Electrochemical Evaluation of a Stainless Steel as Reinforcement in Sustainable Concrete Exposed to Chlorides

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Corrosion of steel reinforcement is one of the top three causes of deterioration of reinforced concrete structures. For this research three concrete mixtures were produced, the first concrete was made with 100 % cement CPC 30R, the second mixture was considered sustainable concrete because using 80 % of cement CPC 30R and 20 % of silica fume and the third mixture was elaborated with 80 % of cement CPC 30R and 20 % of fly ash, these mixtures were designed according to the method ACI 211.1, in the specimens were embedded bars of AISI 304 stainless steel and AISI 1018 steel, the specimens were exposed in a solution at 3.5 % of NaCl, simulating a marine environment, for to evaluate the corrosion resistance were used electrochemical techniques of Half-Cell Potential, standard ASTM C-876-09 and the Linear Polarization Resistance, standard ASTM G59, results E_{corr} and I_{corr} after 180 days of exposure show that, the best performance was presented concrete specimens produced with 20 % silica fume and reinforced with AISI 304 stainless steel, with corrosion potential (E_{corr}) indicating a 10 % probability of corrosion and I_{corr} values that indicate a passivity level of corrosion.

Keywords: Sustainable Concrete, Corrosion, Marine Environment, Fly Ash, Silica Fume

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