

## Accepted Manuscript

Title: Hygrothermal behavior evaluation of walls improving heat and moisture performance on gypsum boards by adding porous materials

Authors: Yujin Kang, Seong Jin Chang, Sumin Kim



PII: S0378-7788(17)31991-6  
DOI: <https://doi.org/10.1016/j.enbuild.2017.12.052>  
Reference: ENB 8245

To appear in: *ENB*

Received date: 10-6-2017  
Revised date: 20-12-2017  
Accepted date: 21-12-2017

Please cite this article as: Yujin Kang, Seong Jin Chang, Sumin Kim, Hygrothermal behavior evaluation of walls improving heat and moisture performance on gypsum boards by adding porous materials, Energy and Buildings <https://doi.org/10.1016/j.enbuild.2017.12.052>

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.

# Hygrothermal behavior evaluation of walls improving heat and moisture performance on gypsum boards by adding porous materials

**Yujin Kang, Seong Jin Chang, Sumin Kim\***

Building Environment & Materials Lab, School of Architecture, Soongsil University, Seoul 06978, Korea

\*corresponding author:

Tel.: +82-2-820-0665; fax: +82-2-816-3354; E-mail: skim@ssu.ac.kr

## Highlights

- The gypsum boards containing porous materials was prepared.
- Thermal conductivity reduces when the porous materials is mixed.
- Carbon nano-materials have the effect of containing a larger amount of moisture.
- The gypsum board mixed with the carbon nano-material improves heat and moisture performance and lowers the water content of the insulation.
- It also is possible to reduce the risk of mold growth on the interior surface using by gypsum board mixed with carbon nano-materials.

## Abstract

Gypsum board as a wall and ceiling finishing material can be used to reduce building energy consumption. To optimally use gypsum board as building material, methods are needed to reduce mold and condensation that frequently found on the material and inner surfaces of the board. The influence of gypsum board on hygrothermal behavior of building needs to be confirmed first. The objective of this study was to reduce gypsum boards' thermal conductivity and improve their moisture properties. Their effect on the hygrothermal behavior and performance of buildings were then evaluated. Specifically, gypsum board was applied to a concrete wall in this study. Porous materials such as expanded vermiculite (EV), expanded perlite (EP), and three xGnP of different surface areas (C-300, C-500 and C-750) were used to improve the thermal and moisture performance of the gypsum board. Gypsum boards' density, thermal conductivity, water vapor resistance factor, and water content of gypsum board by relative humidity were then evaluated. The influence of hygrothermal behavior of walls when gypsum boards adding porous materials were used as interior finishing materials on concrete wall were then examined.

**Keywords:** Hygrothermal behavior; Concrete wall; Porous materials; Gypsum board; WUFI;

## 1. Introduction

Functional building materials with improved performance compared to existing materials can provide a comfortable indoor air environment by reducing harmful chemical substance

Download English Version:

<https://daneshyari.com/en/article/6728757>

Download Persian Version:

<https://daneshyari.com/article/6728757>

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