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**Effect of Intercritical Annealing Treatment on the Mechanical Properties
of SA106 Gr.C Piping Steel**

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Abstract

It is reported that SA106 Gr.C piping steel generally exhibits not enough toughness to apply LBB concept and needs a suitable additional heat treatment to improve the toughness. The intercritical annealing at the (+) phase temperature at 760°C for 40 min was performed in this study. To evaluate the improved material properties with the heat treatments, tensile tests were carried out under various temperatures, from RT to 350°C, and strain rates, from $1.39 \times 10^{-4} \text{s}^{-1}$ to $1.39 \times 10^{-2} \text{s}^{-1}$. Also, Charpy impact tests were conducted to measure impact toughness at room temperature. The manifestations of dynamic strain aging (DSA) were observed in the tensile properties. However, the magnitude of serration and the strength increased by DSA was relatively small compared to similar grade carbon steels. The intercritical annealing was able to increase the impact toughness by 1.5 times compared to as-received material. The dissolved carbon content in the retained ferrite, which was formed at the (+) region, may be lower than that in the transformed ferrite, which was formed at the pearlite transformation temperature. It is considered that the cleaner retained ferrite may have caused the higher impact toughness and ductility in addition to the general toughening due to finer grain sizes, which were resulted from the heat treatment.