**Corrosion Kinetics Study of 316N Weldment**

**Under Cyclic Loading in Acidified Chloride Environment**

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**ABSTRACT**

Corrosion fatigue crack initiation (CFCI) life of AISI Type 316N weldment in as-welded (AW) and heat treated (Solution annealed (SA), 550 °C/4h and 750 °C/1h) conditions was studied in high cycle fatigue regime (above 104 cycles) with a frequency (η) of 0.1 Hz and and R-ratio (σmin/σmaxwhere σmin and σmax signify minimum and maximum tensile stress in MPa, respectively) of 0.5 for different stress amplitude (σa) values in boiling acidified 5M NaCl + 0.15M Na2SO4 + 2.5 ml/l HCl under axial loading in load controlled mode. In-situ electrochemical measurements were employed during corrosion fatigue tests to study the passive film characteristics. SA weldment showed better corrosion fatigue (CF) resistance as compared to AW and heat treated conditions. Homogenization of microstructural and microchemical heterogeneities facilitates highest resistance to CF cracking process for SA weldment condition. Number of cycles to failure (Nf) increased with decrease in stress amplitude for all material conditions. CFCI mechanism was identified based on variation in the strain rate (ε°) due to combined effect of both emergence of persistant slip bands (PSBs) casued by rupture of passive film and initiation of microcrack caused by dissolution around depassivation site. Fractographic studies showed transgranular failure due to dissolution of δ-γ interfaces and crack growth zone was minimum for AW and heat treated (550 °C/4h and 750 °C/1h) conditions as compared to SA weldment

***Key words:*** *Corrosion fatigue; Nitrogen; Stainless steel; Crack initiation; Corrosion Potential; SEM*