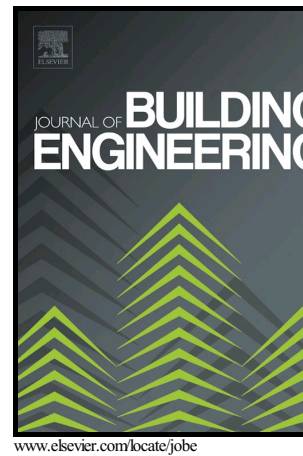


Author's Accepted Manuscript

Thermodynamic analysis of the evaporative-vapour compression based combined air conditioning system for hot and dry climatic conditions

Shailendra Singh Chauhan, S.P.S .Rajput



PII: S2352-7102(15)30031-0
DOI: <http://dx.doi.org/10.1016/j.jobee.2015.09.010>
Reference: JOBE55

To appear in: *Journal of Building Engineering*

Received date: 6 May 2015
Revised date: 16 September 2015
Accepted date: 23 September 2015

Cite this article as: Shailendra Singh Chauhan and S.P.S .Rajput Thermodynamic analysis of the evaporative-vapour compression based combined air conditioning system for hot and dry climatic conditions, *Journal of Building Engineering*, <http://dx.doi.org/10.1016/j.jobee.2015.09.010>

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 galley proof before it is published in its final citable 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.

Thermodynamic analysis of the evaporative-vapour compression based combined air conditioning system for hot and dry climatic conditions

Shailendra Singh Chauhan^{*}, S.P.S. Rajput

Department of Mechanical Engineering, Maulana Azad National Institute of Technology, Bhopal 462003, Madhya Pradesh, India. Corresponding author email^{*}: shailendra_7734@yahoo.co.in, Mb No^{*}: 919300836079

Abstract

An evaporative-Vapour compression based combined air conditioning system for providing good human comfort conditions at a low cost working under hot and dry climate is proposed in this paper. The proposed system is thermodynamically analysed for hot and dry climate of Bhopal, India under some reasonable assumptions. Analysis was done on various parameters for the data from March to June 2013 Bhopal, provided by Indian meteorological department, Bhopal. The proposed system was also compared on the basis of saving (%) in cooling load on the cooling coil for the same sensible cooling rate to the conditioned space from the conventional vapour compression air conditioner working on 100 % fresh air assumption. The saving of cooling load on the coil was found maximum with a value of 64.19 % in the month of March due to lower outside temperature and it is minimum for the month of May with a value of 27.36 % due to higher outside temperature. Saving in the month of June is -51.21% due to higher relative humidity. Negative sign indicates that proposed system is applicable for hot and dry climate and worked well with a net power saving of 646.8 KWh from March-May for a small capacity application. Therefore it could be a better alternative for hot and dry climate with a payback period of 6.6 years.

Keywords: Evaporative cooling, Vapour compression refrigeration system, cooling load, effectiveness, conditioned space, Power consumption.

1. Introduction

Air conditioners are becoming basic necessity in every household today. The temperature of the atmosphere is increasing with the global warming every month. It's not easy to stay indoors without a perfect cooling system. An air conditioner is a major home appliance today across the world to change the temperature and humidity level inside the room. But if not taken care, it can cause serious health issues in the people of all age groups. Conventional vapour compression air condition system operating under hot and dry condition supplies cold and dry air. Studies have shown that dry air has following effects on the human body:

Download English Version:

<https://daneshyari.com/en/article/6750230>

Download Persian Version:

<https://daneshyari.com/article/6750230>

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