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# Thermal treatment effect on silicone degradation under electrical stress

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Dealing with electrical flashover problems, silicone is the ideal material used for coating insulators systems to improve their performances. This paper deals with the thermal treatment effect on the ageing phenomenon of silicone coated insulators in service. For this purpose, a physico-chemical experimental study of silicone rubber films thermally treated and untreated is undertaken. At first, accelerated electrical degradation tests were conducted under a growing alternating 50 Hz homogeneous electrical field. A series of surface breakdown is carried out on this polymer, in both its two states to characterize its performances by measuring the dielectric strength El, the capacitor Cx and the loss factor tgδ. The measurements are performed on virgin (Vg), electrically aged, and electrically aged-heat treated samples. In this latter case, the electrical ageing is performed on relaxed sample during 24 hours, after a heat treatment at a temperature T = 100°C during tT =100 hours. Cx and tgδ are measured under a root mean square voltage in the range of 10 V to 110 V with frequencies of 10 Hz to 1100 Hz using the Schering bridge. Then series of chemical analyses, as an infrared spectroscopy and a X-ray diffraction were performed to monitor the degradation at microscopic scale. Electrical and chemical measurements have evidenced the constraints effects on the silicone ageing phenomenon, and a correlation between the different results was established. It has been observed that the electric stress results in the alteration of silicone dielectric properties while the thermal treatment slows down the silicone electrical aging process. Silicone's electrical ageing results from the production of an oxidation mechanism, a phase change (crystalline to amorphous) and a surface alteration due to the discharge occurrence. This results in the decrease in both its dielectric strength and capacity and the increase in loss factor. Heat treatment of short duration has improved the silicone dielectric properties through oxidation process activity decrease under applied electric field stress.

## Biography

N Rouha received the Dipl.-Ing. degree in Electrical Engineering, the Magister degree and the *doctorat d'État* in High Voltage Technology from the Polytechnic High School of Algiers. Before 22 years, she joined the Electrical Engineering Department of University of Béjaïa, Algeria, as a Lecturer and LGEB Research Laboratory as member of discharge research group. Her main research interests include diagnostics, partial discharge measurement, electrical and water trees modeling and monitoring of power cable. She is author/coauthor of many publications and international conferences papers.

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