

Determining the limitation of strain rate in producing process of API X60 steel to protect to SSC in sour environment

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Abstract

Stress corrosion cracking in environment included H₂S (SSC) is one of the most important reason fail and make economical damage of API X60 microalloyed steel. The present study seeks to evaluate the impact of prior deformation rate as an adjustable parameter on the amount of susceptibility to sulfide stress corrosion cracking (SSC) API X60 microalloy steel. At first , the samples were exposed to as much as 3% plastic deformation in varying rates of from 5 to 35 mm/min. to investigate the effect of diffused hydrogen on the industrial applicable abilities, diffusible hydrogen test and static load ssc test were used. Finally in order to investigation inclusions and fracture mechanisms an scanning electron microscopy (SEM) was used. Findings indicate that amount of diffused hydrogen and susceptibility to ssc increase with increasing the strain rate. Although 25 mm/min was determined as the maximum amount limitation to protect API X60 material to SSC.

Keywords: API X60 steel, stress corrosion cracking, sour gas, diffusible hydrogen, strain rate.