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Wydział Odlewnictwa

Abstract

The role of silicon carbide in the production of ductile iron using an induction furnace.

The paper presents issues related to the smelting of spheroidal cast iron of EN-GJS-500-7 and EN-GJS-400-15, with different proportions of charge materials (steel scrap and pig iron). The key role was given to determining the influence of silicon carbide on the structure and properties of cast iron. In the carried out melts, the shortage of carbon and silicon was supplemented with a suitably selected carburizer, ferrosilicon and metallurgical silicon carbide. The percentage of silicon carbide in the batch ranged from 0 to 0.91%. The basic condition in the planning of melts was the keeping of the repeatability of the chemical composition of the initial cast iron and cast iron after the secondary metal metallurgical treatment, with different batch compositions.

The paper includes a review of literature in the field of methods of obtaining, types and properties of silicon carbide, the influence of silicon carbide on the structure and properties of cast iron, types and properties of cast iron and research methods used in the work.

The research part describes the course of castings of nodular cast iron with the use of silicon carbide and model casts using ferro-silicon (charge measures, temperature, introduced additives, analysis of the chemical composition of liquid metal). The paper describes the results of metallographic examinations carried out on light microscopy and scanning electron microscopy. Mechanical properties, X-ray phase analysis and quantitative analysis of the obtained structures were also carried out.

Based on the conducted tests, calculations and analyzes of the obtained results, it was found that silicon carbide had a positive effect on the structure and properties of melted alloys. In addition, the introduction of SiC into the melt in the tested range (up to 0.91%) increases the carbon and silicon content without increasing the impurities in the alloy. Increasing the addition of SiC to the charge increases the amount and size of graphite particles. The addition of SiC may cause a change in the nature of the solidification of the alloy and the mechanism of growth of graphite spheroids, causing their surface to form a scaly armor. It can also be noticed in the case of EN-GJS-400-15 cast iron, the effect of the addition of silicon carbide on lowering the liquidus temperature in the tested alloys.

The entire work is completed by a list of the cited literature covering 66 items.