

Author's Accepted Manuscript

Thermal conductivity of concrete - A review

Iman Asadi, Payam Shafigh, Zahiruddin Fitri Bin
Abu Hassan, Norhayati Binti Mahyuddin



PII: S2352-7102(18)30465-0
DOI: <https://doi.org/10.1016/j.jobee.2018.07.002>
Reference: JOBE526

To appear in: *Journal of Building Engineering*

Received date: 22 April 2018
Revised date: 2 July 2018
Accepted date: 3 July 2018

Cite this article as: Iman Asadi, Payam Shafigh, Zahiruddin Fitri Bin Abu Hassan and Norhayati Binti Mahyuddin, Thermal conductivity of concrete - A review, *Journal of Building Engineering*, <https://doi.org/10.1016/j.jobee.2018.07.002>

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.

Thermal conductivity of concrete - A review

Iman Asadi^{*}, Payam Shafigh, Zahiruddin Fitri Bin Abu Hassan, Norhayati Binti Mahyuddin

Department of Building Surveying, Faculty of Built Environment, University of Malaya, 50603 Kuala Lumpur, Malaysia
Center for Building, Construction & Tropical Architecture (BuCTA), Faculty of Built Environment, University of Malaya,
50603 Kuala Lumpur, Malaysia

^{*}Corresponding author: Tel: +601139976950; fax: +60379675318, asadi8564@gmail.com; asadi@siswa.um.edu.my

Abstract

The thermal conductivity (k-value) of cement-based materials like concrete is an important factor when considering the amount of heat transfer through conduction. The amount of heat loss through walls and roofs has a direct effect on the energy consumption of buildings. The steady state and transient methods are considered the two main thermal conductivity measurement approaches. The moisture content, temperature, type of aggregate, type of cementitious material and density of concrete are influential factors on the thermal conductivity. The aim of this paper is to review the techniques most commonly used to measure the thermal conductivity of concrete as well as to consider the factors affecting the thermal conductivity of cement-based materials. In addition, a general equation for predicting the thermal conductivity of concrete is proposed in this study based on data reported by researchers. The results of this review indicate that most researchers have measured the k-value of cement-based materials based on transient methods. The reported k-value in saturated conditions is higher than in dry conditions. Moreover, the measured k-value exhibits a declining trend with increasing temperature. It is concluded that using lightweight concrete in structural and non-structural building envelopes is a valuable method of reducing the amount of heat transfer and energy consumption owing to the lower k-value of lightweight concrete compared to normal weight concrete.

Keywords: *Concrete, Lightweight aggregate concrete, Density, Heat transfer, Thermal property, Thermal conductivity*

Download English Version:

<https://daneshyari.com/en/article/6749659>

Download Persian Version:

<https://daneshyari.com/article/6749659>

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