A NEW APPROACH FOR TESTING LONG HV AND UHV CABLES

Peter **MOHAUPT**; Tobias **MEHL**
Mohaupt High Voltage GmbH, 6142 Mieders, Austria,
peter.mohaupt@mohaupt-hv.com; tobias.mehl@mohaupt-hv.com

ABSTRACT

The paper describes a new kind of test system for testing HV and UHV cables. Output voltages up to 400 kV at capacities up to some 10 µF are possible.

The benefit of this testing technology called DRT (Differential Resonance Technology) is to reduce the system weight and dimension. This reduction results in easier and less engineering intensive handling and therefore in lower operational cost.

Furthermore the same test system can be used for DC testing having a charging current of above 10 A. In addition to the charging also a controlled discharging at the same current is possible.

Fig. 1: DRT test system 200kV, 1µF

KEYWORDS

Cable testing; on-site Testing; VLF; very low frequency; variable frequency resonant test system; testing of sea cables; DRT

AUTHOR NAMES & AFFILIATIONS

Peter MOHAUPT; Tobias MEHL
Mohaupt High Voltage GmbH, 6142 Mieders, Austria
peter.mohaupt@mohaupt-hv.com,
tobias.mehl@mohaupt-hv.com

INTRODUCTION

A trend to longer cable lengths in the HV and UHV range for land- and submarine cables can be noticed. This results in an increasing demand for testing longer lengths and therefore higher capacitive loads.

Furthermore a continuous trend for HVDC applications and a subsequent need of testing HVDC cables is observed.

The existing test equipment comes to its limits regarding the maximum test voltages and/or capacities. Further expansion of this equipment leads to enormous effort in space, engineering and cost. As a result, innovative testing solutions are required to make on-site and routine testing for AC and DC cables available and efficient.

For routine testing of AC and DC cables the existing resonant test systems (for long lengths instead of fix frequency, variable frequency test systems are being used) reach their limit, as the maximum transportable weight per unit is at approx. 40t. Only the combination of several of the 40t trailers enables the testing of long HV and UHC cables systems. This restriction restrains the actual and upcoming testing demands of cable manufacturers and operators.

Furthermore more light weighted equipment, easier to handle and operate needs to be available for on-site testing. The parallel connection of test trailers for UHV cables of longs lengths not only is a logistical challenge but is also an enormous engineering effort to prepare and perform the test. A reduction in size and weight of the test equipment will make testing onsite more efficient and reduces the required resources in preparation and conduction of the test.

For DC on-site testing, the existing rectifiers with charging currents in the mA-range require charging times of hours. A controlled discharging is usually not foreseen at all.

This paper describes a new approach for test equipment, providing AC test voltages in the range from 100kV to 400kV (higher voltages are foreseen for the future development) at testing frequencies in the range from 0,1 Hz up to 10Hz. Furthermore the same equipment can be used for DC test voltages up to 600kV and charging (and discharging) currents up to 10A.

The benefit of this new type of equipment is that it overcomes existing testing limits. The system weight and dimension are strongly reduced compared existing test equipment. The combination of AC and DC testing in one unit simplifies the testing setup. Testing in the mentioned frequency range opens a variety of advantages in voltage testing and diagnostic tests (partial discharge measurement as well low frequency dissipation factor measurement) /7/.

The system components, their functionality and testing performance and first measurements are presented.

The output voltage is a pure sinusoidal voltage with a frequency in the range from 0,1Hz up to 5…10Hz. The voltage shape is in line with IEC 60060-1 /1/ and IEC 60060-3 /2/ /3/. The given voltage values are understood as rms (equal to peak/√2) if not otherwise mentioned.