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Discharge current method.

A test procedure for plastic-insulated medium-voltage cables

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Abstract

The diagnostic method for medium voltage cables based on the method of discharge current is an integral measurement technique. The non-linear correlation between charging voltage and discharge current is a criterion for the state of ageing of the dielectric. The results we have to hand show that degradations in the insulating material can only be noticed at higher charging voltage. Mechanisms of polarisation and conduction need a minimum energy in order to be activated and to contribute to diagnosis. For the examined PE-cable the deterioration can be noticed from a charging voltage of $U_c \geq 15kV$ up, in the range of 1.0 - 1.5 U_0 .

Résumé

La méthode diagnostique pour des câbles moyenne tension basée sur la méthode de courant de décharge est une technique de mesure intégrale. La corrélation curviligne entre le voltage de charge et le courant de décharge est un critère pour le vieillissement du diélectrique. Les résultats que nous avons ici montrent qu'un vieillissement n'apparaît qu'à un voltage de charge plus haut. Les mécanismes de polarisation et de conduction ont besoin d'un minimum d'énergie pour être activés et pour contribuer au diagnostic. Pour le câble polyéthylène on remarque une détérioration dès un voltage de charge de $U_{ch} \geq 15kV$ entre 1.0 - 1.5 U_0 .

General

Fig.1 shows the principal possibilities to assess the quality of insulating materials. Using voltage tests the insulating material is exposed to a prescribed testing field strength. If the remaining electrical field strength is lower than the testing field strength a breakdown occurs. In order to get more information about the insulating material diagnostic methods can be used additionally to assess the quality of the insulation. Investigations of conduction and polarisation effects in insulating materials are

able to give further information about dielectric properties and ageing processes.

As a consequence the criterion of assessing a cable get much more differentiated for the diagnostic method reckons the state of ageing of a cable and can give assessment about remaining lifetime.

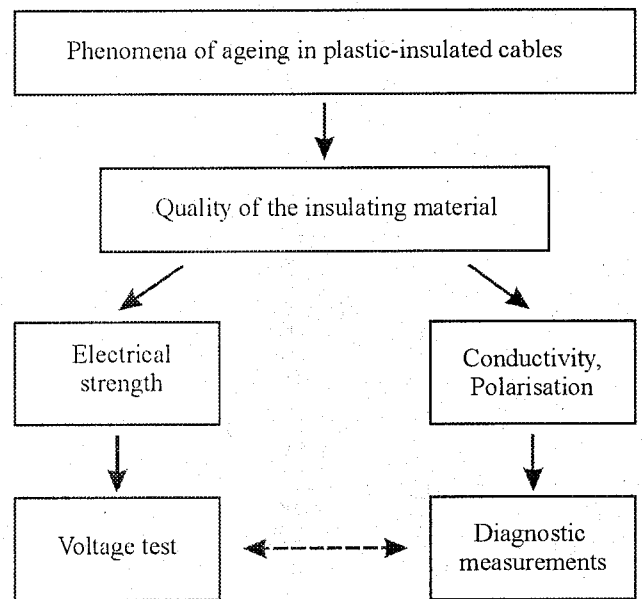


fig.1: Principal possibilities to assess the dielectric properties of insulating materials

Fig.2 gives a brief survey of test procedures for plastic-insulated cables. It shows the different kind of voltage test procedures and diagnostic test procedures being known at present. Diagnostic test procedures can be split up into methods in frequency and time domain and shall not be discussed any further.