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## **PREDICTION OF THE IMPACT STRENGTH OF AUSTENITE HIGH MANGANESE STEELS AT NEGATIVE TEMPERATURES USING THE SPECIFIC PARAMAGNETIC SUSCEPTIBILITY OF AUSTENITE**

High-manganese steels are considered a very attractive material due to a good ratio of strength and plastic characteristics. The mechanical properties of steels are affected by the chemical composition, the content of carbides, the presence of harmful impurities, etc. The different content of chemical elements, even within the limits of the values specified in the grade composition of steels, can significantly affect the physical, mechanical and operational properties of metal products.

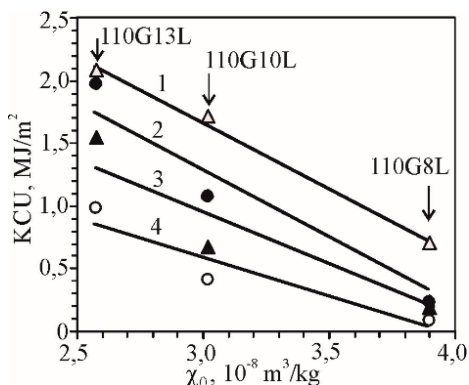
The magnetic state of austenite is characterized by specific paramagnetic susceptibility  $c_0$ , which is determined by the total magnetic moment of a unit mass of austenite under the condition of a unit value of the magnetic field. The parameter  $c_0$  is a complex characteristic of austenite, the state of which was formed as a result of the available chemical elements, phases, mechanical and temperature actions, i.e.  $c_0$  is sensitive to external factors [1].

Hence, it is relevant to investigate the correlation between  $c_0$  of austenite and the mechanical properties of high-manganese steels and will allow us to propose a new method of controlling the mechanical properties of steels with an austenitic structure.

In fig. 1 shows the results of tests conducted on the relationship between impact toughness at low temperatures and the magnetic state of austenite formed before the tests.

As the manganese content increases, the paramagnetic susceptibility  $c_0$  of austenite decreases. Thus, with a decrease in the manganese content, the stability of manganese austenite decreases and the ability to form other intermediate phases appears, which directly affects the mechanical properties.

In order to achieve high impact toughness of manganese steels, it is necessary to obtain the minimum value of the specific paramagnetic susceptibility of austenite  $c_0$  for them (fig. 1).



test temperatures; 1) +20 °C, 2) -20 °C, 3) -40 °C, 4) -60 °C

Figure 1 – Correlation of impact strength KCU at low test temperatures and paramagnetic susceptibility  $\chi_0$  of austenite (formed for mechanical tests) steels 110G8L, 110G10L, 110G13L

The results correlate with KCU studies at room temperatures [2], which confirms the possibility of using the specific paramagnetic susceptibility of the austenite matrix as a parameter for predicting steel properties at low temperatures.

## REFERENCES

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