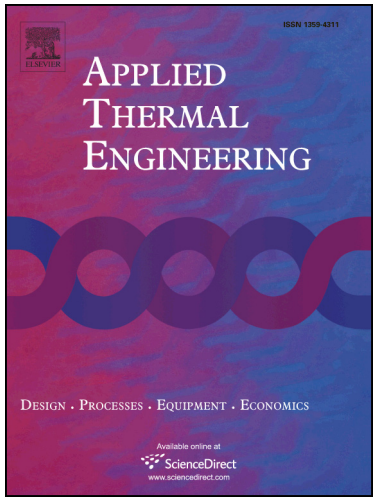
Accepted Manuscript



Research Paper

Parametric study of a tandem desalination system based on humidification-dehumidification process with 3-stage heat recovery

Wu Gang, Zheng Hong-Fei, Wang Fei, Chang Ze-Hui

PII: S1359-4311(16)32367-5
DOI: http://dx.doi.org/10.1016/j.applthermaleng.2016.10.078
Reference: ATE 9280

To appear in: *Applied Thermal Engineering*

Received Date: 5 June 2016
Revised Date: 29 August 2016
Accepted Date: 11 October 2016

Please cite this article as: W. Gang, Z. Hong-Fei, W. Fei, C. Ze-Hui, Parametric study of a tandem desalination system based on humidification-dehumidification process with 3-stage heat recovery, *Applied Thermal Engineering* (2016), doi: http://dx.doi.org/10.1016/j.applthermaleng.2016.10.078

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.

ACCEPTED MANUSCRIPT

Parametric study of a tandem desalination system based on humidification-dehumidification process with 3-stage heat recovery

WU Gang[a], ZHENG Hong-Fei[a], WANG Fei[a], CHANG Ze-Hui[b]

([a]School of Mechanical engineering, Beijing Institute of Technology, Beijing 100081, China;

[b]College of Energy and power engineering, Inner Mongolia University of Technology, Hohhot 010051, China)

ABSTRACT: A heat recovery with tandem desalination system based on humidification and dehumidification process was investigated experimentally in this paper. The sketch and principle of a 3-stage multi-effect solar HDH desalination process are given out. These are the one-dimensional heat and mass transfer control models of humidifier and condenser. The mathematical model of the system is developed and governing conservation equations are numerically solved by using the Engineering Equation Solver (EES). In this experiment, different effects of heating ways on the high and middle stages of the desalination unit were studied, including spraying temperature, air flow rate, condenser drainage and the supplement water mass flow rates. The maximum yield of the unit can reach 0.182 m^3/h, the maximum GOR of the system can reach about 2.65. The results indicate that the yield of the system decreases with the increase of the supplement water flow rate and condenser drainage. In order to ensure the stability and reliability of the system, the optimal yield can be realized only when isothermal heating is adopted in higher and middle stages. The system obtains fresh water by multi-stage isothermal heating mode and the cost is about $2.5 per ton.

Key words: solar desalination; humidification-dehumidification; tandem; multi-stage heat recovery

1 Introduction

Just like the oil of last century, fresh water in the 21st century is an important resource for the country's development. China is a country where regional water is scarce and the ecosystem is fragile. The situation of fresh water resource is grim, especially in remote areas along the coast and the vast western region. while in these

Download English Version:

https://daneshyari.com/en/article/4991696

Download Persian Version:

https://daneshyari.com/article/4991696

Daneshyari.com