
A.1.6.

Real Time Monitoring of Power Cables by Fiberoptic Technologies Tests, Applications and Outlook

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The change in operating conditions of HV underground cable links has led many utilities to consider on-line and/or off-line temperature monitoring via optical fibers. The availability of optical fibers installed along a cable link allows for measurements, in real time, of the temperature distribution along the cable, using distributed temperature sensing (DTS).

Optical fibers can be integrated in several ways into a cable design:

- integration of the fibers in the cable (in the conductor or under the sheath)
- by laying of an optical cable along side the cable (in close proximity to the power cable)

The relative merits of these approaches will be discussed in this paper.

In particular, this paper will describe the test program and results obtained on a 400 kV test installation. The cable loop is made up of multiple laying configurations (duct, direct buried, controlled backfill, etc.) and different deployment of the optical fibers (within the extruded cable and alongside the cable).

During load testing, the DTS measuring system was linked to a rating program which afforded an assessment, in real time, of the allowable ampacity of the cable link as a function of the measured temperatures and applied loads. Simulation of different operating scenarios (steady-state, transient overloading) was performed and the resulting ampacities evaluated.

The paper will provide a summary of the results obtained and discuss the outlook for the application of such monitoring technologies.