CHEMICAL AND STRUCTURAL CONCEPTS OF CREEP-RESISTANT STEELS WITH POLYEDRIC MICROSTRUCTURE

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Abstract

Creep-resistant steels are generally considered as the most demanding steels in terms of their chemical composition; actual composition used should ensure all required mechanical properties with special attention to high-temperature and creep properties. In Slovakia, Železiarne Podbrezová accounts for a major producer of hot rolled tubes for power industry, advocating the utilization of creep-resistant steels for production of seamless tubes. In development and optimization of production processes in Železiarne Podbrezová, the chemical and structural approach is being utilized. This approach considers the fact that, given the chemical composition, it is necessary to create the required state of material structure and substructure by means of thermo-mechanical and heat treatment, respectively. In this paper, it is clearly illustrated on four creep-resistant steels (P235GH, P265GH, 16Mo3 and 13CrMo4-5), which can withstand the long-term temperatures up to (450 ÷ 560) °C. For this purpose, the yield-stress theory has been proposed along with predictive nomograms in order to define the grain size of a ferrite, the volume fraction of a pearlite and other contributions of hardening to fulfill the required standard mechanical properties (especially the yield strength). The results of DTA analyses as a necessary condition for definition of temperature-deformation conditions on a rolling track are presented here, too. A typical microstructure of selected steel grades is presented as well.

Keywords: P235GH, P265GH, 16Mo3, 13CrMo4-5, nomogram, microstructure

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