

New Methods of Dissolved Gas Analysis Diagnosis For Oil-Immersed Power Transformers

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Abstract

A transformer is one of the most important electrical equipment of electric power system, which must have stable and reliable energy. Since a fault in a transformer can have a huge repercussion when failures occur, and as the number of old transformers that are difficult to operate in overload conditions is on the rise, it is important to detect incipient faults in a transformer and prevent failures.

Dissolved gas analysis(DGA) is one of the major maintenance tools for monitoring faults in high-voltage electrical equipment in service and identifying the faults inside transformers. IEEE Guide C57.104 and IEC Publication 60599 recommend several DGA diagnostic methods. However, the task of DGA interpretation is not easy because they often can provide unresolved diagnoses and wrong diagnoses. Therefore, it is necessary to develop new gas ratio methods that have higher accuracy and more reliable diagnoses.

This paper proposes new three advanced DGA diagnostic methods to classify six types of faults specified in IEEE Guide C57.104 and IEC Publication 60599. The one is a gas ratio method. In order to improve diagnosis accuracy of the gas ratio method, 5 combustible gas (H_2 , CH_4 , C_2H_2 , C_2H_4 and C_2H_6) components indicated in the standards can be organized into 10 gas ratios and optimum 6 gas ratios of them are selected to classify faults. Then they are reorganized into 15 gas ratio combinations and 3 gas ratio combinations of them are selected to clearly classify all types of faults. The others are % gas methods. The one is that 4 % gas($\%H_2$, $\%CH_4$, $\%C_2H_2$, $\%C_2H_4$) values are used to classify 6 type of fault in the diagnosis square. The other is that 2 of 4 % gas values are used to 6 type of fault in the each diagnosis triangle. From the results, we confirmed the diagnostic methods proposed in this paper are more accurate and reliable than existing gas-ratio methods.