

USE OF PONDED FLY ASH AND BOTTOM ASH IN READY MIXED CONCRETE

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ABSTRACT

This paper presents the results of laboratory and field experimental investigations carried out to study the effects of ponded fly ash and bottom ash on the properties of non-air-entrained and air-entrained concrete. Concrete was made and tested in laboratory as well as at a ready-mixed concrete plant. A total of nine concrete mixtures were produced; three concrete mixtures were non-air-entrained concrete; three mixtures were non-air-entrained with HRWRA, and three were air-entrained concrete mixtures. Percentage of ponded-ash varied from 22 to 35% of the total cementitious materials in non-air-entrained concrete and 17 to 20% in the air-entrained concrete. All concrete mixtures also contained 5% Class F fly ash as percentage replacement of aggregates. Control mixture of non-air-entrained concrete and non-air-entrained concrete with HRWRA were proportioned to attain 28-day compressive strength of 35 MPa (5000 psi). Control mixture of air-entrained concrete was proportioned to achieve strength of 28 MPa (4000 psi) at 28 days. Tests were performed for fresh concrete properties, and for compressive strength, splitting tensile strength, flexural strength, abrasion resistance, and drying shrinkage. For air-entrained concrete mixtures, salt-scaling test was also conducted.

Based on the tests results it was concluded that: (1) non-air-entrained concrete mixtures can successfully incorporate up to 22% ponded-ash and a blend of 25% ponded-ash and 25% Class F fly ash; (2) ponded-ash up to 35% and 5% of Class F fly ash can also be used in non-air-entrained concrete mixtures using HRWRA for general concrete construction; and, (3) air-entrained concrete mixtures incorporating up to 17% ponded-ash and blends of 20% ponded-ash and 5% Class F fly ash can be used for construction.