Ain Shams University
Faculty of Engineering
Structural Engineering Department

Durability of Glass Fibre Reinforced Cement Mortar (GRC)

By
Eng. Hussein Abdel Ghany Farahat
B. Sc. Civil Engineering
Ain Shams University, 1984

A Thesis
Submitted In Partial Fulfilment For The Requirements Of The Degree Of Master Of Science In Structural Engineering.

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Thesis : **Durability of Glass Fibre Reinforced Cement Mortar (GRC)**

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STATEMENT

This dissertation is submitted to Ain Shams University for the degree of M. Sc. in Structural Engineering.

The Work included in this thesis was carried out by the author in the Department of Structural Engineering, Ain Shams University, from 1989 to 1997.

No part of this thesis has been submitted for a degree or a qualification at any other university or institution.

Date : 21.05.97

Signature : Hussein Farahat

Name : Hussein Abdel Ghany Farahat

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TO MY MOTHER,
TO MY BROTHER
AND SISTERS,
TO MY FRIENDS

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Durability of Glass Fibre Reinforced Cement Mortar (GRC)
Master of Since, 1997
Hussein Abdel Ghany Farahat

Department of Structural Engineering, Ain Shams University

ABSTRACT

Glass Fibre Reinforced Cement Mortar (GRC) is a combination of specially developed Alkali Resistance (AR) glass fibres and a cement sand mortar.
The improved mechanical properties of the GRC and the manufacturing technologies developed, make it a suitable material for production of thinner wall and light - weight members used in a wide variety of civil and building construction work within the last twenty years. Moreover, the GRC feature an excellent moldability and non - combustibility.

However, GRC suffers loss in flexural strength and toughness when exposed to natural environment, and their application is limited to non - structural and semi-structural purposes. The main mechanism leading to strength loss and embrittlement is the growth of hydration products, mainly the calcium hydroxide, in between the glass filaments.

In this study the development of the mechanics for fibre reinforcing of Portland cement by glass fibres is reviewed, along with techniques for mixing and mix proportioning, placing, finishing and applications.
Basic concepts and theoretical principles of fiber reinforcement in tension and flexure, both in short and long term, are discussed.

Long term strength loss because of the embrittlement of the glass fibers into the cementitous matrix due to lime formation, is outlined. Review of the previous attempts to improve the durability of GRC by modifying the cementitous matrix is presented.

The main objective of the experimental work included in this study, is to identify the mechanical properties of the commercially produced GRC, containing nominally 5% (by wt.) of AR glass fibres, manufactured by the

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