

Make Arc Parameters and Subsequent Erosion under 42 VDC in Automotive Area

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Abstract - In our previous papers we have shown that the break arc duration and extinction gap at 14 V, are greatly extended (by one order of magnitude) at 42 V. The transfer and erosion process depends mainly on the contact gap, current and materials. Due to mechanical bouncing at closure, under real switching conditions, additional make arcs occur. In this paper we study the make arc parameters and their subsequent effect on contact material erosion.

Based on the typical profile of bounce in a relay (1 ms of duration and 50 μm height) we have developed a test machine, which can simulate and evaluate erosion and material transfer. It was found that contrary to the 14 V case, the make arc takes place during the total bounce period and the extinction gap is identical to the bounce height. Arc energy is therefore greatly increased and depends mainly on the electrical current and load.

The main action of this arcing is mass transfer from the cathode to the anode at low current and in the opposite direction beyond 15 A. Furthermore, the rating material performances at make arc seems to be reversed at break arc. In fact AgSnO_2 has the best performance at make, whereas it had the worst at break.