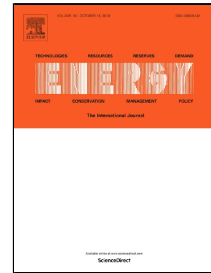


Accepted Manuscript

Deformation of receiver in solar parabolic trough collector due to non uniform temperature and solar flux distribution and use of bimetallic absorber tube with multiple supports



Sourav Khanna, Sanjeev Newar, Vashi Sharma, Pradipta Kumar Panigrahi, Tapas K. Mallick

PII: S0360-5442(18)31915-7
DOI: 10.1016/j.energy.2018.09.145
Reference: EGY 13839
To appear in: *Energy*
Received Date: 15 July 2018
Accepted Date: 21 September 2018

Please cite this article as: Sourav Khanna, Sanjeev Newar, Vashi Sharma, Pradipta Kumar Panigrahi, Tapas K. Mallick, Deformation of receiver in solar parabolic trough collector due to non uniform temperature and solar flux distribution and use of bimetallic absorber tube with multiple supports, *Energy* (2018), doi: 10.1016/j.energy.2018.09.145

This is a PDF file of an unedited manuscript that has been accepted for publication. As a service to our customers we are providing this early version of the manuscript. The manuscript will undergo copyediting, typesetting, and review of the resulting proof before it is published in its final form. Please note that during the production process errors may be discovered which could affect the content, and all legal disclaimers that apply to the journal pertain.

1 Deformation of receiver in solar parabolic trough collector due to non uniform temperature 2 and solar flux distribution and use of bimetallic absorber tube with multiple supports

3 Sourav Khanna^{a,1}, Sanjeev Newar^{b,1}, Vashi Sharma^{c,*}, Pradipta Kumar Panigrahi^c, Tapas K. Mallick^a

4 ^a Environment and Sustainability Institute, Penryn Campus, University of Exeter, Cornwall TR10 9FE, UK

5 ^b Department of Industrial and Management Engineering, Indian Institute of Technology Kanpur, Kanpur 208016,
6 India

7 ^c Department of Mechanical Engineering, Indian Institute of Technology Kanpur, Kanpur 208016, India

8 9 **Abstract**

10 A group of researchers have observed bending in receiver during experiments. In literature, different types
11 of receivers to enhance the heat transfer are proposed. However, bending that leads to practical issues and
12 energy loss (due to defocusing) have not been modelled. Current authors have dealt with the issue of
13 bending in previous work. Present study aims at minimising the risk of bending using double-layered-
14 absorber held at pillars. Mathematical equations are formulated for bending and energy loss. Tube is
15 modelled for practical scenarios supported by pillars made up of movable structure that can slide to help
16 absorber expand when heated. Ball-joints at contact points enable tube to rotate. Equations are validated
17 against the experimental-measurements. Effects of placement of conductive-material, focal-length, PTC-
18 width, geometrical-imperfections and HTF-flow-rate on bending/energy losses are studied. It is found that
19 (i) conventional single-layered-absorber leads to bending and energy loss of -15.1mm and 2.3%. Double-
20 layered-absorber with high-conductivity-material as inside-layer reduces bending/energy loss to -
21 10.0mm/1.0%. However, use of high-conductivity as outside-layer further reduces bending/energy loss to -
22 6.1mm/0.4%, (ii) change in HTF-flow-rate from 0.4kg/s to 1.4kg/s reduces bending/energy loss from -
23 15.1mm/2.3% to -10.2mm/1.0% for single-layered-absorber and -6.1mm/0.4% to -4.5mm/0.2% for
24 double-layered and (iii) focal-length near to 0.7m reduces bending/energy loss to 0mm/0%.

25
26
27
28
29
30
31
32
33
34
35 * Corresponding Author: vashi@iitk.ac.in (Vashi Sharma)

36 ¹First Authors

Download English Version:

<https://daneshyari.com/en/article/11026457>

Download Persian Version:

<https://daneshyari.com/article/11026457>

[Daneshyari.com](https://daneshyari.com)