

Effective on-site testing and non-destructive diagnosis of new installed and service aged (E) HV power cables up to 230kV

Edward **GULSKI** (1), Rogier **JONGEN** (1), Jarosław **PARCIAK** (2), Rafael **MINASSIAN** (3), Alexandra **RAKOWSKA** (4), Krzysztof **SIODLA** (4)

1 onsite hv solutions ag, Luzern, Switzerland, e.gulski@onsitehv.com, r.jongen@onsitehv.com

2 onsite hv solutions Central Europe Sp. Z o. o. Warsaw, Poland, j.parciak@onsitehv.com

3 onsite hv solutions Americas Inc, Toronto, Canada, r.minassian@onsitehv.com

4 Poznan University of Technology, Poznan, Poland, aleksandra.rakowska@put.poznan.pl, krzysztof.siodla@put.poznan.pl

It is known, that an insulation failure of a power cable can occur as a result of the normal operational voltage or during a transient voltage due to lightning or switching surges. Most failures occur as a result of localized electrical stresses that are higher than the dielectric strength of the dielectric materials in the area of the localized stress or if the bulk dielectric material degrades to the point where it cannot withstand the applied voltage. To find this defect (result of poor installation or heavy service conditions) prior to a failure, on-site tests are applied to assess the quality and cable system integrity as well as the availability and reliability of the cable circuit.

Modern on-site testing and diagnosis of power cables up to 230kV consists of voltage withstand testing, partial discharge detection and dissipation factor measurements. Since last 14 years more and more the use of damped AC (DAC) energizing is getting worldwide attention for

1. after-laying testing of newly installed cable systems, see figure 1 as well as
2. maintenance and diagnostic testing of cable systems in operation

which are fundamental for the reliable operation of underground power distribution and transmission networks.

Having in mind the existing IEEE 400 and new up-coming IEEE 400.4 *Guide for Field-Testing of Shielded Power Cable Systems Rated 5kV and Above with Damped Alternating Current Voltage (DAC)* under balloting for the use of DAC testing in this paper different international practical applications of damped AC voltages and testing procedures for on-site testing and diagnosis of underground power cables up to 230kV will be discussed based on general considerations and practical examples.



Figure 1: Example of a DAC after-laying test of a 6.4 km long 110kV XLPE cable circuit.