

**B5.4****MV Cable maintenance, practices and results**

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**Résumé**

L'auteur décrit une méthode diagnostique à très basse fréquence (VLF – Very Low Frequency) appropriée tant pour la maintenance basée sur les événements (EBM – Events Based Maintenance) que pour la maintenance basée sur l'état (CBM – Condition Based Maintenance). La méthode est basée sur la sélection adéquate des circuits câblés pour lesquels il convient d'établir une diagnose, sur des prises de mesures, sur la localisation de décharges partielles et sur la connaissance de règles, qui permettront de convertir les résultats des mesures diagnostiques en une recommandation appropriée (diagnose) concernant l'état du circuit câblé. Des indisponibilités imprévues pourront ainsi être réduites ainsi que des frais, en raison du remplacement en temps dû d'éléments vulnérables du circuit, et ce avant une panne proprement dite. L'auteur décrit des expériences, fournit des résultats et des exemples d'économies de frais.

**Introduction**

Cost-effective operation of a MV network is very important nowadays. Condition dependant maintenance is one of the keys to realise this. Well-known maintenance strategies are EBM and CBM (Events Based Maintenance, respectively Condition Based Maintenance). Such maintenance strategies often use diagnostic tools in order to predict future failures in carefully selected circuits that form the backbone of the network and/or supply major customers. For CBM, the general condition of the network is also important to know. Applying cable diagnostics will save money by exchanging potential breakdown sites by sound cable sections or accessories.

The VLF Partial Discharge measurement and localisation system is the diagnostic system for this purpose. This system is in operation since 1994. Many cable circuits all over the world have been diagnosed since then. The principle of this system is that weak spots will be detected and located and presented in a discharge map of the circuit. The consequent inspection of replaced cable sections and accessories has led to a continuing improvement of the knowledge rules, used for transferring the measurement results into

**Abstract**

The Very Low Frequency (VLF) diagnostic method is described supporting both Events Based Maintenance (EBM) as well Condition Based Maintenance (CBM). The method is based on the proper selection of cable circuits to be diagnosed, on measurements and localisation of partial discharges and on knowledge rules to be able to transfer the diagnostic measurement results to a proper recommendation (diagnose) regarding the condition of the cable circuit. Unscheduled non-availability will be reduced and costs will be saved because of early replacement of weak spots in circuits before failure. Experiences, results and examples of cost savings are given.

recommendations. These rules are also based on operational and laying conditions (if available).

The results of 5 years of diagnostic measurements and services show a very good performance. The network operator will save money and have available a network with a better availability than before.

**Maintenance strategies**

Availability of a distribution network is a critical success factor for network operators. A high availability with a minimum of costs is one of their goals. Regarding cable circuits in the network, the maintenance strategy can be based on events (Events Based Maintenance) or on the actual condition (Condition Based Maintenance).

**Events Based Maintenance (EBM)** In the EBM option, action is taken after a failure of a cable circuit. Repair will result in taking back the cable circuit into operation. Short-term costs are obvious, but the long-term costs are unpredictable and can be even very high.

The next part in EBM can be to diagnose circuits with the same (critical) components as in the