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CONSUMABLES (POWDER ELECTRODES) FOR ELECTROSLAG PROCESSES

The work provides examples of industrial applications of electroslag technology that require consumables of varying chemical composition, in particular consumable electrodes.

Options for alloying the deposited metal are considered, and the advantage of using a powder electrode is proven. A design has been proposed

for a powder consumable electrode consisting of a steel box profile (steel 3ps, 3 kp) and a fixing tape (steel 08 kp), which also works as a dispenser for a charge consisting of crushed ferroalloys.

Electroslag ingots with a diameter of 55 mm, obtained using powder electrodes, correspond in chemical composition to steels 20Х13, Х12 and cast iron ЧХ15Г5 and ЧХ16Г3Т. It has been established that the chemical composition of the ingots meets the requirements of the relevant DSTU. There is also a refining effect, as evidenced by the sulfur and phosphorus content.

When examining the electrode ends, you can see from their appearance that at the end of the solid electrode there is only one place of drop formation, located in the center of the end. At the end of the powder electrode, several sources of droplet formation are formed, which are placed along the perimeter of the steel box profile. This ensures uniformity of heat flow and makes the crystallization front flatter.

The work suggests that when ferroalloys with a high melting point are used in powder electrodes, a refinement of the structure (inoculating effect) may occur, which helps to increase the dispersion of the cast structure.

A comparative diagram of the crystallization of electroslag metal using solid and powder consumable electrodes is presented. Crystallization conditions were assessed by crystallization coefficients (CC) and bath shape (CB.S.), calculated from the imprints of metal baths fixed with iron sulfur during electroslag smelting of ingots with a diameter of 80 mm. For a solid electrode, CC = 0.86-0.88; CB.S.=0.32-0.35, and powder electrode CC=0.95-0.98; CB.S.=0.76-0.80. This suggests that during electroslag surfacing with a powder electrode, a shallow metal pool with a flat crystallization front is formed.