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О ВОЗМОЖНОСТИ ИСПОЛЬЗОВАНИЯ ПРОВОЛОКИ Св-08ГС ДЛЯ СВАРКИ В СМЕСЯХ НА ОСНОВЕ АРГОНА

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This paper comments briefly on advantages of using gas mixtures based on argon as a shielded gas in comparison with carbon-dioxide and on the possibilities of using wires with a low content of element deoxidizers for welding in gas mixtures.

Currently, there is a need to solve a number of production problems related to the use of welding materials, as an increasing number of companies are beginning to use mixtures based on argon as a shielding gas, while most of welding materials used at this stage of the engineering industry are intended for welding in carbon dioxide. However, in domestic production practice, there is not enough information about the possibilities of using cheaper welding wires with a low content of element deoxidizers for welding in gas mixtures, which would significantly lower the cost of welding consumables.

The advantages of gas mixtures in comparison with carbon dioxide are well known: the best form and appearance of the weld, low spatter and weld metal spraying, reduced labor and welding costs. However, when changing gas mixtures, most enterprises don’t take into account the features of the process and keep using the same modes, welding techniques and consumables, which does not enable taking advantage of the gas mixture in comparison with welding in carbon dioxide.

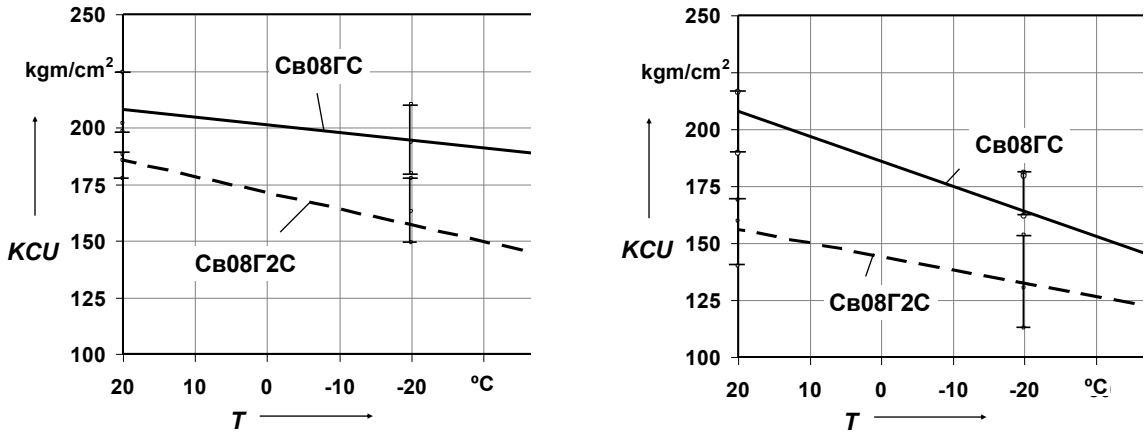
To determine the possibility of using a wire with a low content of element deoxidizers number of experimental research was carried out. As the main criterion for comparison of the mechanical properties of welded joints produced by welding with the use of wires with different chemical composition, the test Charpy impact of the weld metal at different temperatures was chosen.

For this experiment the most common steel St3 thickness of 6 mm was chosen.

Welding was performed in the down position. In order to prevent fluctuation of welding speed and wire depth as well as of other unwanted factors that could affect the objectivity of the obtained results, the welding torch was fixed on the welding tractor. In order to obtain a protective gas mixture of definite composition and to determine the shielding gas flow rate we used a single-station gas mixer. During the experiment, the values of the main parameters of the welding process, such as the wire feed rate, the arc voltage and the welding current, were detected and maintained at a constant level.

During the experiment the mechanical properties of welded joints such as toughness and character of the specimens fracture were determined. For cooling the specimens to low temperatures we used the liquid carbon dioxide. Cooling was conducted in a special chamber. This allowed us to control the precise temperature and to maintain it at a constant level.

In the course of studies we obtained graphic dependences of different ambient temperatures on strength properties of welded joint by using various welding wires. The results show a lower value and a sharp decrease in toughness of welded joints obtained by welding in mixtures based on argon as a shielding gas by using wire-type Св08Г2С in comparison with wire-type Св08ГС (figure 1 a).



a) *b)*

Fig. 1. The results of tests on weld metal Charpy specimens at different temperatures by using traditional type of wire *a)* and wires with a polished surface *b)*

Presumably, the reason for this is an excessive amount of manganese in the wire. It is greater than that required for deoxidation of oxygen in the liquid weld pool. Welding wire of this type is designed for welding in carbon dioxide, where the protective atmosphere of the arc is active and contains a large amount of oxidizing component.

Thus, as for mechanical properties of welded joints, it is most preferably to use a wire Св08ГС in the process of welding in a gas mixture.

Besides, we carried out the tests of welded joints obtained by using wires with a polished surface without copper plating (figure 1 b). These wires are recommended for robotic welding in order to increase the time interval between the clogging and cleaning of the nozzle of the welding torch. The results also demonstrate the benefits of using wire-type Св08ГС for welding in the gas mixture.

It is also important to note that the welded joints obtained by using proposed welding wires with a lower content of element deoxidizers have an area of viscous fiber in the fracture which is significantly larger than that of the specimens ob-

tained by using the traditional type of wire, even at the lowest temperatures of the tests (figure 2).

This suggests that the transformation of weld metal to the brittle state occurs at lower temperatures, which extends the application of such welded joints.

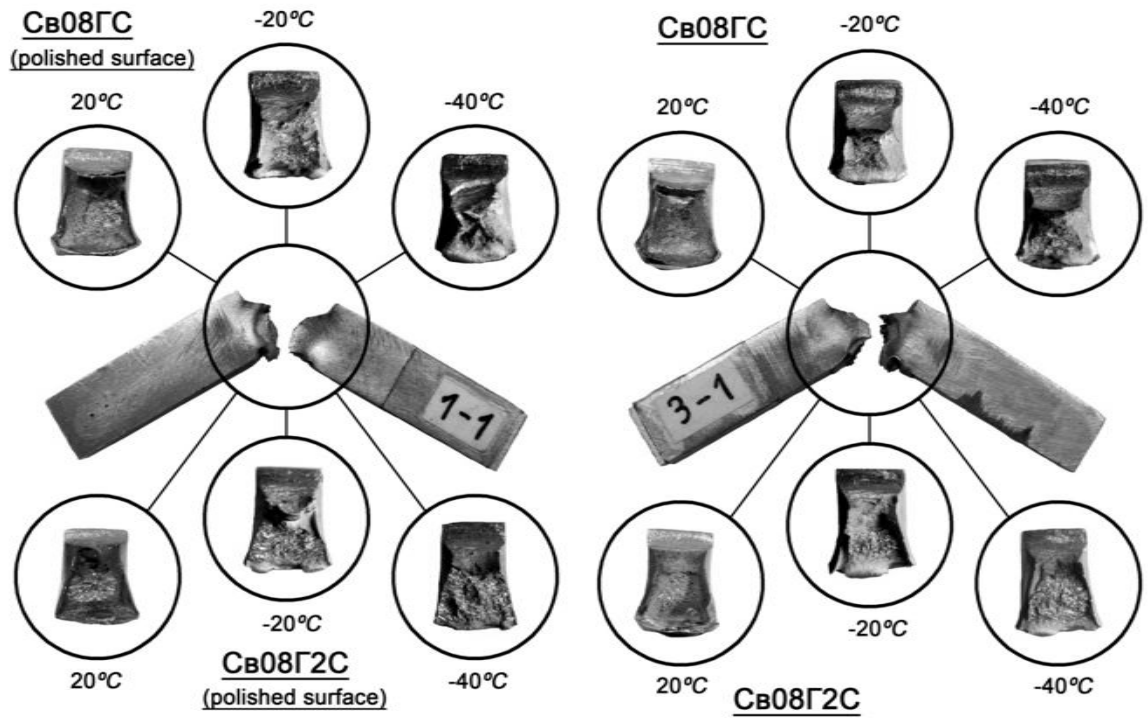


Fig. 2. Fracture of the specimens obtained by welding in argon-based shielding gas mixtures (82%Ar+18%CO_2) with the use of various welding wires at different ambient temperatures

Thus, the experimental research showed that the use of wires with a low content of element deoxidizers by welding in mixtures based of argon not only reduces the cost of welding consumables, but also improves the values of strength properties of welded joints.