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太阳能集热器的研制及结构优化

Design and structural optimization of flat-plate solar air collector

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英文关键词: [solar collectors](#) [temperature](#) [efficiency](#)

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中文摘要:

为了将太阳能通过光热转化运用到农产品脱水干燥中, 该文设计了一种平板型太阳能空气集热器。通过对比试验及热性能测试, 取得集热器各部件的最佳结构, 给出了太阳能空气集热器进出口温差与辐照度的关系式。吸热板为横向波纹, 流量为0.06 kg/s, 平均入口温度为22.16℃, 平均辐照度为870.60 W/m²时, 集热器平均效率可达84.53%; 日平均环境温度17℃, 上下通道空间比为2:1时, 闷晒温度最高能达到87.6℃, 相比当时环境温度21.2℃提升66.4℃。此太阳能空气集热器具有低成本, 高效率的特点, 结构简单, 易于安装, 可用于农产品干燥除湿, 在如今提倡低碳的形式下具有广阔的发展前景。

英文摘要:

In order to utilize solar energy in agriculture products dehydrating drying via solar-thermal transformation, a kind of flat-plate solar air collector was designed. The optimum structures of collector were presented through series of contrast tests. After performance test on the collector, the equation between air temperature at inlet and outlet and irradiance was obtained. The efficiency of this collector was as high as 84.53%, while the absorber was lateral corrugated, the rate of flow was 0.06 kg/s, the average inlet temperature was 22.16℃, and the average irradiance was 870.60 W/m²; When the average daily environment temperature was 17℃, and the top and bottom passageway spacing ratio was 2:1, the highest temperature in the collector was 87.6℃, risen by 66.4℃ compared with the ambient temperature. The collector has the advantages of low cost, high efficiency and simple structure, which can be used in fields of agricultural products drying dehumidifying. With the benefits of low cost, environment protection and easy to install, the collector has a good potential for future market.

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