

Optimizaiton of concrete mix design for durability in the Estern Province of Saudi Arabia

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Abstract

Investigations have been carried out to study the effect of binary aggregate proportioning on the properties of fresh and hardened concrete. It was found that for each of the cement factors investigated there was an optimum coarse to total aggregate ratio at which the workability and compressive strength were maximised. Permeability and corrosion activity were found to be minimum for mixes made with optimum coarse aggregate content. The properties of mixes made with different gradings but same specific surface area were found to be invariant. Data have been developed on optimum specific surface area for various cement factors. Relationship between 30-minute absorption and initial surface absorption has been developed. Sands in the Eastern Saudi Arabia have been classified into three zones. The effect of fineness of local sands on the water demand has also been studied.

Concrete ratings based on absorption tests have been suggested. Recommendations have been made regarding the mix design parameters that should be adopted to produce durable concrete in local conditions.