

Effect of Aging on the Mechanical and Electrical Properties of Ethylene-Propylene Diene/Silicone Blends Used as Outdoor High Voltage Insulators

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Received April 24, 2014; Accepted July 06, 2014

Abstract: The reliability of an insulator depends upon its electrical and mechanical strengths. When insulators are situated in areas where they are exposed to sunlight (UV radiation) and different temperatures, their performance can deteriorate significantly. Ethylene propylene diene /Silicone rubber, EPDM/SIR, blends were utilized in this study as they are widely used nowadays as high voltage outdoors insulators. EPDM, SIR and 75/25, 50/50 and 25/75 EPDM/SIR blends were prepared. All samples were exposed to 500 hours of accelerated UV weathering and thermal aging at 100⁰C for 12 days. The criteria used to evaluate the degree of degradation were tensile test (tensile strength, elongation at break (%), elastic modulus) and electrical properties (dielectric breakdown and flashover voltage). The results showed that EPDM/SIR rubber blends possess the advantages of both EPDM and SIR rubbers. The tensile strength (T.S), and the elongation at break percentage (E %) properties deteriorate upon subjection to aging. The elastic modulus (E-modulus) property, which is an indicator to the elastomer stiffness, is stable against the thermal aging, while improved in case of UV radiation. The dielectric properties of the EPDM/SIR blends were stable when subjected to thermal aging. Blends ratios 75/25 and 50/50 EPDM/SIR possess stable electrical properties toward UV stress than other samples.

Keywords: *silicone rubber, ethylene-propylene diene rubber, insulators, electric breakdown, flashover voltage.*

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