

USE OF FBC ASH AND PONDED COAL-ASH IN READY-MIXED CONCRETE

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ABSTRACT:

This paper presents the results of experimental investigations carried out to study the effects of FBC ash and wet-collected (ponded), coarse coal-ash (WA) on the properties of non-air-entrained and air-entrained concrete. In total, nine concrete mixtures were produced at a ready-mixed concrete plant: three non-air-entrained mixtures, three non-air-entrained mixtures containing HRWRA, and three air-entrained mixtures. The percentage of FBC ash varied from 22 to 45% on the mass of total cementitious (Cm) (cement and FBC ash) materials in the non-air-entrained concrete and 17 to 27% in the air-entrained concrete. In each group of concrete mixtures, one mixture also contained WA as a replacement of up to 5% of natural aggregates (Agg). Tests were performed for fresh concrete properties, and also for compressive strength, splitting tensile strength, flexural strength, and abrasion resistance. For air-entrained concrete mixtures, salt-scaling test were also conducted.

Based on the tests results it was concluded that non-air-entrained concrete mixtures could successfully incorporate up to 22% FBC ash/Cm and a blend of 34% FBC ash/Cm and 5% WA/Agg. Up to 45% FBC ash/Cm and 5% of WA/Agg could also be used in non-air-entrained concrete mixtures using HRWRA for general concrete construction. Air-entrained concrete mixtures incorporating up to 17% FBC ash/Cm and blends of 27% FBC ash/Cm and 5% WA/Agg could also be used for general concrete construction.