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## RESEARCH OF CHARACTERISTICS FOR DURABILITIES OF PELLETS AT RENEWAL

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Influence of regeneration degree for pellets of CMBC and PMBC has been studied on their softening. It is set that at regeneration degree of pellets to a 50...70 % temperature start and end of softening goes down to the minimum values, at regeneration degree to 91...92 % of values of this parameters, however the temperature of softening start for the regenerated pellets below, than unregenerate pellets.

Keywords: pellets, regeneration, agglomerate, coke, blast furnace

It is known that durability of all iron-ore materials diminishes at renewal. Researchers consider that principal reasons of destruction of pellets are a change of their volume at renewal and presence of anisotropy renewal for speed [1].

The unutilized pellets and agglomerate with fine-textured are appeared steady to destruction at the conditions of the blast-furnace melting, and poor burning pellets are exposed to most destruction [2].

Numerous investigations of softening for iron-ore materials during restoration-thermal treatment allowed to educe some conformities to law of this phenomenon and to offer the row of recommendations on the increase of hot durability (durability after restoration thermal treatment) of raw material [3-6]. Essence of these recommendations (optimization of composition of charge and regime of the consolidating burning) is taken to the receipt of agglomerated material of certain physical structure and mineralogical composition, characterized by an excited closeness and lowered restoration ability. In works [3,5,6] there is a conclusion about the necessity of content in the charge of several of slag-forming oxides for providing of high hot durability of pellets. However such condition reduces efficiency of the use for subsequent

However such condition reduces efficiency of the use for after-blowing metallization of rich iron-ore concentrates with subzero content of gob (less than 1.5-1.0) because of by their slag-forming additions.

At renewal of the oxidized pellets metallic iron is formed at alteration of rhombohedra grate in cube ( $Fe_2O_3 \Rightarrow Fe_3O_4$ ). Therefore properties of durability for such pellets did not get better and they, as a rule, spontaneously collapse on all section of stove.

For the study of softening of the recovered pellets of the Central combine (CMBC) and Poltava combine (PMBC) samples exposed to renewal from the dif-

ferent degree at the stream of hydrogen on the special stand. The degree of renewal for sample was estimated on the loss of his mass at renewal.

Metallic iron was fixed in pellets at a degree renewal to 21.1 % and after as far as her increase content of iron increases to the maximal values of 71.17 % at degree of renewal made up 92.1 %.

The temperature of beginning of softening for pellets of CMBC goes down from 1100 °C (unrecovered standard) to 955-960 °C at renewal to 58.7-67.9 %. Next postproduction to the 92.1 % accompanied by increase of temperature of beginning for softening of pellets to 1000 °C.

The temperature of beginning of softening for pellets of PMBC changes like, she is some higher, than for pellets. So, a temperature of beginning for the unrecovered pellets is 1095 °C. For pellets, renewable to 44.3-68.8 % a minimum value of temperature of beginning for softening is 990 °C, at further renewal to 92.4 % the temperature of beginning for softening of pellets increases to 1060 °C.

The temperature of end of softening for pellets at renewal changes approximately the same as and temperature of beginning for softening. For the pellets of CMBC on 10-20 % to the decline of temperature of end for softening from 1225 °C (unrecovered sample) to 1130-1120 °C and her size not up to the degree of renewal 70-75 %. Renewal of pellets to the 92.1 % accompanied by increase of temperature to 1225 °C, there is smoother decline of temperature of end and her minimum values (1120-1130 °C) took place at the degree of renewal 44.3-68.8 %. At the degree of renewal for pellets equal 92.4 % the temperature end of their softening rises to 1175 °C.

Character of change of temperature for beginning and end of softening for fluxed agglomerate OAS «The Metallurgical combine «Zaporozhstal» [7,8] at his renewal the same as well as for pellets, however agglomerate begin of grow soft at more high temperature in all interval renewals, than pellets.

By other method achievements of high hot durability of pellets from rich concentrates it is an increase for closeness of raw pellets.

Lately for the increase of fluidity and desulphurizing ability of blast-furnace slag's (especially at their small leaving on unit of cast-iron) in an agglomerate and pellets enter magnesia. In-process specified, that degree of renewal for pellets, fluxed by a dolomite limestone, below, and durability higher what pellets, by a limestone.

*Conclusion.* Renewal of pellets of CMBC, pellets of PMBC and agglomerate is accompanied by the decline of temperature of beginning and end of their softening. Character of change of this temperature at renewal of iron-ore materials is identical and distinction consists only at her absolute values: a minimum temperature is had a pellet of CMBC, more high temperature - pellets of PMBC and highest temperature is agglomerate. Unrecovered an agglomerate and pellets begin to soften at a high enough temperature (1112 °C; 1095-1100 °C accordingly), that explained by the presence of anhydroferrite and magnetite. At renewal to 30-40 % samples the quantity of fusible constituent increases – wustite ( $Fe_xO$ ), that results in the minimum values of temperature of softening. Increase of temperature of beginning of softening at re-

more 80 % explain by formation of metallic framework from the recovered iron in all volume of sample.

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