Stress Corrosion Cracking of 05Cr17Ni4Cu4Nb and 1Cr12Ni3Mo2VN Martensitic Stainless Steels under Constant Load

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The stress corrosion cracking (SCC) of martensitic stainless steel was evaluated in 5 wt.% NaCl solution under constant load with different stress levels. Results showed that the strength loss of 05Cr17Ni4Cu4Nb at the stress levels of 95% $\sigma_{0.2}$, 90% $\sigma_{0.2}$, 85% $\sigma_{0.2}$ and 80% $\sigma_{0.2}$ was 3.05%, 2.46%, 0.57% and 0.21% , respectively; the corresponding strength loss of 1Cr12Ni3Mo2VN at such stress levels was 3.76%, 3.09%, 1.42% and 0.49%, respectively. The stress corrosion resistance of 05Cr17Ni4Cu4Nb was better than that of the 1Cr12Ni3Mo2VN. The electrochemical measurements revealed that the passive potential range of 05Cr17Ni4Cu4Nb (from -0.15 to 0.12V) was wider than that of the 1Cr12Ni3Mo2VN (from -0.15 to -0.02V). A better passive film was formed on the surface of 05Cr17Ni4Cu4Nb, which led to a better stress corrosion resistance for 05Cr17Ni4Cu4Nb.

Keywords: A. Constant load; B. SCC; C. Martensitic stainless steels; D. Electrochemical measurement; E. Corrosion

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