

Reduce the Permeability of Concrete Used In Marine Structures and Tunnels

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Abstract:

This research aims to find a solution to the problem of seepage occurring in oil interchange facilities and tunnels. Recently, real instances of the problem occurred at Al-Anbar province of Iraq. The impact of this phenomenon seriously erodes the concrete and thus reduces the life span of affected structures. The presented work investigates the effect adding the admixture plastocrete-N to concrete as a partial replacement of cement weight in order to reduce seepage and improve the strength of concrete. Plastocrete-N was added by (0.25, 0.5, 0.75, and 1) % of cement weight. Five mixes were selected, four of them contained plastocrete-N and one reference concrete sample was left without any admixtures for the ages 7, 14 and 28 days. Compressive strength, flexural strength and porosity as an empirical indicator of permeability were tested. The test results indicated that the use of plastocrete-N led to significant increase in concrete strength and decrease in porosity with the increase of plastocrete-N. For example at 28 days, the compressive strength of reference concrete (A) was 44.96 MPa, while the compressive strength of (B,C,D,E) samples containing (0.25, 0.5, 0.75 and 1) % plastocrete-N were (48.22, 51.02, 52.41 and 56.45) MPa respectively. The modulus of rupture of reference concrete (A) was 5.8 MPa, while the modulus of rupture of the (B,C,D,E) samples which contained (0.25, 0.5, 0.75, 1) % plastocrete-N were (6.44, 7.38, 8 and 8.37) MPa respectively. The porosity of reference concrete (A) was 6.92% , while that of the (B,C,D,E) samples which contained (0.25, 0.5, 0.75 and 1) % plastocrete-N were (2.101, 2, 0.862, 0.182) % respectively.