

عنوان مقاله:

HSLA Steel Based on 0.03 %C and 0.10 %Nb Metallurgy and Results

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نویسنده:

Klaus Hulka - Niobium Products Company GmbH Steinstraße ۲۸, ۴۰۲۱۰ Düsseldorf, Germany

خلاصه مقاله:

Reducing the carbon content of high strength low alloy (HSLA) steel to about 0.03% improves many properties such as toughness, ductility and weldability. Furthermore, a reduced segregation including the slab centerline regions, guarantees resistance against cracking initiated by the transportation of sour media. Lower carbon contents increase the niobium carbide solubility and permit the use of higher niobium contents than these traditionally used. With higher niobium contents austenite processing can be carried out at higher rolling temperatures. Additional strength increases are observed due to niobium's role in retarding the transformation to ferrite, thus promoting a higher volume fraction of bainite, and by forming NbC precipitates in ferrite. This concept is ideally suited to produce high strength via accelerated cooling, but one has to balance the amount of alloying elements with the cooling rate to guarantee the demanded strength level for the considered plate thickness. The alloy approach allows the production of HSLA steel with high toughness on mills not capable of withstanding high rolling forces. Such steels are also characterized by excellent heat affected zone toughness. Niobium contents up to 0.10% have recently been adopted in low carbon pipe steels, e.g. for producing high strength sour gas resistant pipes and pipes asking for high toughness. Several other interesting applications are under discussion or already implemented

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