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INFLUENCE OF COAL QUALITY AND ITS PREPARATION ON THE EFFICIENCY OF COAL CHARGE TAMPING AND COKE QUALITY

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The paper presents the results of a study of real coal blends of different compositions intended for coking by charging into the chamber through stamping. The problem of ensuring high-quality blast furnace coke is one of the key issues for the steel industry, since coke performs energetic, chemical, and physical functions in the blast furnace process. Under wartime conditions, limited supply, and the high cost of high-quality coking coal, the optimization of coal blend composition and the improvement of its preparation technology acquire particular importance.

It was established that with an increase in the content of gas coal of a low degree of metamorphism and a corresponding decrease in the share of coal of a high degree of metamorphism, a gradual deterioration of coke quality indicators is observed. This is reflected in a reduction of coke yield (from 75.2 % to 73.6 %), an increase in abrasion (from 7.3 % to 8.0 %), as well as in the deterioration of "hot" strength (CRI up to 40.8 %, CSR down to 45 %). At the same time, the stampability of the blends decreases (from 22.5 to 21.1 kPa), the expansion pressure reduces (from 6.8 to 5.9 kPa), and the stamping work required to achieve the specified cake density decreases (from 8966 to 6822 J). It was also shown that the degree of blend grinding has a significant effect on energy consumption: with a decrease in the average particle size, the stamping work decreases from 7407 to 6238 J.

In addition, it was found that an increase in the content of DG+G coal grades leads to a higher yield of coking by-products, in particular crude benzene and CO_2, while the properties of tar and the satisfactory characteristics of ammoniacal liquor remain unchanged. This is important for the efficiency of subsequent treatment of condensates and wastewater.

The obtained results indicate that, under the existing limitations of the raw material base, the second variant of the coal blend composition is the most optimal. It ensures acceptable coke quality at a lower cost and can be recommended for industrial application. The practical significance of the study lies in determining the regularities of the influence of petrographic and granulometric characteristics of coal blends on the stamping process and coke properties, which provides a basis for improving the efficiency of steel production in Ukraine under the conditions of a shortage of high-quality coking coal.

Keywords: coal concentrates, coal blend, coal charge preparation, tamped coal cake, tamping work, strength of the tamped coal cake, coke quality.

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