

Resistance to Chloride Penetration of High Strength Self-Compacting Concretes: Pumice and Zeolite Effect

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Abstract : This paper aims to contribute to the characterization and the understanding of fresh state, compressive strength and chloride penetration tendency of high strength self-compacting concretes (HSSCCs) where Portland cement type II is partially substituted by 10% and 15% of natural pumice and zeolite. First, five concrete mixtures with a control mixture without any pozzolan are prepared and tested in both fresh and hardened states. Then, resistance to chloride penetration for all formulation is investigated in non-steady state and steady state by measurement of chloride penetration and diffusion coefficient. In non-steady state, the correlation between initial current and chloride penetration with diffusion coefficient is studied. Moreover, the relationship between diffusion coefficient in non-steady state and electrical resistivity is determined. The concentration of free chloride ions is also measured in steady state. Finally, chloride penetration for all formulation is studied in immersion and tidal condition. The result shows that, the resistance to chloride penetration for HSSCC in immersion and tidal condition increases by incorporating pumice and zeolite. However, concrete with zeolite displays a better resistance. This paper shows that the HSSCC with 15% pumice and 10% zeolite is suitable in fresh, hardened, and durability characteristics.

Keywords : Chloride penetration, immersion, pumice, HSSCC, tidal, zeolite

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