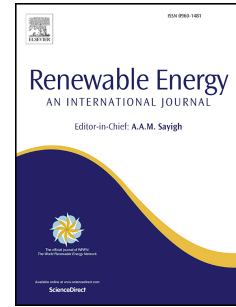


Accepted Manuscript

Comparison of thermal performance between tube and plate ground-air heat exchangers

Mroslaw Zukowski, Justyna Topolanska



PII: S0960-1481(17)30863-7

DOI: [10.1016/j.renene.2017.09.001](https://doi.org/10.1016/j.renene.2017.09.001)

Reference: RENE 9199

To appear in: *Renewable Energy*

Received Date: 30 April 2017

Revised Date: 11 August 2017

Accepted Date: 2 September 2017

Please cite this article as: Zukowski M, Topolanska J, Comparison of thermal performance between tube and plate ground-air heat exchangers, *Renewable Energy* (2017), doi: 10.1016/j.renene.2017.09.001.

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 Comparison of thermal performance between tube and plate ground-air heat 2 exchangers

3

4 Mroslaw Zukowski*

5 Department of HVAC Engineering

6 Bialystok University of Technology, Bialystok, Poland

7 e-mail: m.zukowski@pb.edu.pl

8

9 Justyna Topolanska

10 Department of HVAC Engineering

11 Bialystok University of Technology, Bialystok, Poland

12 e-mail: justynatopolanska@wp.eu

13

14 Abstract

15

16 The article compares the thermal performance of two types of ground-air heat exchangers
17 (GAHEs). The subject of the study included a new type of tube exchanger with a two-level
18 arrangement and an innovative plate exchanger, in which the air is in direct contact with the
19 ground. Experimental tests of the two systems were conducted in identical weather and
20 ground conditions, and in the same surface area of the exchangers, 12 m × 28 m.

21 The results indicated that the energy gain in heating mode was 13.5 MWh for the tube GAHE
22 and 16.35 MWh for the plate GAHE. In the summer season (cooling ventilation air) the tube
23 GAHE provided 10.3 MWh of energy while the plate GAHE gave 20.41 MWh. It was
24 observed that in the winter season, the plate exchanger demonstrates an increase of humidity
25 in the ventilation air by an average of 1.45 g/m³ per hour. Based on the experimental results it
26 can be concluded that the using both types of the GAHEs in summer and winter is energy-
27 efficient in the climatic conditions of north-eastern Poland.

28

29 **Keywords:** Tube ground-air heat exchanger, Plate ground-air heat exchanger, Cooling and
30 heating potential, Renewable sources of energy, Ventilation.

31

32 1. Introduction

33 Supporting mechanical ventilation systems with ground-air heat exchangers (GAHE) is
34 becoming increasingly popular. The air which enters buildings via a GAHE is pre-processed -

* Corresponding author

Download English Version:

<https://daneshyari.com/en/article/6765269>

Download Persian Version:

<https://daneshyari.com/article/6765269>

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