

Compliance criteria for quality concrete

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Abstract

In spite of the considerable research work in the area of concrete durability in the aggressive environmental conditions of the Arabian Gulf, there is a lack of pertinent quality compliance criteria for the locally produced concrete. Compressive strength of concrete is often considered as the unique quality criterion. As a result, the concrete suppliers try to achieve only the target strength without any proper consideration to the durability aspects. Therefore, in most cases, the concrete constructions fail, by one way or another, in durability thereby leading to disputes on the quality compliance between the concrete suppliers and the end users.

This research aims to develop appropriate concrete quality compliance criteria through an extensive experimental investigation using typical materials available in eastern Saudi Arabia. The experimental program consisted of testing the concrete specimens prepared with different mix proportions. Type I cement, Abu-Hadriah aggregates and dune sand were used in the mixes and the variables were: four levels of w/cm ratio, three levels of cementitious materials content, and three types of plain and blended cements (Type I, type I + 7.5% silica fume and Type I + 20% of fly ash). The following tests were conducted in the experimental program: (1) compressive strength; (2) pulse velocity; (3) rebound hammer (4) water penetration; (5) rapid chloride permeability; (6) Chloride diffusion; (7) time to initiation of reinforcement corrosion and (8) corrosion current density.

Correlations between the results of various tests and the concrete mix parameters and compliance criteria in terms of both the strength and durability indices were established for local concrete.