JICABLE'07
Rapporteur's Session Report

C.7.1 SESSION : INSULATION AND AGEING

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This session, which includes twenty poster presentations, shows that ageing of insulations, particularly in wet conditions, is always an important item.

C 7.1.1 concerns the development of a bipolar model of transport intended to describe the behaviour of PE under DC stress. Simulation has been developed with the purpose of giving outputs directly comparable with experimental data using the Pulsed Electro Acoustic technique

C 7.1.2 describes a research project to develop condition assessment techniques for water treeing in MV XLPE cables, and so to have a better correlation of the results with the laboratory and fields measurements.

C 7.1.3 compares the conductivity of PE and XLPE. The conductivity of PR with antioxydant remains lower than the basic resin in all the range of fields studied.

C 7.1.4 studies the effect of annealing on conductivity of XLPE insulation, which shows an increase at 90 °C in a first step, due to the presence of by-products, and decreases after 20 days annealing. At 50 °C, the conductivity decreases after a long annealing time.

C 7.1.5 describes the effect of the dielectric strength test on dielectric properties of a PVC insulation

The authors of C 7.1.6 establish a correlation between perforation test results of 3 MV cables and the behaviour in PEA measurements and IR spectroscopy.

C 7.1.7 presents results for water treeing studies based on a water needle test method. The results show that water needle test method exhibits the same ranking for the different materials a seen in model cable test. The new enhanced copolymer XLPE shows superior performance.

C 7.1.8 analyses the influence of PE crosslinking on the water tree growing. The crosslinking, by irradiation or peroxyde, decreases the number of initiated trees.

C 7.1.9 examines the stress induced electrochemical degradation causing growth of vented trees from the conductor screen. The quality of the internal screen can have a significative impact.
After a review of commercial WTR XLPE, C 7.1.10 presents exploratory work to identify antioxydants that have a positive effect on the WTR effect of XLPE.

C 7.1.11 proposes new methods to investigate water trees distribution in MV insulation

The C 7.1.12 paper propose a space charge measurement in wet ageing insulation in order to elaborate a non destructive methodology to estimate the treeing degree of a cable.

C 7.1.13 shows the example of an high voltage heating cable for oil transport in offshore applications. The cable works in water, and bow tie trees are initiated rapidly. But no significant vented trees growth is observed, even after 2 years..

The paper C 7.1.14 propose simple modification to electrical test procedures to make it able to adress more detailed discrimination.

In C 7.1.15, the relation between electrical ageing of XLPE and its molecular characteristics is examined. It is shown that XLPE cable ageing directly depends of the breaking of C-C bonds.

The aim of C 7.1.16 is to build a non empirical kinetic model for the life time of electrical cable insulation exposed at low dose rates at room temperature. This approach is possible for stabilized matrices, in introducing the stabilisation reactions into the model.

A numerical procedure is presented in C 7.1.17 which is intended to be used as an analytical method for the description of the life volume for electrical equipment, on the basis of experimental data yield by several diagnostic measurements on multistress aged XLPE cables.

C 7.1.18 presents a new approach to understand the gamma radiation ageing of polymer materials used in cables. At low doses, the EPDM material is crosslinked, and degrades at higher doses. A filler can strongly influence the results.

In C 7.1.19, a great diversity of cables coming from the Belgian MV distribution network is studied on ageing behaviour. Space charge measurements, DSC, IR are performed and the results confirm the influence of the couple insulation-semiconductor.

C 7.1.20 uses analytical methods to investigate break down mechanism of MV power cable joint.