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D.3.4. Détection de décharges partielles hautes fréquences dans les accessoires de câbles extrudés HT

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Résumé

A KEMA, on a utilisé une nouvelle technique de mesure à haute fréquence pour détecter les décharges partielles dans les câbles et accessoires isolés au plastique. Pour des câbles utilisés avec blindage de terre à structure hélicoïdale des fils individuels, on peut détecter des décharges à l'aide d'une bobine (inductive), tandis que pour des câbles avec blindage de terre en métal solide, la détection s'observe par une interruption. Des expériences réalisées dans le laboratoire ont prouvé que cette technique permet de localiser très précisément les décharges. De plus, les seules connexions à effectuer pour mesurer les décharges se situent du côté terre du système. Donc, à l'encontre de la mesure traditionnelle, aucun accouplement capacitif n'est requis entre la haute tension et le circuit de détection. D'autre part, ce système convient idéalement au diagnostic d'accessoires. Des mesures étendues dans le champ ont prouvé que cette technique donne des résultats cohérents pour le diagnostic d'accessoires.

D.3.4. HF partial discharge detection of HV extruded cable accessories

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Abstract

At KEMA, a new high frequency measuring technique is used to detect partial discharges in plastic insulated cables and accessories. For cables applied with a helically structured earth screen of individual wires, discharges can be detected by means of a coil (inductive), while for cable applied with a solid metal earth screen, discharges can be detected by means of an interruption. Experiments performed in the laboratory have shown that with this technique it is possible to locate the discharges very accurately. Moreover, the only connections to be made to measure discharges are on the earthed side of the system; so, contrary to the traditional discharge measurement system, no capacitive coupling between the high-voltage and the detection circuit is necessary. Furthermore, this system is very suitable for diagnosing purposes of accessories. Extensive field measurements have shown that using this technique for diagnosing accessories coherent results are obtained.

Introduction

In cables or cable accessories, partial discharges may occur which could lead to breakdown. Certain discharges can maintain for very long periods before causing a complete failure of the system. Such discharges mainly occur in accessories at the interface of different materials (e.g. PE and silicone rubber). It is very important to detect these discharges in an early stage, so there is a need for discharge detection mainly focused on accessories.

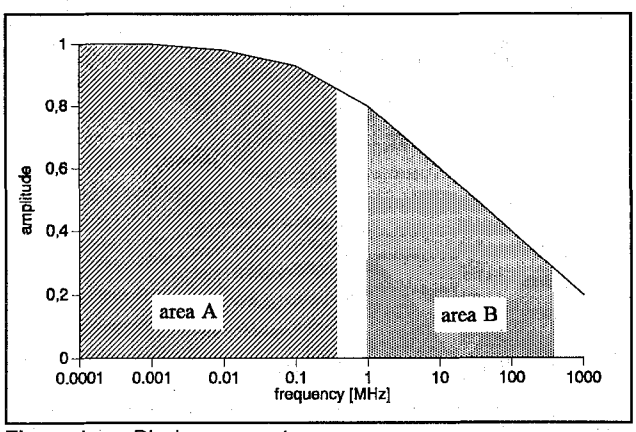

Figure 1 Discharge spectrum

The conventional way of electrical discharge detection at-site (bandwidth < 1 MHz, see Figure 1, area A) has several disadvantages, one of these is the significant noise level, and is therefore done rarely.
An alternative is the acoustic discharge detection. The advantage is clear, no firm electric connection to the cable or accessory is needed and the measuring system is simple. However, an important disadvantage is that not all discharges can be detected, especially smaller discharges or larger discharges acoustically hidden within the system are difficult to find.

On the basis of existing knowledge and some new ideas, KEMA has developed a new measuring technique. It is called high frequency partial discharge measurement; this technique is an alternative for low frequency partial discharge measurements and acoustic measurements.
This way of detection is very suitable for short cable lengths (in the laboratory) or accessories (at-site) and can be used for diagnosing purposes.
The new method is based on the high frequency characteristics of a discharge pulse. Because the noise level is relatively low in the upper frequency band, this method is ideally suited for unshielded measurements, i.e. at-site measurements, on cable accessories.

For NUON, one of the Dutch utilities, KEMA twice measured a certain set of terminations applied in their 150 kV grid. The general results of these measurements will be discussed in this paper.