Expanding the performance of on site testing with frequency tuned resonant test systems

Sadettin **ERDENIZ**, Kemal **GÜRSOY**; EMELEC Electrical Engineering &Trading PLC, Istanbul, Turkey, sadettin.erdeniz@emelec.com.tr, kemal.gursoy@emelec.com.tr

Peter **MOHAUPT**, Ina **FRANJIC;** Mohaupt High Voltage, Mieders, Austria, peter.mohaupt@mohaupt-hv.com, ina.franjic@mohaupt-hv.com

ABSTRACT

The necessity of after laying tests of long HV and EHV cable line becomes more and more obvious. Equipment for the testing of long lengths HV or EHV cable can become bulky and logistically challenging. This paper introduces the new trend to use a frequency tuned resonant test system operating at a frequency of the test voltage of 10Hz. This approach enables either much more light weighted equipment or the possibility of testing much longer lengths compared to existing testing solutions of same type. The outlines of the test equipment, its practicability and first onsite experience are described.

KEYWORDS

Low frequencies, cable testing, reactor, resonant test system, coreless design

Figure 1. Reactors test assembly onsite in 4P connection

BASIC OF RESONANT CIRCUIT

A resonant circuit is an electric circuit consisting of an inductor, represented by the letter L, and a capacitor, represented by the letter C, connected together.

An LC circuit, oscillating at its natural resonant frequency, can store electrical energy. A capacitor stores energy in the electric field (*E*) between its plates, depending on the voltage across it, and an inductor stores energy in its magnetic field (*B*), depending on the current through it. Resonance occurs when an LC circuit is driven from an external source at a frequency ω at which the inductive and capacitive reactances are equal in magnitude. The frequency at which this equality holds for the particular circuit is called the resonant frequency. The resonant frequency of the LC circuit is:

$$\omega = \frac{1}{\sqrt{LC}} \quad [1]$$

The equivalent frequency in Hertz is:

$$f = \frac{1}{2\pi\sqrt{LC}} \quad [2]$$