1. Testing

After the entire cable system has been established, the sheath is tested for damage. This is done by applying a 10 kV direct current for 5 minutes to the sheath. If the cable shield can achieve a voltage of 10 kV in relation to earth without any current passing, then there are no holes in the cable sheath.

Principle. Figure 55. Photos nos. 115 and 116

Finally, the cables are tested with high voltage. This test is carried out on all 400 kV cables. The test voltage is 392 kV in relation to earth. The test lasts one hour per cable.

In order to achieve a sufficiently high test voltage, the cable which is being tested becomes a capacitor in an LC oscillating circuit. The corresponding inductance is introduced in the circuit using two reactors connected in series. The resonance frequency is solely determined by inductance and capacitance in the circuit and can thus be decided in advance. A generator supplies the necessary energy to the circuit. The circuit consists of two frequency converters, two transformers, two reactors as well as the high-voltage cable. The two frequency converters each feed into a transformer. The two transformers are connected in series and connected to two reactors which are also connected in series. The voltage which is generated along the cable (the capacitor) depends on the frequency. By varying the frequency, the resonance curve of the circuit is obtained. The maximum voltage is achieved at the resonance point. This can be adjusted by using the frequency converter. In the resonance circuit, the energy “splashes” backwards and forwards between the cable and the reactors. The input power is only the energy which is necessary to compensate for the loss in equipment and the cable.

Diagram showing principle for testing equipment. Figure 56

The limit for the testing equipment’s capacity was reached at a cable length of 7,500 metres.