

The Effect of Fly Ash and Natural Pozzolans on the Quality of Passive Oxide Film Developed on Steel Reinforcement Bars

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Abstract : The effect of supplementary cementitious materials (SCMs) with concrete pore solution on the protective properties of the oxide films that form on reinforcing steel bars has been experimentally investigated using electrochemical impedance spectroscopy (EIS) and Tafel Scan. The tests were conducted on oxide films grown in saturated calcium hydroxide solutions that included different representative amounts of NaOH and KOH. In addition to that, commonly used supplementary cementitious materials (natural pozzolan and fly ash) were also added. The results of electrochemical tests show that supplementary cementitious materials do have an effect on the protective properties of the passive oxide film. In particular, natural pozzolans has been shown to have a highly positive influence on the film quality. Fly ash also increases the protective qualities of the passive film.

Keywords : supplementary cementitious materials (SCMs), passive film, EIS, Tafel scan, rebar, concrete, simulated concrete pore solution (SPS)

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