Engineer: lamiaa eied sadek haroon
Date of Birth : 27 / 3 / 1978
Nationality : Egyptian
E-mail : **Lamiaaeied@gmail.com or**
Lamiaahosny2012@yahoo.com
Phone. :01222597836
Address : kattamya ring road opposite to Carrefour in front of Sama language school
Registration Date : 1 / 10 / 2009
Awarding Date : / /
Degree : Doctor of philosophy
Department : Structural engineering

Supervisors : **Prof. Dr. Ahmed M. Ragab**
Dr. Mohammed Mohsen El- Attar
Dr. Dina M. Sadek, Assistant Professor, Building Materials and Quality Control Institute - Housing and Building National Research Center

Examiners : Prof. Dr. Ahmed M. Ragab
Prof. Dr. Ousama Hodhod
Prof. Dr. Moniur Kamal , Professor - Faculty of Engineering, Menoufia University

Title of Thesis : **Durability of concrete exposed to sea water attack**

Key Words: **Durability, compressive strength, salinity level, Red Sea**

Summary :

Large numbers of concrete structures are in contact with marine environment, hence exposed to both physical and chemical detrimental effects during their service life. The aim of the thesis is to study the main factors affecting the behavior of concrete in marine environments such as the effect of cement content, cement type, using of silica fume as a mineral additive, exposure condition and salinity level of seawater on the behavior of concrete exposed to seawater attack. Fifteen concrete mixes were cast with three types of cements; ordinary Portland cement (OPC), sulfate resistant cement (SRC) and slag cement (SC), and three cement contents (i.e., 350, 400 and 450 kg/m^3) were used. Ten percentage of silica fume was used as a mineral additive in some concrete mixes with cement content 400 and 450 kg/m^3. After 28-days of water curing, the specimens were exposed to three exposure conditions (i.e., wet and dry, immersion and splash condition) in artificial Red and Dead Sea for 12 months and their properties were determined and compared with those of specimens immersed in tap water. It was found that as expected Dead Sea is more aggressive than Red Sea due to its higher salinity level. The highest reduction in the compressive strength was found in concrete mixes exposed to splash zone. Slag cement concrete mixes showed the lowest reduction in compressive strength after exposure to sea water attack, while ordinary Portland cement concrete mixes showed the highest reduction. Furthermore, the reduction in the compressive strength of concrete increased by the addition of silica fume to concrete.

Acknowledgement

The author wishes to express her sincere gratitude to her supervisors:

Prof. Dr. Ahmed Mahmoud Ragab, Professor of Strength of Materials, Structural Engineering Department, Faculty of Engineering, Cairo University.

Dr. Mohamed Mohsen Al-Attar, Assistant Professor of Strength of Materials, Structural Engineering Department of Structural Engineering, Faculty of Engineering, Cairo University

Dr. Dina Mahmoud Sadek, Assistant Professor, Building Materials and Quality Control Institute Housing and Building National Research Center

Table of Contents

List of figures

Page

Page

Page

Page

Page