

ENHANCEMENT OF MECHANICAL PROPERTIES IN HIGH STRENGTH STEELS COILS FOR ERW CASING AND TUBING APPLICATION

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Abstract

The variation of mechanical properties has been one of the continuing problems in hot-coils from the beginning of history of hot strip mill. In order to fulfil strength requirement, steel mill has used micro-alloyed high strength steel, containing titanium and niobium content. The addition of microalloying elements is economical in increasing the strength of the hot coils but, it is promoting anisotropy of mechanical properties and developing tensile properties variation further when hot rolling process conditions is not optimized properly. Steel coils for ERW casing and tubing pipes had been used with low carbon HSLA for better toughness but, there had been several typical difficulties such as surface defect at coil width edge due to peritectic range of carbon, lower tensile strength occasionally, and higher deviation of strength through a coil length. Huge efforts have been made to improve all the above mentioned weak points and then medium carbon HSLA steel has been developed with the optimized HSM processing control. Medium carbon showed less surface defect and the amount Ti and Nb contents were precisely selected with considering nitrogen content. Slab reheating temperature and retention time were optimized with consideration of dissolution kinetics of Ti and/or Nb content. Finishing temperature of rough rolling was defined based on recrystallization stop temperature. Moreover finish rolling temperature and coiling temperature were controlled tightly to reduce deviation of mechanical properties. All the details will be explained by the actual test results throughout coil length in this paper.

Keywords: Casing and tubing, titanium, niobium, slab reheating, surface defect, mechanical deviation

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