

THE INFLUENCE OF ARC CHAMBER WALL MATERIAL ON ARC GAP DIELECTRIC RECOVERY VOLTAGE

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ABSTRACT

The dielectric breakdown strength of an arcing contact gap after current zero was compared when using alumina, polyamide 6/6, and polyoxymethylene arc chamber wall materials. Plasma characteristics were obtained for each material by applying a reverse recovery voltage across the open contacts at a predetermined delay time after current zero. Ablation from each type of chamber wall material produced different plasma compositions each with different recovery voltage, arc voltage, and pressure characteristics. Tests were performed for an arcing current of 12 kA_p for one half-cycle using symmetric AgW contacts. An exponential curve fit to the measured results was used to obtain the initial holdoff voltage and plasma time constant for each material. These values were used in a model to show which material parameters have the greatest effect on recovery. Two types of breakdown mechanisms were identified - thermal and dielectric breakdowns.

Keywords: Arcing contacts, Breakdown, Circuit breaker, High current, Arcing, Gassing walls, Dielectric