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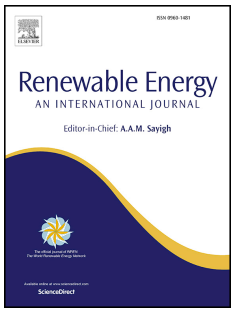

Comparison of thermal performance between tube and plate ground-air heat exchangers

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

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Abstract

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

The results indicated that the energy gain in heating mode was 13.5 MWh for the tube GAHE and 16.35 MWh for the plate GAHE. In the summer season (cooling ventilation air) the tube GAHE provided 10.3 MWh of energy while the plate GAHE gave 20.41 MWh. It was observed that in the winter season, the plate exchanger demonstrates an increase of humidity in the ventilation air by an average of 1.45 g/m^3 per hour. Based on the experimental results it can be concluded that the using both types of the GAHEs in summer and winter is energy-efficient in the climatic conditions of north-eastern Poland.

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

1. Introduction

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

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