

MECHANICAL AND DURABILITY PROPERTIES OF CONCRETE INCORPORATING CLASS C FLY ASH FROM VARIOUS SOURCES

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ABSTRACT

This research was carried out to evaluate the effects of source and amount of fly ash on strength and durability properties of concrete. Mechanical properties considered were compressive strength, tensile strength, flexural strength, and modulus of elasticity. The durability properties considered were: shrinkage, abrasion resistance, air and water permeability, chloride permeability and salt scaling resistance of concrete.

A reference concrete was proportioned to attain the 28-day compressive strength of 41 MPa. Three sources of Class C fly ash were used in this work. Fly ash from each source was used at three levels of cement replacements (40, 50, and 60%) in producing concrete mixtures. The water to cementitious materials ratio was maintained at 0.30 ± 0.02 for all mixtures.

In general strength and durability properties of concrete were considerably affected by both the fly ash source and amount of fly ash. Also, the strength and durability properties for the 40% fly ash mixture were either comparable or superior to the no-fly ash concrete. The salt scaling resistance of fly ash concrete was either comparable to or better than the no-fly ash concrete, except for one source of fly ash at 60% cement replacement level. All the mixtures, with and without fly ash, tested in this investigation conformed to the strength and durability requirements for excellent quality structural grade concretes.