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Velocity hardening influence on the martensite transformation nature in constructional average alloy steel

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The quantitative study of the hardening velocity influence on the α-phase morphology in 30CrNi3MoVA (0.3%C, 1%Cr, 3%Ni, 1%Mo, 1%V) cast average alloy steel after gomogenization (1125℃, 13 h), normalizing (980℃, 10 h) and high tempering (660℃, 10 h. with cooling on air) is the aim of this work. The following hardening was realized from 950℃ (the endurance 5 h.) under two cooling velocities: (1) 10℃/min(on air) and (2) 100℃/min(in water). The long, broad, direct plates of high temperature martensite are formed under the raised hardening velocity, dividing the volume of the material into the areas where low temperature lath and lamellar martensite is formed. The martensite packages are short, not broad. Under the lowered hardening velocity the direct long plates of high temperature martensite are absent, but path martensite is a long and broad. There is a bainite (volume part is 0.10±0.01) in a steel structure under the lowered hardening velocity.

The quantitative estimations of the volume parts of martensite structure at the lowered hardening velocity give the following values: the lath martensite is 0.80±0.03 part of α matrix, low temperature plate martensite —0.03±0.01. The increasing of hardening velocity up to 100℃/min leads to some increasing of the volume part of lath martensite (up to 0.86±0.03) and lamellar low temperature martensite (up to 0.11±0.01). The volume part of the lamellar high temperature martensite remains unchangeable and equal 0.03±0.01.

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