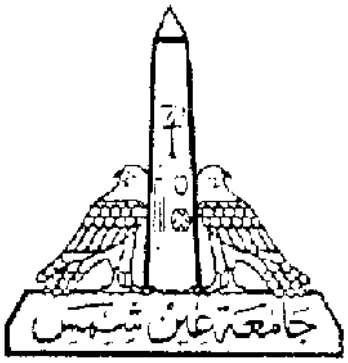

AIN SHAMS UNIVERSITY
FACULTY OF ENGINEERING
ELECTRICAL POWER AND MACHINES DEPT.

Electrical characteristic enhancement for Silicone rubber/EPDM blends as high voltage insulator

A Thesis
Submitted in Partial Fulfillment for the Requirement of the
Degree of Master of Science in Electrical Engineering

By
Amir Alber Youssef Nasif
B.Sc. Electrical Engineering, Ain Shams University, 2005

Supervised By

Prof. Dr. Mahmoud Abd El Hamed

Electrical Power & Machines Dept.
Faculty of Engineering
Ain Shams University

Dr. Loai Saad El-Deen Nasrat

Electrical Power & Machines Dept.
Faculty of Engineering
South Valley University

Dr. Jeannette Nassif Asaad

Polymers & Pigments Dept.
National Research Center

Cairo – 2012

Ain Shams University-Faculty of Engineering
Electrical Power and Machines Dept.

Agreement Report

Student Name: Amir Alber Youssef Nasif
Thesis Title : Electrical characteristic enhancement for Silicone rubber/EPDM blends as high voltage insulator.
Degree Name: Master of Science in Electrical Engineering.

Supervised by

Prof.Dr. Mahmoud Abd El Hamed	:	Electrical Power & Machines Dept. Faculty of Engineering Ain Shams University
Dr. Loai Saad El-Deen Nasrat	:	Electrical Power & Machines Dept. Faculty of Engineering South Valley University
Dr. Jeannette Nassif Asaad	:	Polymers & Pigments Dept. National Research Center

Examiners Committee:

1- Prof.Dr. Mazen Abd-ElSalam	:	Electrical Power & Machines Dept. Faculty of Engineering Assuit University
2- Prof.Dr. Abd-ElRazak Nosseir	:	Electrical Power & Machines Dept. Faculty of Engineering Ain Shams University
3- Prof.Dr. Mahmoud Abd- Hamed	:	Electrical Power & Machines Dept. Faculty of Engineering Ain Shams University
4- Dr. Loai Saad El-Deen Nasrat	:	Electrical Power & Machines Dept. Faculty of Engineering South Valley University

STATEMENT

This dissertation is submitted to Ain Shams University for the degree of Master in Electrical Engineering.

The work included in this thesis was carried out by the author. No part of this thesis has been submitted for a degree or a qualification.

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ABSTRACT

High voltage insulators are essential for the reliable performance of electrical power systems. All insulators regardless their material are exposed to various electrical, mechanical and environmental stresses. The electrical stresses are the consequence of regular voltages and over voltages. The mechanical stress is related to the presence of various loads such as the weight of conductors and wind load. The environmental stresses of prime importance are the many forms of precipitation, UV radiation and pollution.

Polymeric insulators are widely used as outdoor H.V insulators due to their superior service properties in the presence of heavy polluted and wet condition, resistance to vandalism and high dielectric strength voltage.

Polymer insulators particularly those made of Ethylene Propylene Diene Monomer and silicone rubber are increasingly being used today and blending of two polymers is an attractive way to develop a new material combines the best properties of these two materials.

In 1986 the first alloy of silicone rubber /EPDM was prepared. Today the most widely used insulator weather shed materials are silicone rubber /EPDM blends.

In this thesis samples are prepared from Ethylene Propylene Diene Monomer “EPDM” and silicone rubber “SiR” with different percentage.

Five type have been prepared, 100% of EPDM, 100% of SiR, 25% SiR with 75% EPDM, 50% SiR with 50% EPDM and 75% SiR with 25% EPDM. Five samples from the same type with the same concentration are used in each test to check the trueness of the results.

The aim of this work is to study dielectric strength under several conditions, tracking resistance and some of mechanical and thermal properties of SiR/ EPDM blends samples.

The test results shows that increasing proportion of silicone rubber enhance the Tracking resistance, thermal stability and mechanical properties such as tensile strength and elongation at

break whereas increasing weight percentage of EPDM improves the dielectric strength of the blends.

Finally the main points of this work have been summarized and presents, indicating the important of this study as polymer are presently being used worldwide in highly competitive and advance power industry.

It may be recommended to use the blend percentage with 50% SiR and 50% EPDM in the industrial application.

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CHAPTER (2): Review of previous work

CHAPTER (3): Experimental technique and test procedure

LIST OF ABBREVIATIONS

H.V : High Voltage.

O.H.T.L : Overhead Transmission Line.

K V : Kilo Volt.

C.B : Circuit Breaker.

G.I.S : Gas Insulated System.

EPR : Ethylene Propylene Rubber

EPDM : Ethylene Propylene Diene Monomer.

SiR : Silicone rubber.

(RTV) SiR : room temperature vulcanized -silicone rubber

(HTV) SiR : high temperature vulcanized silicone rubber

ATH : Alumina trihydrates

UV : ultra violet

LMW : low molecular weight

LDPE : low density polyethylene

EVA : ethylene vinyl acetate

XLPE : cross linked polyethylene

PP : polypropylene

PA-6 : polyamide-6

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LIST OF FIGURES