
26 air for use. Solar air heater are the most frugal and extensively used solar energy accumulation
27 collector employed to distribute heated air at low mitigate temperature for space heating, drying
28 agricultural product, seeds and vegetables and some modern applications. Thus, investigators
29 have focused their research toward diverse performance amelioration methods. The Corrugated
30 wall channel has been extensively studied by [1] to enhance the heat transfer rate. [2] Showed

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