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Analysis of PD source locations in mixed insulated cable circuits

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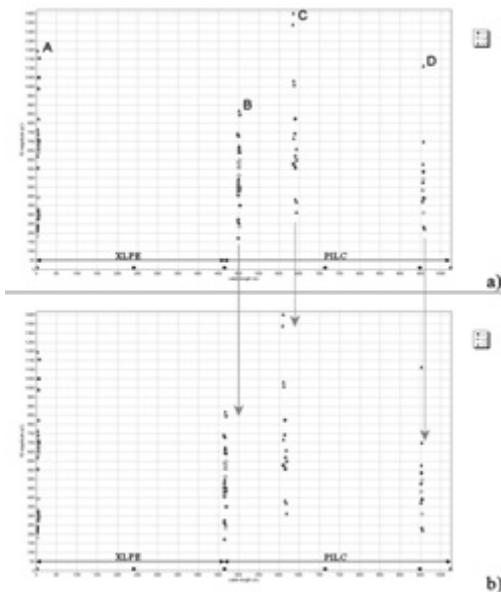
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In the distribution power cable network, more and more power cable circuits consist of cable parts with different types of insulation, due to the general transition from paper/oil insulated cable to polymeric insulated cable. Repairs, replacements and detours of multiple metres of cable, result in the introduction of polymeric insulation in the existing paper insulated lead cable (PILC) circuits.

For PD location purposes, the mixed insulated cable circuits may result in misinterpretation of the measurement analysis. Due to the applied materials and constructions, the propagation velocities of HF signals may be different for the various cable parts in a circuit. Using the standard location technique, with the calibrated velocity (averaged velocity for a mixed cable circuit), dislocations of the analysed PD sources occur which may be several percent of the total cable circuit length. Therefore, mixed insulated power cables need a different location approach as compared to single insulation power cables.

The figure shows an example of the dislocations that may occur in a mixed insulated cable circuit using standard location techniques. Dependent on the combination of applied lengths and materials, the location errors can be up to several percent of the total cable length.

In this paper, the background of the misinterpretation in the localisation is described, together with the errors that may occur. Furthermore, correct location analysis for PD diagnostics of mixed insulated cables are represented with a practical example to show the differences in the location techniques.



Practical example of the PD location error in a mixed insulated power cable circuit:
a. PD mapping analysed according to single cable localisation technique;
b. PD mapping analysed according to mixed insulated cable localisation technique.