Accepted Manuscript

Title: Net heat gain assessment on a glazed transpired solar air collector with slit-like perforations

Author: Xianli Li, Chao Li, Bojia Li

 PII:
 S1359-4311(15)01450-7

 DOI:
 http://dx.doi.org/doi: 10.1016/j.applthermaleng.2015.12.069

 Reference:
 ATE 7483

To appear in: Applied Thermal Engineering

 Received date:
 11-8-2015

 Accepted date:
 12-12-2015

Please cite this article as: Xianli Li, Chao Li, Bojia Li, Net heat gain assessment on a glazed transpired solar air collector with slit-like perforations, *Applied Thermal Engineering* (2016), http://dx.doi.org/doi: 10.1016/j.applthermaleng.2015.12.069.

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ACCEPTED MANUSCRIPT

1	Net heat gain assessment on a glazed transpired solar air collector
2	with slit-like perforations
3	Xianli Li ^a , Chao Li ^b , Bojia Li ^c
4	^a School of Energy and Safety Engineering, Tianjin Chengjian University, Tianjin 300384, China
5	^b Tianjin Eco-city Environmental Technology Consalting Ltd., Tianjin 300467, China
6	^c China Academy of Building Research, Beijing 100013, China
7	Corresponding author: Xianli Li
8	Address of Corresponding author: School of Energy and Safety Engineering, Tianjin Chengjian University, Tianjin
9	300384, China.
10	Tel: +8622 23085106, Fax: +8622 27892626, E-mail: lixianliyn@163.com
11	
12	Highlights
13	• A glazed transpired solar collector with slit-like perforations has been studied.
14	• Its thermal and flow characteristics is analyzed in terms of net thermal efficiency.
15	• Empirical correlation of ξ_p through the slit-like perforated plate is proposed.
16	• Optimized values of structure and flow parameters for the collector are obtained.
17	
18	Abstract
19	Numerical simulation and experimental investigation have been performed on the heat transfer and air flow characteristics
20	of a glazed transpired solar air collector with slit-like perforations. The values of outlet air temperature prediction by the
21	model compare well to the measured values for four D-P combinations, with average deviation index of only 0.88 K. The
22	empirical correlation of local drag coefficient is proposed. Compared with circular holes, the local resistance loss through
23	the slit-like perforated plate at constant σ and Re_h is smaller. The effects of varying key parameters in terms of effective
24	efficiency have been analyzed. It is found that for small heat capacity, when the air volume flow rate is beyond 160 m ³ /h,
25	the increase in the fan power is greater than that in the heat collected and then the effective efficiency begins to decrease.
26	The effective efficiency increases with increases in the perforation diameter and ambient temperature, and decreases in the
27	pitch, plenum thickness and inlet air temperature. Conclusions could be drawn that perforation diameter and pitch have a
28	lesser influence on the heat collected than the pressure drop for the ranges of D and P considered in the paper. The
29	proportion of local resistance loss to total pressure drop is great. The impact of coating absorptivity is more obvious than

- 30 that of emissivity.
- 31 Keywords: Glazed transpired solar air collector; Slit-like perforations; Local drag coefficient; Effective efficiency

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