Study on erosion corrosion behavior of welded joint of 90-10 cupronickel reducing pipeline in flowing seawater

Cheng Xu[1], Shaohua Xing[1,*], Zonghao He[1,2], Ran Liu[3], Fan Zhang[1], Shuyu Bai[1], Dalei Zhang[2]

[1] *National Key Laboratory of Marine Corrosion and Protection, Luoyang Ship Material Research Institute, Qingdao266237, China*

[2]*School of Materials Science and Engineering, China University of Petroleum (East China), Qingdao 266580, China*

[3] *Hisense Visual Technology Co.,Ltd., Qingdao 266071, China*

Abstract

The localized corrosion of pipeline welded joint has always been a widely concerned issue, particularly under the synergistic effect of high shear stress and electrochemical corrosion. The localized corrosion behavior of 90-10 cupronickel pipeline welded joint under 1 m/s seawater was initially studied by traditional electrochemical measurements. The composition and characteristics of the corrosion products were analyzed by scanning electron microscopy (SEM), energy dispersive spectroscopy (EDS), X-ray photoelectron spectroscopy (XPS) and three-dimensional laser microscope. The results show that different welded joint regions exhibit varied corrosion behavior. Due to the coarse grain influenced by welding heat input, heat affected zone (HAZ) exhibits the worst corrosion resistance. High shear force peels part of the product film and promotes localized corrosion initiation. Welded metal (WM) presents better film formation effect thus the best corrosion resistance due to the addition of Ni element. The corrosion resistance of the base material (BM) is between the HAZ and WM.

Keywords 90-10 cupronickel; Welded joint; Reducing pipe; Corrosion; Welding method

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