

DURABILITY PERFORMANCE OF EPOXY-MODIFIED CONCRETE

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INTRODUCTION:

Improve and develop to properties of concrete has resulted in a new type of concrete known as "polymer concrete". Polymer Portland cement concrete (PPCC) is one of its classes. It is a premixed material in which either a monomer or polymer is added to a fresh concrete mixture in a liquid, powder or dispersion phase, and if needed, polymerized in place [1].

Several investigations had been reported on the use and properties of many types of PPCC such as that made with water-soluble polymers [2], Polymer emulsions and latexes [3] and polymer dispersions [4]. These investigations exhibited improvement in strength and durability of concrete [5,6]. The properties do indeed depended on the type of polymer and /or its amount [7]. PPCC applications are enomorous. They are used in overlays of bridge decks, parking garage and floors, plus precast operations and patching any concrete surface [8].

It is well known that epoxy resin has superior properties such as high adhesion and anticorrosion. Hence, it had widely been used as adhesive and anticorrosive in the construction industry in the world. Provided the incorporation of the epoxy resin into cement concrete and mortar can give its superior properties to the concrete and mortar.

The first patent of an epoxy-modified cement system was taken by Donnelly in 1965 [9]. The aim of this work was to investigate experimentally the durability characteristics of concrete to which an epoxy resin was added. 1/3-scale specimens were prepared to be more economic. The durability characteristics which were examined included carbonation, chloride ion penetration, freezing-thawing resistance, permeability (water absorption and water permeation) and chemical resistance.

EXPERIMENTAL:

Materials:

The cement used was Iraqi ordinary Portland cement. Natural sand that is normally available was taken from Al-Zubair area , sieved through 2.63mm and used. Crushed gravel used in this work , was taken from Al-Zubair area , sieved through 6.35 mm to obtain the 1/3 scale concrete mixes. The properties of the concrete mix material were investigated according to British Standards. The suitable mix proportion of the ingredient materials was adopted to be 1:1.5:3 (cement: sand: gravel). The epoxy resin used was the commercially available diglycidyl ether of bisphenol A, a triethylene tetraamine (TETA) was used as the epoxy hardener. Both the epoxy and its hardener were supplied by Leyda Co. (W.G.). The epoxy/hardener ratio was adopted