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A1.1 Caractéristiques de vieillissement électrique de plusieurs noirs de carbone de four

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A.1.1 Wet electrical ageing characteristics of various furnace carbon blacks.

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INTRODUCTION

Inorganic contaminants present in furnace carbon blacks used in semiconductive compounds have been reported to contribute to premature degradation of power cable insulation. Most of these reports refer to carbon blacks as they were produced several years ago. Modern furnace carbon blacks have been cleaned to such an extent that these studies may no longer be indicative of the performance of presently-available materials. The role of these impurities on the wet electrical aging of shielding compounds is investigated in a series of laboratory tests. Ten shielding compounds were prepared using consistent mixing procedures with one master polymer formulation containing an ethylene copolymer, antioxidant, crosslinking agent, and carbon black. The selection of carbon black for each compound was varied, representing a range of contamination levels from very low to very high. The compounds were evaluated in a laboratory test, using slabs of crosslinked polyethylene insulation compound, laminated on two opposite faces with the shielding compound under study. The cells were aged for 200, 3500, and 7000 hours at room temperature, with an applied electric stress of 80 Volts/mil (3.1 kV/mm), at 60 Hz frequency. One face of each cell was immersed in distilled, deionized water, while the opposite face was exposed to air. At each aging interval, cells were sectioned and examined for the size distribution and population density of vented water trees. Microchemical analysis methods were used for representative cases to determine the role of selected impurities on the propensity for water treeing. This paper summarizes the experimental results. A brief review of carbon blacks used in semiconductive power cable shielding compounds is also presented.