

DEVELOPMENT OF OPTIMAL COMPOSITIONS OF COAL BLENDS FOR TAMPING. REPORT 1. THE RESEARCH OF RAW MATERIALS FOR THE POSSIBILITY OF THEIR USE IN TAMPED CHARGES

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It is shown that the coal used for coking with the tamping technology should be characterised by a low basicity index, the necessary levels of sintering and tamping to achieve cake stability when it is loaded into the coking chamber. Based on this, a comprehensive study of the properties of 15 components of hard coal charges (13 coal concentrates, sludge and flotation concentrate) was carried out in terms of their prospects as a raw material base using the technology of tamping coal charges. The analysis of the obtained results is presented. In particular, the evaluation of the shear strength of coal concentrates showed low values (from 9.6 to 12.6 kPa) of the shear force for all the studied samples. The strength of rammed cakes made from fine additives is significantly higher (σ_{zz} of flotation concentrate is 15.8 kPa, and sludge is 14.9 kPa), so an increase in their content in the charge will have a positive effect on the strength of the rammed cake.

It has been established that the most accurate of the studied coal quality indicators, the tamping index σ_{zz} , is predicted by the Hardgrove rejuvenation coefficient and the thickness of the plastic layer. Prediction by volatile matter yield and free swelling index FSI is possible with medium accuracy, while the vitrinite reflection coefficient, Horn index and maximum compression index of Odibert-Arnoux are inaccurate. The heterogeneity of the samples for all the studied indicators characterising the fluid-plastic properties of coal was revealed.

The optimums of the function of the tamping index were calculated, which are achieved at the following quality indicators: $V^{daf} = 25.7\%$; $Y = 14.3\text{ mm}$; $HGI = 69.6\text{ units}$; $R_0 = 1.17\%$; $RI = 37.9\text{ units}$; $a = 1.9\%$; $FSI = 2.6\text{ units}$. It was established that the optimum ramming properties are achieved at the values of classification indicators corresponding to coking coal. A positive feature of the tamping technology is the possibility of ensuring the specified set of properties by using not expensive and scarce coking coal, but a mixture of cheaper grades of low-baking, petrographically heterogeneous coal..

Keywords: coal, coal concentrates, coking, tamping, technological properties, testing, plastic-viscous properties, Hardgrove threshold.

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