

Corrosion Behavior of Austempered Ductile Iron Microalloyed with Boron in Rainwater

Authors : S. Gvazava, N. Khidasheli, V. Tediashvili, M. Donadze

Abstract : The work presented in this paper studied the of austempered ductile iron (ADI) with different combinations of structural composition (upper bainite, lower bainite, retained austenite) in rainwater. A range of structural states of the metal matrix was obtained by changing the regimes of thermal treatments of a high-strength cast iron. The specimens were austenised at 900 °C for 30, 60, 90, 120 minutes. Afterwards, isothermal quenching was performed at 280 and 400 °C for 40 seconds. The study was carried out using weight-change (WC), cyclic potentiodynamic polarization (CPP), open-circuit potential (OCP), and electrochemical impedance spectroscopy (EIS) measurements and complemented by scanning electron microscopy (SEM-EDS). According to the results, corrosion resistance of the boron microalloyed bainitic ADI greatly depends on the type of the bainitic matrix and the amount of the retained austenite, which is driven by diffusion permeability of interphase and intergrain boundaries.

Keywords : austempered ductile iron, corrosion behaviour, retained austenite, corrosion rate, interphase boundary, upper bainite, lower bainite

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