DEVELOPMENT OF BLENDED CEMENTS FOR WATER PROOFING APPLICATION

(MEMBANGUNKAN SIMEN TERUBAH SUAI UNTUK KEGUNAAN SIMEN KALIS AIR)

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ABSTRACT

(Keywords: cement replacement, mineral admixtures, multi-blended pozzolan)

The application of mineral admixtures as partial cement replacement in concrete leads to a reduction in construction cost. Usually single mixture has limitation and some have contrasting influences on properties of concrete. The combination of more kinds of mineral admixtures is postulated to improve concrete properties. Since RHA is highly reactive pozzolan, it has led to the idea of focusing the study on the performance of Multi-blended pozzolan as partial cement replacement in mortar. Over 8 different mixes were produced in which four mixes contained varying percentages of admixtures (Multi Blended Cement, MBC) and the remainders were single mix (Binary Blended Cement, BBC) containing optimum percentages (based on literature study) of 20% PFA, 20% RHA, 50% SLAG, and 10% POFA. Three samples for each mix, curing period and parameter tests were prepared. This work initially deals with compressive strength characteristics, water absorption, and total porosity on mortar cured (standard curing) for 7, 28, 60 and 90 days. The performance of optimum MBC mortar was studied in terms of ultimate compressive strength, water absorption and total porosity. The strength properties of the optimum mixes of MBC mortars was also examined at different curing regimes. This research also focuses on studying some durability aspects of the optimum mix of MBC mortars namely acid attack, and carbonation. Besides, the effects of saline seawater were investigated for short term exposure. Finally attempt in brief study on suitability of the optimum mixes of MBC mortars as face sheets to produce lightweight non-load bearing sandwich block was conducted. From the results obtained, it was found that the strength of control and BBC mortars at early age on average were 20% higher than MBC mortars, and at final age both were comparable with MBC mortars. The strength of all mortars at 90 days on average was 59MPa. However, the MBC system produced low permeability mortar compared to control, and BBC mortars at all ages. The total porosity and water absorption of control and BBC were 28% and 21%, and 9% and 14%, respectively. The strength of MBC mortar after 45 cycles of wet and dry curing in seawater exhibited 24% higher than control mortar. The initial water curing for 7 and 14 days and continuous air curing also exhibited 13% and 19%, and 21% and 26%, higher early strength than
continuous water and air curing, respectively. The strength and durability properties of MBC mortar are more pronounced than control when it is provided with adequate curing. After exposure to chemical attack, the MBC mortar exhibits better resistance than control mortar. With adequate curing the MBC mortar was higher in durability than control mortar when subjected to chemical attack.

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