

MEASUREMENTS OF ELECTRIC FIELDS AND PLASMA VELOCITIES  
IN THE "BOGEN"

by

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Abstract

Calculations concerning the energy balance in a steady state arc show a relation between temperature and electric power input at a given magnetic field. To confirm this relation experimentally in addition to the arc current, the axial electric field must be known.

The latter was obtained from potential probes being swept across the "Bogen". The results agree with calorimetric measurements of the radial heat loss.

The measurements revealed the existence of radial electric fields up to 200 V/cm, the axial field being only in the order of 3 V/cm. The radial electric field is explained by e.m.f. forces due to a rotation of the arc. This yields azimuthal velocities between  $10^5$  and  $10^6$  cm/sec, confirmed by the Doppler shift of spectral lines. The probe causes an electric perturbation which travels downstream the arc and is noticed as a small drop in the arc voltage. The assumption that the velocity was verified by an additional measurement: A small plasma volume was followed photoelectrically.