Short Communication

Comparative Study on Electrochemical Corrosion Behavior of B500SD Carbon Steel and 2205 Duplex Stainless Steel Exposed to Concrete Pore Solution Containing Chloride Ions

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In this work, a comparative study was done on electrochemical corrosion behavior of B500SD carbon steel and 2205 duplex stainless steel rebars immersed into concrete pore solution containing chloride ions. An electrochemical impedance spectroscopy (EIS) analysis was conducted to consider the corrosion resistance of steel rebars in various environmental conditions such as pH, temperature and chloride ion concentration. The EIS results exhibit that the double-layer capacitance value decreased as pH-value gradually increased, which indicates that the size of passive film was enhanced, causing an improvement of the protective ability. Corrosion resistance of both steel rebars was increased by a temperature drop from 45 °C to 20 °C. The electrochemical findings reveal that 2205 duplex stainless steel exhibits a higher corrosion resistance and higher impedance with a higher durability in different conditions than B500SD carbon steel rebar which can be associated with the existence of Cr noble metal in stainless steel composition.

Keywords: Electrochemical corrosion behavior; 2205 duplex stainless steel; B500SD carbon steel; Concrete pore solution; Electrochemical impedance spectroscopy

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