Identification of cable local thermal stress with time domain reflectometry.

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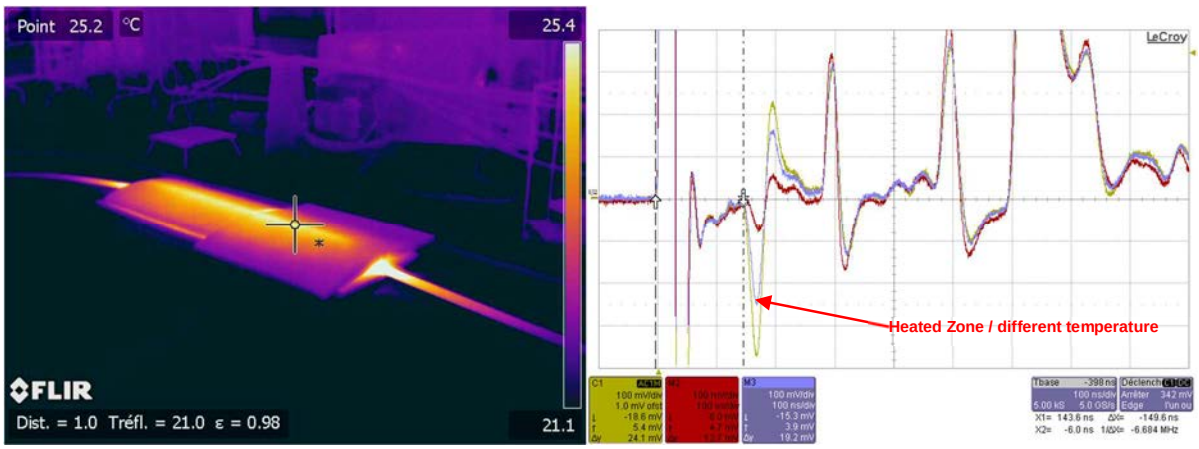
Studies on insulation resistance decrease that have been observed on certain single core MV PVC insulated cable showed a behavior closely related to the thermal history of the cables. Ageing test showed that, even after a long period of application, steady constraints led to very low evolution of the resistivity. As considered cables are operated in very stable condition, no preventive replacement is needed.

Nevertheless, as cable insulation characteristics appeared very thermo sensitive, the very unlikely hypothesis of a local thermal constraint had been considered. So, possibility for identifying such a constraint applied with onsite electrical measurements had been studied and results are presented in this paper.

Lab test were performed on single core MV cable removed from network after more than 20 years of operation. Samples on cables with low values of resistivity were focused.



Experiments showed that local constraint could be identified by time domain reflectometry (TDR). Then the physical reason have to be clearly defined in order to precise the relation between high frequency electrical characteristics versus thermal constraint.

Results of dielectric spectroscopy characterization of thermal behavior had been analyzed in order to identify the main physical parameter involved. Then, impedance changes detected by TDR had been most likely attributed to differential radial dilation.

EMTP simulation showed that reflected signal amplitude could be very important even very small geometrical changes occurs as a consequence of differential dilatation.

Dielectric spectroscopy characterization is used to model thermal dependence of electrical characteristics on a large frequency range. First results are presented.

Works have to be completed in order to define accurate decision criteria for a non destructive control method but industrial application foreseen to identify thermal constraint is presented.

Results are also usefully applied to explain impedance change observed in PD measurements.