Effects of DC Stray Current on the Polarization Characteristics of X70 Steel

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To investigate polarization characteristics of X70 steel at direct current densities in the 50~1200 A/m² range under anodic and cathodic interferences, electrochemical method was used to test Tafel polarization curves. The critical current density was 180 A/m² and equal or above this value the Tafel polarization curves were linear. By fitting these curves, we obtained polarization resistance R_p , which can be used to characterize the polarization characteristics of X70 steel at DC current. R_p decreased with an increase in the DC current density under both cathodic and anodic interferences. Relational between R_p and DC current density was calculated. As the anodic interference current density increased, corrosion potential of X70 steel shifted positively. Opposite behavior is observed in the case of cathodic interference.

Keywords: DC stray current; X70 steel; corrosion; linear fitting method; polarization resistance

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