

EFFECT OF Cu CONTENT ON THE ELECTRICAL EROSION OF TUNGSTEN COPPER CONTACTS SWITCHING LOAD- CURRENT IN VACUUM

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ABSTRACT

The research into the load-current erosion of tungsten-copper (W-Cu) contact materials in vacuum was continued. Tungsten-copper contacts containing 20, 25, and 30 weight percent (wt%) Cu were evaluated after switching an ac current of 600A for up to 60,000 operations. Unidirectional current switching was also examined by maintaining the contacts at the same polarity for up to 25,000 operations. In the ac switching experiments, in which a contact served as the cathode and the anode alternatively in consecutive operations, build-up spots were again observed on both the W-Cu(20wt%) and the W-Cu(25wt%) contacts. These, however, were very much less pronounced than those previously observed for W-Cu(10wt%) contacts. The surfaces of the W-Cu(30wt%) contacts showed a uniform erosion. It was thus possible to measure an effective erosion rate for the W-Cu contacts used in these experiments. The effective erosion rate was higher as the Cu content of these contacts was increased. In the unidirectional current experiments a rapid build-up of material was again observed on the anode and a corresponding large crater on the cathode. The development of this structure of anode pip and cathode crater is slower for the W-Cu(30wt%) than for the W-Cu(25wt%) and W-Cu(10wt%). These observations are explained in terms of the high cathode erosion rate of Cu and the reluctance of the cathode spots to move away from the initial bridge column arc.

KEYWORDS: Arc erosion, vacuum arc, vacuum interrupters, W-Cu, contacts