Research and development of an electric arc chamber for a three-phase plasma torch with end electrodes [[1]](#footnote-1)\*)

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Three-phase plasma torches with end electrodes were widely used in special-purpose electro physical installations in the 70-80s of the last century. They had been used as sources of heating a large amount of gas to temperatures of 3000-4000 ºC. These include gas-dynamic lasers, development of channels for MHD generators, blowing the parts of aircrafts. In this case, the lifetime of the plasma torch was of very small importance, since this was not a critical value. In recent years, a number of technologies have been outlined, in which three-phase plasma torches with end electrodes fit well. These technologies include the production of fullerenes, as well as the direct reduction of metals from oxides [1]. The use of three-phase plasma torches in modern technologies requires the debugging of previously developed plasma torch designs [2].

This work is concerned with the study of existing designs of three-phase plasma torches with end electrodes and the development of a new design in relation to the needs of modern technologies.

The main reasons for the failure of the electrode block with ceramic insulation of the electrodes are the failure of structural elements under the effect of arc attachment or the non-uniformity of gas supply in transient operating modes [3-5].

A metal electrode block was developed to eliminate the above-mentioned disadvantages. The tests were carried out at voltage of 800 V. The preliminary studies showed that it was mainly possible to get rid of all these disadvantages. As a result, it was found that moving away from ceramics in the electrode block could significantly increase the lifetime of the plasma torch. However, it is likely that at a higher voltage, it will be necessary to introduce gas protection along the electrode holders and, thus, to increase the voltage class of the installation.

References

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