



**AIN SHAMS UNIVERSITY
FACULTY OF ENGINEERING
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**STUDY AND TESTING OF POLYMERIC CABLE
TERMINATIONS PERFORMANCE UNDER
ARTIFICIAL CONTAMINATION CONDITIONS**

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Engineering

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ABSTRACT

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

The present work comprises an experimental investigation to check the suitability of the polymeric cable terminations. This experimental investigation aimed at assessing the performance of polymeric cable terminations used in the distribution networks in the environmental conditions of Arabic Republic of Egypt.

The effect of ultraviolet radiation on the polymeric insulators was studied. To achieve this objective, dry and wet flashover tests were carried out on cable terminations under the effect of ultraviolet radiation. As well, the effect of salinity caused by the exposure of these terminations near coast areas and the effect of sand storms were studied experimentally and analytically.

Finally, the polymeric cable terminations were tested after being coated by silicone grease in order to improve their performance and protect them against weathering conditions.

Each test was repeated five times on each termination under the same weathering conditions to check the accuracy of the results.

The hydrophobicity of cable termination sheds as affected by the different contamination conditions was studied and classified according to standard specifications and related to the resulting effects on the electrical characteristics.

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LIST OF ABBREVIATIONS

HV	High Voltage
UV	Ultraviolet
MV	Medium Voltage
IEC	International Electrotechnical Commission
IACS	International Annealed Copper Standard
Cu.	Copper
Al.	Aluminum
PE	Polyethylene
XLPE	Cross Linked Polyethylene
TR-XLPE	Tree Retardant Cross Linked Polyethylene
EPR	Ethylene Propylene Rubber
PVC	Polyvinyl Chloride
CSPE	Chlorosulfonated Poly Ethylene
ICEA	Insulated Cable Engineers Association
AEIC	Association of Edison Illuminating Companies
ANSI	American National Standards Institute
IEEE	Institute of Electrical and Electronics Engineers
kV	Kilovolt
ESDD	Equivalent Salt Deposit Density
mg/cm ²	Milligram per square centimeter
SiR	Silicone Rubber
LMW	Low Molecular Weight
EPM	Ethylene Propylene Monomer
EPDM	Ethylene Propylene Diene Monomer
g/m ³	Gram per cubic meter
TPE	Thermoplastic Elastomer
UVA	Ultraviolet A
W/m ²	Watt per square meter
°C	Degree Celsius
SEM	Scanning Electron Microscopy
μS/cm	Micro Siemens per centimeter
UVC	Ultraviolet C
EAP	Early Aging Period
UVB	Ultraviolet B
mg/l	Milligram per liter

TDS	Total Dissolved Solids
SCT	Screen Copper Tape
SCW	Screen Copper Wire
STRI	Swedish Transmission Research Institute
HC	Hydrophobicity Class

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