EVALUATION OF J-R CURVES FOR API 5L X70 PIPELINE STEELS USING SE(T) SPECIMENS

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Abstract
This work considered the influence of size and geometry of SE(T) specimen on the fracture toughness of API 5L X70 steel. J-R curves, using the single specimen methodology in conjunction with the variation of the elastic compliance technique measured at the crack mouth (CMOD), were obtained from SE(T) specimens with shallow (a/W=0.2) and deep (a/W=0.5) cracks, and two different W/B ratio: 2.5 and 1.0. From the results it was observed that, independent of the initial a/W value, no significant differences were observed in the J-R curves. This fact was verified in both W/B values. However, the great majority of specimens with W/B = 2.5 presented an accentuated crack tunneling, even considering a 20% side groove, due to the dominance of a plane stress state at the crack front. The specimens with W/B=1.0 were capable to produce J-R curves with straight crack fronts, allowing the measurement of the mean value of the crack length (a_i e a_f) according to the ASTM E1820 standard. The specimens with W/B = 1 presented J-R curves less conservative than the specimens with W/B=2.5. The fracture behavior was strongly affect by the presence of splits, and in some cases, the occurrence of splits has lead to instable fracture of the specimens.