“Metal Vapour Impact on Ceramic Surfaces of Vacuum Interrupter” After Current Interruption Operations Dielectric Performance and Surface Resistance Measurement: Final principle in practice

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Vacuum Interrupters (VIs) provide a good arc extinction and even after a large number of switching operations they are able to withstand high voltages. Metal vapor that is produced during switching operations due to contact erosion by electric arc, condenses on inner component parts of the VI. Inner ceramic surfaces of the VI are protected by shieldings from being evaporated with metal vapor. In general, these shieldings consist of a floating shield and two end-shields. The gap between these shields is necessary for insulation when the VI is in the open position. During switching operations, metal vapor can reach the inner ceramic surfaces by flowing through these gaps. If a certain degree of condensed metal vapor on the ceramic surfaces is exceeded, the VI can lose its excellent dielectric performance. Previous investigations revealed that switching operations with higher currents lead to thicker evaporation layers on ceramic surfaces.

Standard VIs with an open shield design have been tested. After switching operations with short circuit currents, the coated ceramics were examined. Regarding dielectric performance of the VI, conductivity of coated ceramics plays an import role.

These results were used to build up an equivalent circuit of the VI in order to calculate the influence of different intensities of evaporation on ceramics to the electric field strength inside the VI. The results showed, that with increasing intensity of evaporation a growing field strength at the surface of the end-shields can be observed.