

Author's Accepted Manuscript

Effects of humidity on thermal performance of
aerogel insulation blankets

Atiyeh Hoseini, Majid Bahrami



PII: S2352-7102(17)30301-7
DOI: <http://dx.doi.org/10.1016/j.jobee.2017.07.001>
Reference: JOBE295

To appear in: *Journal of Building Engineering*

Received date: 11 May 2017
Revised date: 30 June 2017
Accepted date: 2 July 2017

Cite this article as: Atiyeh Hoseini and Majid Bahrami, Effects of humidity on thermal performance of aerogel insulation blankets, *Journal of Building Engineering*, <http://dx.doi.org/10.1016/j.jobee.2017.07.001>

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 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

Effects of humidity on thermal performance of aerogel insulation blankets

Atiyeh Hoseini^a, Majid Bahrami^{*1b}

^aPhD student, ahoseini@sfu.ca, ^bProfessor, mbahrami@sfu.ca, Tel: +1 (778) 782-8538

Laboratory of Alternative Energy Conversion (LAEC), School of Mechatronic Systems Engineering, Simon Fraser University, Surrey, British Columbia, V3T 0A3, Canada

Abstract

Actual thermal conductivity of insulation materials is subject to change over time under various environmental conditions. Particularly, insulations may degrade due to moisture absorption or condensation when they are exposed to humidity. This work presents a comprehensive investigation of aerogel blankets thermal conductivity (k-value) in humid conditions at transient and steady state regimes. Transient plane source (TPS) tests revealed that the k-value of aerogel blankets can increase by up to approximately 15% as the ambient relative humidity (RH) increases from 0% to 90% at 25°C. In addition, a relatively long time is required, at constant T (temperature) and RH, for such enhancement. Therefore, mechanisms affecting the k-value of aerogel blankets as a function of RH and T are investigated. Also, theoretical approaches for predicting the moisture content and k-value over time are discussed, and parametric analyses are performed to identify the most affecting variables.

Keywords: Aerogel blankets; composites; RC model; Transient plane source; humidifier; Relative humidity

¹ * Corresponding author

Download English Version:

<https://daneshyari.com/en/article/4923060>

Download Persian Version:

<https://daneshyari.com/article/4923060>

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