HEAT OF HYDRATION AND TIME-DEPENDENT DIMENSIONAL CHANGES OF MASS CONCRETE INCORPORATING LOCAL EGYPTIAN BLENDED CEMENTS

By

Samiha Emam Abdel-Aziz Alharty

A Thesis Submitted to the
Faculty of Engineering at Cairo University
in Partial Fulfillment of the
Requirements for the Degree of

DOCTOR OF PHILOSOPHY

in

STRUCTURAL ENGINEERING

FACULTY OF ENGINEERING, CAIRO UNIVERSITY
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FACULTY OF ENGINEERING, CAIRO UNIVERSITY
GIZA, EGYPT
2017

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Title of Thesis:

HEAT OF HYDRATION AND TIME-DEPENDENT PEHAVIOR (SHRINKAGE) OF MASS CONCRETE INCORPORATING LOCAL EGYPTIAN BLENDED CEMENTS

Key Words:
Hydration heat; Temperature; Blast Furnace Slag; Limestone; Shrinkage

Summary:
This study examines the influences of using different Egyptian cement types and supplementary cementitious materials (SCMs) to control the hydration heat, durability, and the time-dependent behavior developed in massive concrete. Three different sorts of cements, two different water types, and three different fly ash ratios were used. For each binder type, two concrete mixes are produced. The results show that the hydration heat decreases with increasing SCM and with using blended cements. Hydration heat was decreased to 88% for slag cement and 79% for limestone cement regarding ordinary portland cement. It was also decreased to 86%, 78%, and 74.5% in case of using 30%, 40%, and 50% fly ash substitution respectively. Also it can be concluded that the maximum shrinkage and permeability values decrease with increasing SCM and with using (CEM II-B-L) and (CEM II-A-S). The shrinkage was decreased by 29% for CEM II-A-S and 5% for CEM II-B-L with respect to CEM I. It was also decreased by 17%, 25%, and 44% in case of using 30%, 40%, and 50% fly ash replacement respectively.

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DEDICATION

To my parent, my Husband, and my daughters

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