PLASMA INJECTOR ON THE BASIS OF DC PLASMA TORCH FOR LOW VOLTAGE POWERFUL AC PLASMA TORCH WITH RAIL ELECTRODES

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The paper deals with the development of a plasma injector based on a direct current plasma torch. The plasma injector is required for arc initiation in a low-voltage high-power plasma generator [1,2,3].

Previously, a high-voltage alternating current plasma torch was used as a plasma injector [4]. The operation principle of a three-phase ac plasma torch with rail electrodes is described in detail in [5]. The main disadvantage of the injector based on the ac plasma torch is the necessity to use high voltage, which greatly complicates the commissioning of a three-phase ac plasma torch with this kind of injector. A number of dc plasma torch designs have been developed for the transition to low voltage and the most promising one has been chosen with an end cathode made of copper-iron alloy and an anode with a ledge, which ensures that the average arc length remains unchanged over a wide range of current and gas flow rates. The erosive properties of the anode and cathode are investigated. Current-voltage diagrams of a dc plasma torch in a wide range of currents and gas flow rates are obtained. The possibility of its operation in the structure of a three-phase ac plasma torch with rail electrodes is shown.

The developed dc plasma torch allowed decreasing the voltage class for a plasma plant to 1000 V. The performed work demonstrates the possibility of replacing a high-voltage injector plasma torch by a dc plasma torch with ensuring the stability of the operation parameters of the whole plasma installation.

References

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