Vacuum interrupters equipped with TMF contact system and contact material different from each other; a study under short circuit current conditions and high-speed arc observation during current interruption

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Vacuum interrupters (VI) used within a mechanically driven mechanism, especially with high-level short circuit interruption, are mostly equipped with copper-chromium contact material. For short circuit current and interruption, the contact material is based on the material mixture CuCr-25…50 wt.-% in most cases. Applying a self-generated magnetic field drives the arc to distribute its energy between the contacts or keeps the mode of the arc diffuse at the point of the next current zero.

This study was carried out inside a test set-up using contact material different from each other equipped with a transverse magnetic field (TMF) contact system.

The short circuit current and interruption operation sequence was done in accordance to a defined test program under short circuit current conditions to study its effect on arc movement velocity and behavior with the average speed values between the statistical limits. This paper presents the statistical effect on the development of the arc movement velocity at each chosen contact material via the test sequence.

Using a high-speed digital video camera, we observed these different contact materials during short-circuit interruption arcing. The investigation concentrated on speed and arc movement for different and optimized contact materials: this paper presents the behavior of the arc movement as interaction with contact material and there surfaces from operation to operation at increasing short circuit current within a defined and specified test sequence the same for all the contact pairs. For some selected contact material the contact separation velocity were varied to get further information related to the arc speed and movement behavior.