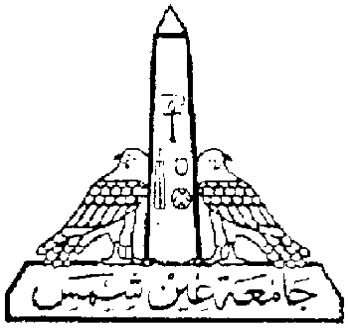

AIN SHAMS UNIVERSITY
FACULTY OF ENGINEERING
ELECTRICAL POWER AND MACHINES DEPT.

INVESTIGATION OF THE ELECTRICAL AND PHYSICAL CHARACTERISTIC FOR ETHYLENE PROPYLENE DIENE MONOMER (EPDM) CABLE TERMINATION

A Thesis
Submitted in partial fulfillment for the requirement of the
Degree of Master of Science in Electrical Engineering

By
Ahmed Ragab Elsayed Mohamed
B.Sc. Electrical Engineering, Zagazig University, 2005

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Agrement Report

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STATEMENT

This thesis 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 another degree or a qualification.

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Ahmed Ragab

Cairo - 2014

ABSTRACT

Polymeric cable terminations are widely used for a variety of electrical applications and are being produced and used in the Arab Republic of Egypt. Polymeric cable terminations find increasing applications in distribution networks. The electrical properties of polymers are strongly influenced by environmentally induced degradation mechanisms.

The present work shows an experimental and analytical investigation to check the suitability of the Ethylene Propylene Diene Monomer (EPDM) cable terminations for use in medium voltage and high voltage networks. This investigation aimed to improve the performance of the EPDM cable terminations that are used in the Egyptian networks in the environmental conditions of the Arab Republic of Egypt.

The effects of salinity caused by the exposure of EPDM terminations near coastal areas and the effects of sand storms were studied. The effect of ultraviolet radiation on EPDM terminations is also investigated. Dry and wet flashover tests were carried out on the EPDM terminations under the effects of the ultraviolet radiation.

Finally, the EPDM terminations were tested after being coated by Silicon grease under the above environmental conditions in order to improve their performance and protect them against weathering conditions.

LIST OF ABBRIVIATIONS

HV	High voltage
UV	Ultraviolet
MV	Medium Voltage
IEC	International Electrotechnical Commission
Cu	Copper
Al	Aluminum
EPDM	Ethylene Propylene Diene Monomer
EPM	Ethylene Propylene Monomer
SiR	Silicon Rubber
kV	Kilovolt
HDPE	High Density Polyethylene
PE	Polyethylene
XLPE	Cross Linked Polyethylene
DMTA	Dynamic Mechanical thermo-analysis
DMA	Dynamic Mechanical analysis
TGA	Thermogravimetric analysis
CB	carbon Black
EPR	Ethylene Propylene Rubber
NR	Natural Rubber
XPS	X-Ray Photoelectron spectroscopy
ENB	Ethylidene-Norbornene
UVA	Ultraviolet Grade A
PVC	Polyvinyl Chloride
TPE	Thermoplast Elastomer
WAXD	Wide Angle X-ray diffraction
DSC	Diffrential Scanning Calorimetry
TG-DTA	Thermogravimetric-Diffrential Thermal Analysis
SEM	Scanning Electron microscopy

UVB	Ultraviolet Grade B
EAP	Early Aging Period
µS/cm	Micro Siemens per centimeter
mS/cm	Mille Siemens per centimeter
UVC	Ultraviolet Grade C
UK	United Kingdom
° C	Degree Celsius
ESDD	Equivalent Salt Deposite Density
NaCl	Sodium chloride
TDS	Total Dissolved Solids

CONTENTS

LIST OF TABLES

LIST OF FIGURES