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MV partial discharge cable diagnostics as part of CBM: Yes or No? Comparison and examples of utility applications

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Since 1994 the 0,1 Hz cable diagnostic method is applied. At first the objective of users (electric utilities) was mainly to diagnose cables with a bad reputation. Later on their objective was often focused on CBM on power cable systems. Originally the use was mainly focused on single cable sections. Criteria for distinction between real bad spots, bad spots and up-coming bad spots were developed and checked by means of visual inspection of replaced parts. Knowledge rules per component were developed. A lot of (positive) experience was built up.

As CBM became applicable on cable networks too, a strategy was developed in close co-operation with electric utilities to focus diagnosis on those sections with the best financial benefit. After determination by a utility of the objectives for CBM on power cables, specific criteria for selection of cable sections to be diagnosed have to be developed. After testing, the analysis has to indicate clear actions to be taken: replace on a short time notice, replace within one year, testing again after 1-2 years or no action needed. These actions are based on knowledge rules developed on a "learning by doing" base. Networks of different utilities have different operating conditions, construction and types of components used. When using CBM on power cables, visual inspections of replaced bad parts will contribute to the improvement of the knowledge rules applied. Evaluation of results are part of the "control loop" to be able to direct systematically CBM on power cables to the objectives stated. Experiences in Europe and outside Europe show that the costs/benefit analysis (financial) of CBM, related to the objectives stated, gives a positive financial result.

Most publications on this subject show success stories only. However, there are also doubts about the usefulness of PD diagnostic testing. Expectations for positive results may be very high and then disappointment may be near. There are various items that make a PD diagnostic test effective or not. Those items are both on the side of the diagnostic test as on the side of the network owner. The various PD diagnostic methods, although all having their own special features and area's of applicability, hardly influence the usefulness of PD diagnostic testing as part of CBM on power cable systems. It is mainly the experience of test engineers, the availability of good and well-proven knowledge rules, the accuracy of circuit data available and the co-operation between the testing people on one hand and the network-owner on the other hand that are decisive.

Examples of utility applications show the usefulness, such as from REMU, a utility in the Netherlands. They focus on the cost/benefit analysis and on the method for selection of cable sections to be diagnosed. Results of diagnostic measurements of several utilities show the different aspects of diagnostic testing and its effectiveness as part of CBM: Yes or No?