

ABSTRACT

HIGH-TENSILE STEEL PLATE GIVING WELDING HEAT-AFFECTED ZONE WITH EXCELLENT LOW-TEMPERATURE TOUGHNESS, AND PROCESS FOR PRODUCING SAME

Provided are a high-tensile steel plate having a yield point of 620 MPa class and realizing good CTOD characteristics of a multipass welded zone and a method for producing the high-tensile steel plate.

The high-tensile steel plate has a chemical composition containing, by mass, specific amounts of C, Mn, Si, P, S, Al, Ni, B, N, one or more elements selected from Cr, Mo, V, Cu, Ti, and Ca as needed, $C_{eq} \leq 0.80$, and a center-segregation zone hardness index HCS satisfying Expression (1). The hardness of a center-segregation zone satisfies Expression (2). A steel having the above-described chemical composition is subjected to hot rolling at a specific slab-heating temperature at a specific rolling reduction ratio, subsequently reheated, cooled at a cooling rate of 0.3°C/s or more until the temperature of a central portion in a plate-thickness direction reaches 350°C or less, and tempered to a specific temperature range. $5.5[\text{C}]^{4/3} + 15[\text{P}] + 0.90[\text{Mn}] + 0.12[\text{Ni}] + 0.53[\text{Mo}] \leq 2.5$ (1), $HV_{\text{max}}/HV_{\text{ave}} \leq 1.35 + 0.006/C - t/750$ (2), where HV_{max} represents a maximum value of center-segregation zone Vickers hardness, HV_{ave} represents

an average Vickers hardness of a portion that does not include a center-segregation zone and portions extending from both surfaces to $1/4$ of the plate thickness, C represents carbon content (mass%), and t represents plate thickness (mm).

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