

Maintenance Management for Risk Reduction of High Voltage Transformer

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Abstract

Power transformer is one of significant electrical equipments in power system. As it has high acquisition cost and failure consequences to the network, its proper maintenance task should be planned effectively. Nowadays, risk-based maintenance of power transformer in substation has played a critical role increasingly. The maintenance management is recommended by combining two evaluations: transformer condition and transformer importance. The condition evaluation is performed by electrical and insulating oil testing with their associated limitation to classify into good, suspect and poor condition. The importance evaluation is performed by load criticality, system stability, failure possibility, and failure consequence with three levels of low, moderate and high impacts. Score and weighting techniques are utilized in the analysis. The risk matrix is then developed by these two evaluations with nine zones of recommended maintenance actions for the power transformers in order to reduce the risk. A number of power transformers installed in 115 kV and 230 kV transmission systems are selected for the risk evaluation due to available and qualified data. The sample power transformer with rating of 230 kV, 200 MVA is presented as an example with its test results. Finally, the proposed method can be applied with the fleet of power transformers and other high voltage equipments in the network.

Keywords : Power transformer, Condition-based maintenance, Importance evaluation, Risk-based maintenance

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