STUDies OF EXTENDED ELECTRIC ARCS ON MASSIVE ANODES

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The experimental research of the extended (up to 40 cm) electric arcs was been spent in the free aerial atmosphere between graphite electrodes – the rod cathode and massive anodes of various shapes. The active surface of viewed anodes essentially surpassed the active surface of the cathode. The shape of anodes varied from rod (with a hemispherical face surface) to lamellar, cylindrical and funneled. The discharge currents were up to 600 A. Recording of signals of discharge currents and voltages, and touch signals of a voltage of the pyrometer diagnosing temperature of the anode, were been spent by means of analogue-to-digital converter E 20-10. Discharge visualization was carried out by means of video-shot of a motion of a pole of an arc and its basic stains by means of cabinets CASIO EX-F1 and velocity camera Motion Blitz 4000 with frequency of shots to 4000 f/s, and the under load endurance 2.7 micro seconds**.** Recording time is up to 3 s. A color palette of 256 gradations of grey, the size of the image is 140 х 140 pixels at 4000 f/s. The measurements of electrodes erosion depth it was been spent by micrometer indicator ICH 10-2М. So it was been made by a method of filling of an erosive vacuity a plastic material. The accuracy of measurements are to 10 microns.

As a result, of the spent examinations the data about influence of the shape of the anode on structure of the extended discharge and formation of various modes of course of a current is obtained: screw [1–3], multichannel, diffuse, including and in an axial magnetic field [4, 5]. Comparison of erosive firmness of viewed electrodes and electrical resistances of discharge gaps were been spent at different anodes.

References

1. Sinkevich O.A. // Reports of USSR Science Academy. 1985. V. 280. No. 1. p. 99. (in Russian).
2. Ladikov-Roev JU. P, Cheremnyh O. K. Mathematical models of continuous mediums. Kiev: Naukova Dumka, 2010 (in Russian).
3. Kuzmin A.K. Corkscrew instability of an electrical arc: an increment and some performances of the erected state.// PhD dissertation, М: Institute of High Temperatures, 1984 (in Russian).
4. German V.O, Glinov A.P, Golovin A.P, Kozlov P.V.// Prikladnaya Fizika. 2015. No. 5.   
   p. 33 (in Russian).
5. Glinov A.P, Golovin A.P, Shaleev K.V. // Prikladnaya Fizika, 2018, No. 2, p. 21 (in Russian).