EARTTHING SYSTEM EVALUATION AND INFLUENCE ON PROTECTION PERFORMANCE IN RESONANTLY EARTHED MV NETWORKS

In Zagreb distribution area, Petersen coils are installed in five 110/10(20) kV substations.

An overview of the procedure implemented before putting Petersen coils in operation is given, with emphasis on the earthing system evaluation and protection testing.

All data are given for two distribution areas in which Peterson coils have been recently installed. In these substations high capacitive short circuit currents of 186 A and 114 A were measured with an increasing trend (7-10 A per year), and therefore resonant earthing with Petersen coils of 3603 kVA and 5000 kVA was proposed.

Extended field measurements of earthing systems were conducted on the randomly chosen 55 / 46 distribution substations 10/0.4 kV. Croatia adopted the standard HD 637 S1 “Power installations exceeding 1 kV”. An earthing resistance higher than 2.5 Ohm was measured in 12 out of 55 substations in area A, and in the 10 out of 46 substations in area B. According to obligatory safety measures, earthing systems that have higher than allowed resistance values have to be reconstructed before putting the Peterson coil in operation.

Resonance characteristics of the healthy network should be recorded.

In resonantly earthed MV networks, the probability for development of double earth faults at the weak points in the network is increased.

Protection testing should be conducted for the cases of the single phase earth fault on the busbar in the substation and in the cases of the single phase earth fault in some distant point in the network (direct earth fault; over_resistance of 4 kOhms; _intermitted earth fault).

The Wattmetric protection is the predominantly used method for resonantly earthed MV networks. Wattmetric protection can function properly only in case of an earth fault resistance up to 2-3 kOhm. Therefore, additional protection methods could be used such as transient earth fault procedure.