

Refinement of copper and Cu-Cr alloys with deoxidizer-modifying agents in the aspect of improvement of electrical conductivity

Marek Kranc

AGH University of Science and Technology, Faculty of Foundry Engineering,
Reymonta St. 23, 30-065 Krakow, Poland

Abstract

The first part of the work describes the current state of knowledge in the field of obtaining copper castings and its alloys with small additions of alloying elements. Copper and its alloys are widely used primarily due to the very high electrical and thermal conductivity. They are also characterized by high corrosion resistance, thermal fatigue and good durability. The melting and casting technology of such alloys is known as very difficult processes. The crystallization and evolution of the microstructure is presented along with the problems of technology of copper and its alloys with small additions of alloying elements with particular reference to processes for the refining procedures. Refining treatments lead to a high quality liquid metal and allow to obtain castings with optimal physicochemical properties. The alloys after the treatment are free from casting defects, mainly a gas porosity and shrinkage porosity. In the second part of the study the three theses and the purpose of scientific and practical that precede own research are presented. The aim of the research work was to develop a technological procedure allowing for obtaining the highest quality castings. Scientific objective is to analyze the impact of changes in structure and porosity on the electrical conductivity of copper and its alloys as a result of refining treatment and modification. Comprehensive research was carried out, including analysis of the melting process, additives used, shaping of the original copper and copper structure with the addition of chromium. Particular attention was paid to the analysis of the numerical impact of porosity and precipitations of chromium particles on the electrical conductivity of copper and copper castings with the addition of chromium.