

Research on critical chloride ion concentration and corrosion resistance mechanism of different corrosion-resistant rebars

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Abstract Rebar corrosion triggered by chloride ions is the main cause of durability failure of marine reinforced concrete structures, and the use of corrosion-resistant rebars to replace ordinary rebars is one of the most important means to solve the problem of rebar corrosion and enhance the durability of marine reinforced concrete structures. However, in the existing research, there is a lack of comparative study on the chlorine salt erosion resistance of different corrosion-resistant rebars, and the corrosion resistance mechanism of different corrosion-resistant rebars is still unclear. In this paper, we analyze the corrosion behavior of different rebars and compare the critical chloride ion concentration of different corrosion-resistant rebars by testing the open-circuit potentials, electrochemical impedance spectra, and linear polarization curves of different corrosion-resistant rebars such as low alloy steel rebars, stainless steel rebars, duplex stainless steel rebars, galvanized steel rebars, galvanized aluminum rebars, and stainless steel clad rebars, etc., in the simulated concrete pore solutions with different NaCl concentrations after passivation. The kinetic parameters and surface semiconductor properties of different corrosion-resistant rebars in the simulated chlorinated concrete pore solution were also analyzed by kinetic potential polarization curves and Mott-Schottky curves. Combined with x-ray electron spectroscopy, x-ray diffraction spectroscopy, scanning electron microscopy and other means to characterize the composition and morphology of the passivation film of different corrosion-resistant rebars, analyze the mechanism of chlorine salt erosion resistance of different corrosion-resistant rebars, in order to provide some guidance for the practical engineering applications of corrosion-resistant rebars.

Keywords corrosion-resistant steel; critical chloride ion concentration; corrosion resistance; corrosion Mechanism

Reference

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