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Thermal Interruption Performance of High Voltage Gas Circuit Breaker Operating with CO_2 Mixtures

Authors : Yacine Babou, Nitesh Ranjan, Branimir Radisavljevic , Martin Seeger, Daniel Over, Torsten Votteler, Bernardo Galletti, Paulo Cristini

Abstract : In the frame of replacement of Sulfur hexafluoride (SF6) gas as insulating and switching medium, diverse alternative gases, offering acceptable Global Warming Potential and fulfilling requirements in terms of heat dissipation, insulation and arc quenching performances are currently investigated for High Voltage Circuit Breaker applications. Among the potential gases, CO_2 seems a promising candidate for replacing SF6, because on one hand it is environmentally friendly, harmless, non-toxic, non-corrosive, non-flammable and on the other hand previous studies have demonstrated its fair interruption capabilities. The present study aims at investigating the performance of CO_2 for the thermal interruption in high voltage self-blast circuit breakers. In particular, the correlation between thermal interruption performance and arc voltage is considered and the effect of the arc-network interaction on the performance is rigorously analyzed. For the considered designs, the thermal interruption was evaluated by varying the slope at current zero (i.e., di/dt) for which the breaker could interrupt. Besides, the characteristics of the post-arc current are examined in detail for various rated voltages and currents. The outcome of these experimental investigations will be reported and analyzed.

Keywords : current zero measurement, high voltage circuit breaker, thermal arc discharge, thermal interruption
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