Challenges when Factory Testing Cable Segments for a 3800 km 525-kV-DC Submarine Cable Project

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Abstract

As a result of the energy transition, energy has to be transmitted further and further, especially through sub sea links. The only appropriate solution for this is using DC cables. As part of the Xlink large-scale project, which will connect Great Britain to Morocco with a submarine cable route around mainland Europe, cable links over 3800 km in length are being built. The project is currently being prepared. The aim is to use as few field joints as possible to minimize the risk of faults. To date, AC testing has proven the best way to test the factory joints of DC cables quickly and reliably.

This article describes how screen currents, frequency or losses can be minimized to facilitate AC testing of the longest possible cable segments without the cable drum overheating and the cable becoming damaged. It describes how the test system works, as well as the key criteria for optimum design. Furthermore, it considers the question of the maximum length of this specific cable type that can be tested with max. 450 kV AC based on what we know today.

The paper also describes the challenge of DC testing the cable segments. Solutions must be found for charging and discharging to avoid unnecessary overloading of the cable.

1 The Resonance Principle

The series resonance principle to generate high test voltages in high-capacity test specimens is sufficiently well known and established that some fundamental principles are no longer considered when it is applied.

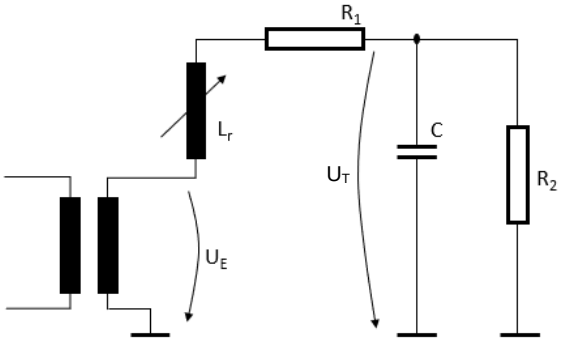

Figure 1: Equivalent circuit diagram of a resonance test circuit