# NOVEL METHOD FOR ON-SITE TESTING AND DIAGNOSIS OF TRANSMISSION CABELS UP TO 250KV

Paul P. SEITZ, Seitz Instruments AG, (Switzerland), pps@seitz-instruments.ch
Ben QUAK, Seitz Instruments AG, (Switzerland), bq@seitz-instruments.ch
Edward GULSKI, Delft University of Technology, (The Netherlands), e.gulski@tudelft.nl
Johan J SMIT, Delft University of Technology, (The Netherlands), j.j.smit@tudelft.nl
Piotr CICHECKI, Delft University of Technology, (The Netherlands), p.cichecki@tudelft.nl
Frank de VRIES, NUON Tecno, (The Netherlands), frank.de.vries@nuon.com
Frank PETZOLD, SebaKMT, (Germany), petzold.f@sebadyn.de

## ABSTRACT

*For complete on-site diagnosis of transmission power cables up to 220kV by partial discharge detection and dielectric losses measurement it is necessary to energize the disconnected cable system. One of the methods available for this purpose is based on applying damped AC voltages up to 250kV. In this paper, the use of modern technological solutions in power electronics and signal processing as well as in technical design and production methods will be discussed on the basis of ultra light system (300kg) which is able to test cables up to 20km lengths.*

## KEYWORDS

HV power cables, on-site energizing, DAC, partial discharges, dielectric losses

## INTRODUCTION

Condition assessment of HV cables is one of the issues of asset management in power utility business. In particular, due to the importance of HV cables in the transmission network is the knowledge about the initial condition during after-laying as well as the actual condition of HV power cable sections during operation after several years of service of great importance.
With regard to partial discharge (PD) processes and dielectric degradation processes in transmission power cables there is still a need for advanced, sensitive and economical attractive tools suitable for non-destructive PD diagnosis on-site: the after-laying testing as well as the service diagnosis [1, 2].
For complete on-site diagnosis of transmission power cables by PD detection and dielectric losses measurement it is necessary to energize the disconnected cable system. In order to decrease the capacitive power demands for energizing cables as compared to 50Hz test voltages, different energizing methods have been developed in the past. One of the methods available for this purpose is based on applying damped AC voltages [3, 4]. In particular, in the last 8 years [5, 6] the worldwide acceptance of this method has already demonstrated that in the case of power cables up to 40kV by means of advanced PD diagnosis the identification of high-risk cable circuits in the network can be achieved and implemented in utility asset management decision processes.
In this contribution, based on 4 years [7] of utility experiences and laboratory investigations a novel method

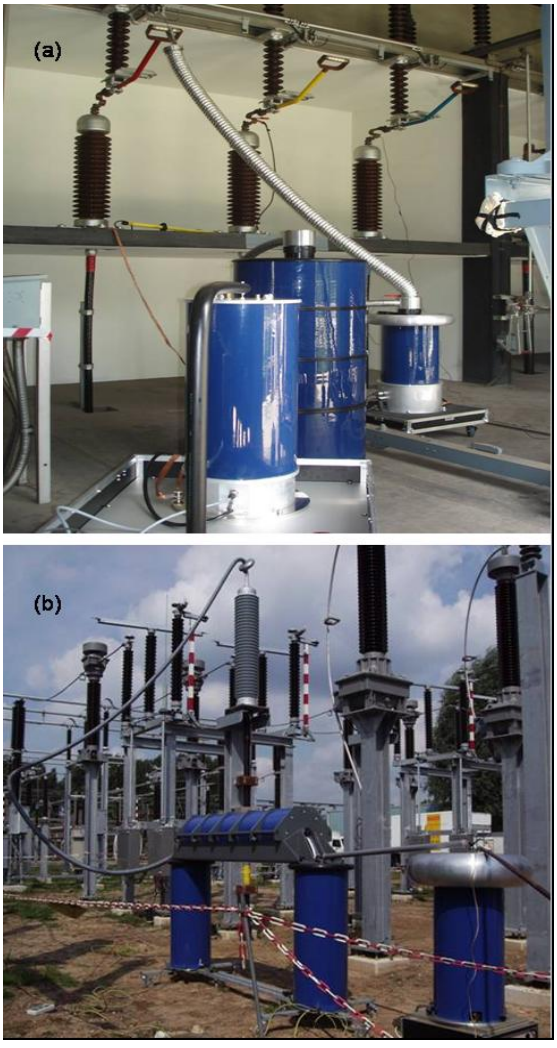


**Figure 1: Examples of on-site testing and diagnosis of HV power cables:**
**a) OWTS HV150 system testing at 23Hz damped AC voltage frequency a 12.4km long 66kV oil-filled cable,**
**b) OWTS 250 system testing at 71Hz damped AC voltage frequency a 2km long oil-filled 150kV cable**

for diagnosis of PD and dielectric losses of transmission power cables using damped AC voltages up to 250kV will be presented. To generate on-site damped AC voltages up to